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The National System of Innovation in Morocco: an empirical review

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Abstract: *Until the early 2000s, Morocco did not have a real national innovation system (SNI) based on a dynamic technology policy open to the productive sector. The system dedicated to scientific research was indeed characterized by the lack of resources, the heterogeneity of the elements that made it up, a lack of coordination between its different bodies and the lack of synergy between scientific research (Academia) and companies. The purpose of this paper is to examine the trajectory of Morocco's National System of Innovation and to analyze the ambivalence that drives it. On the one hand, we seek to highlight the efforts made by the actors to strengthen the system by intensifying systemic interactions a priori between them and, on the other hand, we try to identify the shortcomings and obstacles that handicap its dynamism and draw some lessons.*
Our analysis shows that hampered by institutional and structural obstacles: - this system remains largely centralized and underfunded, also, the productive sector is insensitive to innovation and therefore not equipped to absorb knowledge, adapt it and developing new ones, - the educational system suffers from several handicaps, one of which is its inability to produce new knowledge, - relations between actors are limited and episodic, - there is no real institutional complementarity between the actors and between plans and initiatives at the national level, - the persistence of social and mental factors that turn their backs on innovation, risk-taking and merit .
National System of Innovation, Moroccan case, institutional and structural obstacles, Strategies and Policies.

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I. Introduction

Until the early 2000s, Morocco did not have a real national innovation system (SNI) based on a dynamic science and technology policy open to the productive sector. The system dedicated to scientific research was indeed marked by the lack of resources, the heterogeneity of the elements that made it up, a lack of coordination between its different bodies and the lack of synergy between scientific research and companies. Studies carried out by the Department of Scientific Research within the Ministry of Higher Education for the preparation of the five-year plan (2000-2004) revealed a certain number of handicaps (Bouoiyour, 2003):- adequate management and administration of research, -low resources allocated to scientific research (0.3% to 0.4% of GDP),- a virtual absence of link between scientific research and the productive sector. This gap is reflected in the absence of mechanisms and structures for the promotion of research coupled with a lack of incentives, especially tax incentives, to encourage R & D in the private sector, - insufficient support measures for research, which results in the scarcity of scientific and technical information, the lack of media for editing, difficulties in ensuring the maintenance of scientific equipment and a lack of research allowances for doctoral students.

In the same line, Mezouaghi (2002) points out that in the Maghreb countries the difficulties in setting up an SNI reside in the lack of interest of university professors in research. The exceptional increase in the number of students in university settings has the effect of crowding out scientific research activities in favor of those of education and supervision which are in fact cut off from the productive sector. On the other hand, the insufficiency of large industrial groups leads to the isolation of the production units, on the one hand from research centers and, on the other hand, from suppliers and customers, thus depriving them of feedback effects on the technological learning process. Bouoiyour (2003), however, nuances his point and emphasizes that even if this observation remains valid, the Moroccan authorities have become aware of the importance of scientific and technical research. They have thus changed their position by deploying numerous efforts to bring out and consolidate a dynamic NIS as evidenced by the efforts made in terms of strengthening research within the academic institutions, the rapprochement between universities and companies, the implementation of new incentives, the launch of many industrial plans, etc. The purpose of this paper is to examine the trajectory of Morocco's NIS and to report on the ambivalence that drives it. On the one hand, we seek to highlight the efforts

made by the actors to strengthen the system by intensifying systemic interactions a priori between them and, on the other hand, we try to identify the shortcomings and obstacles that handicap its dynamism and draw some lessons.

The plan is the following. The first part is devoted to the theoretical foundations of the SNI. Special attention is given to Lundvall's broader approach, which seems better suited to examine the NIS of developing countries. The second part aims at identifying the main institutional actors of this system. The third part is divided into two parts. It begins with the efforts of these actors to strengthen and revitalize the NIS, attempts to pinpoint the density of the relationships that unite them, and presents the coordination and incentive mechanisms undertaken to consolidate it. Then, it brings elements of lighting which relate to the insufficiencies, the dysfunctions and the institutional and structural obstacles which slow down and weaken the development of the SNI of Morocco.

