

Spain innovation policy: Best practices to implement in Mexico

Katya A. Luna López

Centro de Investigaciones Económicas, Administrativas y Sociales,

Instituto Politécnico Nacional

Lauro Aguirre 120, esquina Sor Juana Inés de la Cruz, col. Agricultura, Del. Miguel Hidalgo,

C. P. 11360, México, D.F.

Tel: 57296000 ext 63115 E-mail: katluna22@yahoo.com

The research is financed by: Instituto Politécnico Nacional.

Abstract

This article shows the policy mix of innovation policy of Spain and identifies the best practices. The period of analysis is from 1980 until 2010. Then analyze the relevance of implementation in Mexico, a country which is lagging in the area of innovation and which presents issues which could very well be addressed with some of the policies employed by Spain. From this analysis, thirteen instruments of Spanish innovation policy are considered as best practices, but only 4 are highly recommendable for implementation in Mexico.

Keywords: Spain innovation policy, best practices, policy mix, Mexico.

1. Introduction

Today, there exists a consensus regarding the participation that innovation has in the development of the economies, for this reason countries establish public policies which look to boost the execution of innovative activities in companies, both public and private, with the understanding that the expenditure they incur into will turn into a profitable investment whose return comes hand in hand with the strengthening of the productive apparatus and its competitiveness. The innovation policy, considered by Lundvall and Borrás (1997) as the elements of science, technology, and industrial policy which explicitly promote the development, promotion and efficient use of new products, services and processes in markets or in organizations, public or private, is implemented by focusing on the impact in the economic performance, nevertheless, its immediate objectives are limited to the scope of the contributions that can be carried out in terms of science, technology and in the innovation for the solution of problems, or in order to take advantage of strategic opportunities.

The implementation of public policy occurs through the instruments, which are a set of techniques implemented by the governing authorities with the intention of promoting the support of change at a social level (more specifically, the economic change through technological change); as such, they have the purpose of inducing change in a particular direction, in this case, by stimulating innovation (Borras y Edquist, 2013). Thus, the policy instruments are the vehicle through which those who are in charge of the design and execution of the policies exercise their capability of influencing the decisions taken by the economic agents; these can be of different sorts, highlighting those of legal and fiscal aspect and the programmes of direct support to strategic sectors.

Specifically, in the policy of innovation the instruments include: the creation and development of a solid public infrastructure of research, as well as the mechanisms of inter-institutional coordination, the direct support of basic and applied research (as a means to compensate for the fact that the private agents do not carry it out due to the cost, uncertainty, the elevated risk of not knowing the true value of the investment and because of the long time required to generate a new product and obtain its commercial value). Other instruments are those of financing through the granting of credits and subsidies to promote research and development activities (R&D) that boost company innovation as well as tax incentives that allow for the deduction of expenses in activities that lead to innovation. Regarding human resources, professional training programmes are implemented for high level researchers as well as for workers in order for companies to have enough qualified workforce, and with competences to develop, assimilate, and incorporate the new technologies, at their disposal. In this context, programmes to encourage cooperation that allows for the transmission of technological knowledge from one organization to another are implemented.

In addition, some of the other main policy instruments of innovation are the legislation and the national plans focused on the promotion of science activities, technology and innovation, which coordinate and provide the institutional framework in order to carry out said activities under defined objectives and strategies. Inside the regulatory framework it is fundamental to establish intellectual property policies that give security to the creators of patentable inventions and which allow them to recover their investments and establish attractive investment regimes to boost strategic sectors.

According to Flanagan *et al* (2011), the term policy mix, considers the group of instruments that governments implement on a specific policy objective and the relations that take place between them given that the articulation of the diverse instruments in the configuration of favourable synergies to the innovation system of a country is important. Nevertheless, it becomes nearly impossible to determine ideal models of good mixes which is why the analysis of specific cases results significant in order to identify best practices of policy instruments (Koschatzky