II. The Theoretical foundations of the SNI

Originally, the notion of the National System of Innovation (SNI) was developed by Freeman (1987), Lundvall (1992) and Nelson (1993) in order to determine the springs underlying the dynamics of SNI. This concept incorporates systemic and institutional elements that determine the dynamics of innovation in a given national space, especially those of developed countries. The common starting point for this research is that we must move away from the conception of innovation as an individual decision-making process independent of its institutional environment (Amable and Petit, 2003). As such, SNI is "a network of institutions in the public and private sectors and the activities and interactions that initiate, import, modify and disseminate new technologies" (Freeman, 1988). In this framework, the use of this notion covers various attempts to incorporate institutional elements into the economic analysis of technical change and its consequences for the long-term economic performance of nations. The dynamic generated by innovation thus refers to systemic elements that, within a country, determine policies and scientific and technical directions focused on learning that drain different flows: financial, social, informational, legal and politics ... (Niosi et al., 1992, Casadella, Benlahcen-Tlemcani, 2006).

This dynamic is based on three pillars (Hakimi, 2010). On the one hand, economic decisions are based on institutional foundations. The different institutional structures give rise to differences in the economic behaviors and in the performances to which these behaviors lead. On the other hand, the competitive advantage of the nations is consolidated on the specialization of the economies. Corporate competitiveness and industrial specialization play a key role in national trajectories at this level. Finally, technological knowledge results from interactive learning, which gives rise to distinct "knowledge bases" depending on the agents. These bases condition the possibilities of innovation. Innovation therefore involves interactions and mutual influences between various stakeholders and their environment.

The latter is made up of a set of actors, formal and informal rules, modes of coordination, forms of organization and institutions that are part of processes of interactive learning and adaptation to the national context. (Lazaric, 2010), but above all they allow the capacity of these actors to absorb and adapt technologies coming from universities, research centers ... at home and abroad, and therefore are able to assimilate, use and adapt existing knowledge. and to develop new knowledge, which gives learning a key role (Cohen, Levinthal, 1990, Kim, 1997). Thus, the observable differences between the SNI of some developed countries (USA, France, Germany, Japan ...) result from differences in the institutional structures specific to each of them (pace of technical change, type of innovation (radical or incremental).), sectoral specialization, role of the State, importance of public procurement, importance of the defense sector ...).

These structures therefore give rise to differences in the economic behavior of firms, regions and nations (Guellec 1999, Amable and Petit 2002, Tabatoni 2004, Foray 2009).

Lundvall's (1992) approach is distinguished by taking into account two acceptances of this notion. The first favors a restricted design of the SNI. It focuses attention on scientific and technical institutions, both private and public, and looks at their modes of association or cooperation. The definition adopted by the OECD (1994) goes in this direction: the SNI is "an interactive system of private and public enterprises, universities and interacting government agencies focused on scientific and technological production in a national territory. The interaction of units may be technological, commercial, legal, social and financial, as long as the purpose of the unit is to develop, protect, finance or regulate new science and technology activities. " . Thus, companies, government agencies, independent laboratories and universities are taken into consideration. Their interactions are part of modes of association that essentially revolve around basic research, applied research and research and development. They crystallize a body of knowledge necessary for the development of new, reproducible, and therefore marketable products or processes, and the development of means to reproduce them (Morvan, 1991).

This type of approach uses a set of micro, meso and macroeconomic indicators (R & D expenditure as a% of GDP, business R & D expenditure as a% of turnover, and scientific staff share of the active population) to prove the vitality of R & D and to make international comparisons (Guellec 1999, Maâninou 2010). The issue of public policy is therefore reduced to the sphere of science and technology. The production of knowledge

therefore becomes a specific function, held by certain actors, engineers and research laboratories in the first place (Amadaoud, 2017). The underlying idea is that in developed countries, R & D is old and routine (see Table 1) or, if you prefer, innovation is a learning-oriented meta-routine in these countries. and the resolution of cognitive problems (Nelson, Winter, 1982, Maâninou, 2016). In short, universities, companies and research laboratories are the main actors.

Pay special attention to the role of training and education, the impact of the financial system on the dynamics and diffusion of innovations, the importance of protecting intellectual property, the Technological transfers and individual and collective learning ... Thus, as Amable and Petit put it (2002), the limited conception of the SNI is not the only possibility. Another approach broadens all the relevant institutions in a more or less ad hoc way: if innovation is an accumulation of knowledge, the training system as a whole must be an important element of the NIS, if companies see their innovative investments financially constrained, the financial system must play a role in the NIS ... The boundaries of the SNIs in the broad sense are therefore mobile. With this in mind, the SNI are human and sociotechnical systems governed by several factors - cultural, socio-political, technological, educational ... - which influence the level and pace of innovation in different countries, frame interactions between actors by changing mentalities, and define the environment of innovation behaviors and the mechanisms of incentives and disincentives (Tabatoni, 2004). One of the major axes of this conception is the place of learning and the ability to absorb knowledge, which implies, among other things, quality education, dynamic companies in R & D, and sustained interactions between actors. . In these circumstances, it is difficult to transpose the restricted concept in developing countries, and the mistake would be to want to copy developed countries (Bouoyiour, 2003) or, to say it with Haudeville (2010), Foray (2010), there is no universal path or magic solution.

The broader approach therefore seems better suited to try to examine the NIS of developing countries because it does not focus only on the techno-economic factors, but integrates other factors and questions the obstacles or the brakes that disable these SNI. In this context, it takes into consideration the education system and the capacity of developing countries to absorb and produce knowledge, the size of the domestic market, the characteristics of the labor market, sector specializations, the role of financial institutions, mode of international integration ... In fact, the actors as well as the types of institutions are numerous. The following table gives us an idea.

III. Morocco's SNI: institutional actors

The institutional organization of scientific and technical research is based in Morocco on the contribution of two types of actors: vertical and horizontal (see diagram). As far as the vertical players are concerned, it is, on the one hand, the Hassan II Academy of Science and Technology which contributes to the promotion of scientific research and makes proposals on this subject for the development of the scientific policy through the launching, financing and evaluation of research programs and, on the other hand, of the State and its various components.

Also, from the point of view of the implementation of the science policy, it is the Ministry of National Education, Higher Education, Training of Managers and Scientific Research which has the load. This ministry is in charge of both the follow-up and the execution of the decisions and governmental orientations taken by the permanent interministerial committee of the scientific research, and the coordination between the academic operators of the research and the public establishments of R & D. At the national level, other vertical actors intervene, namely the Ministry of Industry and Commerce as well as the OMPIC (Moroccan Office of Industrial and Commercial Property).

On another level, horizontal actors intervene. These are universities, institutions that do not belong to universities (Institutes for Training in Health Careers, Higher Normal Schools ....), Those intended for post-graduate vocational training (OFPPT) and structures specific to private higher education. With regard to public universities, the role of certain institutes, among which the IURS (the University Institute of Scientific Research) and the CNRST (National Center for Scientific and Technical Research (ex Center National Coordination and Planning of Scientific and Technical Research) To these actors, we must add public and private companies, as well as foundations and other associations that aim to promote innovation.

IV. The trajectory of the SNI of Morocco: a promising dynamism ...

To This dynamism is reflected in many efforts to consolidate the SNI. These efforts are part of a context marked by numerous institutional, educational, economic and social reforms, the purpose of which is to lay the Moroccan economy on a more solid footing. These reforms have materialized through a series of privatization and deregulation operations, further integration into the dynamics of globalization through the signing of many free trade agreements (with the EU, the US, etc.), the launch of numerous sector-specific strategic orientations to strengthen the industrial fabric (Emergence Plan launched in 2005, National Plan for Industrial Emergence 2009-2015, and Industrial Acceleration Plan 2014-2020), the establishment of

infrastructure and Incentive mechanisms to attract the maximum FDI and thus benefit from technology transfer, not to mention other initiatives and plans (Moukawalati for the creation of a company launched in 2006, Morocco Green for Agriculture launched in 2008 , Plan Numeric 2013, Renewable Energy Plan 2020, etc.) with the background of the search for strong and sustainable growth. These different plans integrate, directly or indirectly, the desire to strengthen R & D and build bridges between academia and business.

At the macroeconomic level, the share of expenditure allocated to R & D is increasing: 0.34% of GDP in 2006, 0.73% in 2010, 0.8% in 2013, with the prospect of reaching 1% in 2016. As shown in the following table, the distribution of these expenditures did not show any significant changes insofar as the State continues to occupy the first place with almost 70% in 2010, compared with just under 30% for private enterprises (Aissaoui, 2015)

Table 1: Distribution of R & D Expenditures by Sources of Finance (2006)

Sources de financement	Dépenses totales (en MDH)	%
Budget de l'Etat	2721,61	73
Partenariat public-public	19,31	1
Partenariat public-privé	23,99	1
Entreprises	809,21	22
Coopération	95,96	3
Total	3670,08	100

Source : Attouch, Nia, 2011

Then, in terms of protection of intellectual property, there is significant effort. Indeed, since 1997, the OMPIC has been the subject of a series of reforms to strengthen its missions, that is to say to comply, in terms of property rights, with international standards , to roll back counterfeiting ... This office promotes a better promotion and dissemination of information on patents. In fact, the new legislation is less "lax": it gives a precise definition of patentable inventions, provides for a procedure of prior examination of the form and, in certain substantive aspects, determines the rights and obligations of the patentee, defines the counterfeits and its sanctions, provides for a preventive border control ..., which is the opposite of the old regulation in which any new invention was patentable, regardless of the concrete nature of the industrial result (Abdellaoui, 2003). In the wake, the year 2012 marks the creation of the Moroccan Academy Intellectual and Commercial Property. Its missions are multiple: to provide training in the field of intellectual property, to promote and protect property rights ... (OMPIC, 2012) (see Table 4).

Table 2: Patent Application Breakdown by Origin of Applicants

Nature du déposant	2012	2013	2014	2015	2016
Université	58	138	152	109	131
Centre de recherche	16	25	32	31	24
Personne physique	96	96	127	70	64
Total	196	315	353	224	237

Source : OMPIC, 2016

Note: for the year 2016, the top 5 applicants of Moroccan origin are: Mohammed V Rabat University leads with 53 applications for deposits, followed by the UIR with 40, then the Mascir Foundation with 24, followed by the University Hassan II Casablanca with 9, finally the Polytechnic School of Agadir Universiapolis with 5.

In addition, higher education has been the subject of a series of reforms whose main lines are (El Aoufi, 2012):

- establishment of university-business interface units with the task of identifying research needs in companies, to make known the research potential of university laboratories and to allow the promotion of technological development;

-creation of a new type of partnership such as the public interest grouping between training and research institutions and public or private companies;

-creation of business incubators located in or near universities and research centers whose mission is both to help create innovative businesses and to give universities more links strong with businesses through technology transfer;

- Establishment of networks of technological diffusion which are networks of skills able to approach the company, to detect its needs in leveling through the realization of pre-industrial diagnostics;

-creation of industrial engineering networks focused on training, pre-audit ... in order to meet the needs of companies in terms of technological diffusion and service provision;

-validation of staff dedicated to R & D through the mobility of researchers to businesses.

In this context, the mission of the CNRST is strengthened and multiplies, so it aims to identify priority options and define the lines of research. Its mission is thus in the plural: - coordination of research, - planning, - scientific and technical cooperation, - and promotion of research and exploitation of results. This center has several laboratories (geophysics, microbiology and molecular biology, renewable energy technologies and economics, etc.). Since 2005, it has a technological platform called Technical Support Units for Scientific Research. These units cover several areas (chemistry, materials, life science ...). This structure makes it possible to generate knowledge to invest in promising research and technological development areas such as the environment, agri-food, health, energy ... (see tables 5 and 6).

Table 3: Distribution of Research Structures by Disciplinary Domain

Discipline	Nombre	%
Sciences exactes	456	39
Sciences de la vie	193	17
Sciences de la terre	82	7
Sciences de l'ingénieur	106	9
Sciences humaines et sociales	323	28
Total	1160	100

Source : El Aoufi, 2012

Table 4: Public Scientific and Technical Research Establishments, (2008-2009)

Institution	Effectif
CNRST	154
Centre National de l'Energie, des Sciences et Techniques Nucléaires	230
Centre de Développement des Energies Renouvelables	143
Centre Royal de Télédétection Spatiale	41
Laboratoire Public d'Essais et d'Etudes	1035
Office National des Hydrocarbures et des Mines	462
Institut National d'Hygiène	286
Institut Pasteur du Maroc	250
Institut National de Recherche Agronomique	1295
Institut National de Recherche Halieutique	224
Centre de Recherche et d'Expérimentations Forestières	182
Centre d'Etudes et de Recherches Démographiques	12
Institut Royal de la Culture Amazigh	38
Total	4352

Source : Attouch, Nia, 2011

In addition, the CNRST has other units and services such as:

-The National Institute of Scientific and Technical Information whose mission is to collect such information, national and international, and make it available to researchers, - the barometer of scientific production that produces statistical indicators on research scientific, - a service dedicated to the electronic publishing of Moroccan and foreign scientific journals -etc. This same center also establishes relationships with researchers from the Moroccan diaspora and finances projects in specialized fields such as computer security, aeronautics or the automobile.

For their part, private universities come into play and give a boost to the efforts devoted to R & D (Djeflat, 2012). Among these actors, the International University of Rabat (UIR) is committed to actively participate in scientific and technical research through the establishment of structures that cover many areas: renewable energy, ICT, aeronautics , electronics, automotive ... The arrival of these universities is likely to encourage the return of Moroccan scientists from abroad, and thus to take advantage of their experience and the opportunities offered by their presence on Moroccan soil to constitute dynamic research networks open to the world of business. Moroccan scientists participate in the creation of numerous associations to promote R & D activities. This is the case with the association Savoir et développement, which works, among other things, to promote scientific and technical transfer to Morocco and to create a database of Moroccan skills abroad, or R & D Morocco which Its mission is to promote R & D in private companies thanks to several actions: awareness-raising, organization of conferences, study tours and company visits, proposals to put in place incentive mechanisms and funding channels, building bridges between researchers and companies ...

29% d'entre elles ont déclaré avoir participé aux travaux de R & D, contre 42% en 2004.

A survey on the Economic, Social and Environmental Council (2014), there were almost twice: between 2009 and 2010 and on a sample of 300 companies, of which 23% were declared to have a research and development activity. Djeflat (2012), especially the SME, whose business is in the agri-food, textile-clothing, leather, electronic banking or industrial transformation part. In this project, the Office Cherifien des Phosphates (OCP) launched, in 2011, the Fund for Agricultural Innovation for Innovation and Entrepreneurship in

Agriculture and Agro-Industry (Faucheux, Nicolai, 2017). As for the relations between companies and the academic world, the last years of the launch of projects, the people likely to boost the scientific and technical research, as well as the creation of a research center in the field of electronic purchases at the School Mohammedia of Engineers of Rabat. It is a partnership between Mohammed V-Agdal University and ST Microelectronics. This example is not isolated. Indeed, thanks to the Moroccan Network Incubation and Spinning (RMIE), other projects are launched outside (see Table 7).

Table 5: Examples of projects supported by the RMIE

Projet	Incubateur
Système de détection de la pollution marine	MA-IN Marrakech
AGMAR-Valorisation des algues rouges par « agar-agar »	MA-IN Marrakech
Valorisation de résidus miniers en vue de préparer des concentrés marchands	CIAEI-ENIM
Création d'une entreprise de fabrication d'anticorps monoclonaux et polyclonaux	CIT-EMI
Production, transformation des huiles essentielles pour le commerce équitable et valorisation des eaux florales	MA-IN Marrakech
Planétarium	Technopark-Casablanca
INNOVA, développement logiciel	INPT-Rabat
Jeux mécaniques pour la vulgarisation des mathématiques	Ibn Zohr Agadir
Chariots réfrigérateurs mobiles à énergie solaire « Hout Bladi »	CIT-EMI

Source : Attouch, Nia, 2011

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V. But Thwarted By Inadequacies And Blockages

It should now be sought to identify what, in terms of R & D and innovation, El Mouhoub (2011) refers to the barriers to entry for developing countries, especially Morocco, to consolidate their NIS . With this in mind, El Aoufi (2012) and Aissaoui (2015) identify a number of institutional weaknesses and rigidities:

-the share of R & D expenditure in GDP is less than 1%, it is far from the target of 3% set by the EU countries to claim to build a knowledge economy;

-knowledge production suffers from many handicaps, as Moroccan universities still largely limit themselves to the role of conservation of knowledge through their transmission through the activities of education.

In fact, scientific production remains not only timid, but regresses. In this regard, the number of scientific and technical articles published by Moroccan researchers increased from 466 in 2000 to 386 in 2011, against 1016 for Tunisia and 2515 for Egypt (year 2011). In the same vein, the rate of supervision has deteriorated in Moroccan universities, all disciplines combined, rising, in 2007, from 29 students per teacher-researcher to 45 in 2012.

This is explained by a much faster increase number of students relative to the number of teacher-researchers. In addition, nearly 70% of students are enrolled in the humanities and social sciences, humanities and education, which reduces the proportion of those affiliated with the exact, natural and engineering sciences, essential disciplines to promote R & D. Finally, while the share of education expenditure in GDP exceeds the world average, life expectancy at school and the tertiary enrollment rate remain at low levels (see following table).

Table 6: Performance Indicators of the Education Sector in Morocco (2014)

Variables	Maroc	Moyenne pays à revenu intermédiaire	Moyenne mondiale
Dépenses d'éducation (en % du PIB)	5,4	4,67	4,81
Espérance de vie à l'école (en années)	11,6	11,67	13,36
Taux d'inscription dans l'enseignement supérieur (en %)	16,2	23,16	39,5

Source : Aissaoui, 2015

Following the voluntary departure operation, the number of professors-researchers has been reduced, thus affecting the level of supervision, -in a context where the valorization of research struggles to find an appropriate cruise race, many researchers have turned to expertise and consultation, -the dynamics of the mobilization of resources dedicated to R & D continues to be weighed down by administrative procedures (budgetary headings, a priori control, clientelism, heaviness ...) that do not favor opportunities for co-financing research, cooperation international or mobility within Morocco and abroad. Added to this are the problems related to the maintenance of scientific and technical equipment. The companies are the second "poor relative" of the SNI of Morocco. Indeed, despite their efforts, their contribution to the innovation dynamic remains modest.

A World Bank study published in 2014 (quoted by Ben Soltane, Ramadan, 2017) underlines that investments in innovation remain below 5% of the turnover of Moroccan companies. Similarly, a study by El

Aoufi (2007) on Moroccan companies concludes that there is a weak crystallization of entrepreneurship in the sense expressed by Schumpeter: he uses, in this respect, the metaphor "d ' businesses without entrepreneurs ". Consequently, the links between the university and the company are limited, episodic, and thus do not allow to constitute a viable "critical mass", materialized by sustained, lasting interactions and whose tone is truly dynamic.

In addition, the setting up of numerous schemes to develop clusters and other competitiveness clusters would not have given rise to the expected results. In this regard, Morocco has developed economic, institutional, industrial and territorial policies based on a strategy of installation of Integrated Industrial Platforms, Technopoles and support and labeling of Clusters to create ecosystems conducive to fertilization. cross-fertilization of innovation and skills (Amine, 2016). The stated objective is to favor localized groupings of organizations of institutional actors (firms, public research organizations ...) underpinned by relational density, various forms of cooperation and exchange of knowledge capable of innovating (Vicente, 2016). However, the case of the automobile industry, considered the flagship sector of the various industrial plans mentioned, contradicts the desire to go in this direction. Efforts to develop a real cluster in the region of Tangier is based on the absence, or almost none, of sectoral interdependencies and technological spillover effects because of the weak interactions between Renault, its leading suppliers (out of 33, only 2 are Moroccan-owned) and Moroccan SMEs (Ettoumi, 2016, Benabdeljlil et al., 2017).

In the same vein, there is no linear correlation between FDI and economic growth through knowledge diffusion and technology transfer. This presupposes that the host country has a minimum level of qualification and competence to assimilate this knowledge or, to put it another way, that the country has a national absorptive capacity whose determinants are numerous: quality human capital, a favorable institutional environment (corruption index, business regulation, etc.), a dynamic financial system ... Ben Soltane and Zouikri (2016) underline in this respect that the Maghreb countries have a low capacity to absorb knowledge and produce new ones. As such, Moroccan exports of high-tech manufactures are still negligible: barely 7% (Ben Soltane, Ramdan, 2017).

On another level, the multiplication of sectoral plans with different time horizons "blurs the tracks", in that it gives a serious blow to the visibility of the actors, testifies to the absence of an overall coherence, makes coordination mechanisms between public policies (economic, fiscal, apprenticeship, sectoral, etc.) ineffective or inefficient, and thus fuels incentives (El Aoufi, 2012, Akesbi, 2017), which hampers the construction of favorable conditions for a genuine innovation dynamic supported by strong and sustainable institutional coordination linked to economic development. (Ben Slimane, Ramdan, 2017, Casadella et al., 2017). In this wake, the process of industrialization in Morocco remains fragile, irregular, poorly supported and weakly turned towards R & D, inscribed in an asymmetrical international insertion. Largely directed towards the European commercial space, this process is disconnected from the domestic market - in any case narrow - and "at the mercy" of the FDI and the implantation of the FMN whose logic fits in Morocco in vertical strategies (traditional subcontracting), with few incentives for technology transfer and apprenticeship, and little connection with local companies, and thus no spin-off effects on processing industries and innovation (Piveteau, 2007). In addition, Moroccan companies invest, for the most part, the most banal segments of the global value chain of MNCs, which are therefore not very capital intensive, generate low added value and are not very sensitive to R & D. In short, these are structural blockages that testify to the fragility of the Moroccan productive structures dominated by SMEs (often of the family type), a lack of supervision, a low command of technology, a preference for short-term profit. term and immediate profitability, a domestic-style management - turned to tradition or paternalism, discipline, incentive by the salary ... - and less on efficiency, performance, creativity, innovation, taking of risk ... (El Aoufi, 2001, 2007, Maaninou, 2011, Dkhissi, 2014).

In addition, the persistence of corruption, privilege, clientelism, lack of civic education ... (Affaya, Guerraoui, 2009, Mesbahi, 2017) do not promote a spirit of entrepreneurship oriented towards innovation and creation ... whereas innovation thrives in societies whose social ties are articulated around law, trust, empathy ... (Casadella, Uzunidis, 2017) and which, therefore, institutionalize change but also "safeguards" to cope with Promethean "drifts" (Salomon, 1992).

VI. Conclusion

The trajectory of the SNI in Morocco is ambivalent. In recent years, it has made numerous advances: - the creation of the Hassan II Academy of Science and Technology, - the strengthening of the role of ONPIC, - the increase in the number of patent applications, - the commitment of universities (public and private) and companies in R & D, - bridging the gap between academia and business, - the emergence and multiplication of associations to promote innovation and entrepreneurship. undertake, - the establishment of infrastructures and new incentive mechanisms, - the arrival of international groups likely to ensure the transfer of technologies and to deploy strategies of outsourcing or technical cooperation with local actors, - setting up clusters to strengthen R & D, etc.

However, these advances are hampered by institutional and structural obstacles and obstacles: - this system remains largely centralized and underfunded, - the productive sector is insensitive to innovation and therefore not equipped to absorb knowledge, adapt it and developing new ones, - the educational system suffers from several handicaps, one of which is its inability to produce new knowledge, - relations between actors are limited and episodic, - there is no real institutional complementarity between the actors and between plans and initiatives at the national level, - the persistence of social and mental factors that turn their backs on innovation, risk-taking and merit ...

In short, it is, in the words of Haudeville (2010), immature and therefore requires a redesign and consolidation of the links established between its components and the inclusion of the policy of scientific and technical research in a global development strategy long-term. In this respect, we would like to point two tracks:
- Moroccan companies can draw legally, and most often free of charge, from the US patent system (UPSTO) and the EU patent system (EPO), which constitute a huge technological database. Once, in fact, the annual renewal fee is not paid, the patent falls before maturity in the public domain (Haudeville, 2010).
-the same companies can also turn to frugal and inverted innovations, which have been proven in many countries (India, Brazil, China ...). They are inexpensive, make available to customers more or less limited resources many products and services, meet the needs of a large section of the population, and can be exported to developed countries (Dou, Koné, 2016 Laurens, Le Bas, 2016, Haudeville, Le Bas 2016, United Nations, 2016).

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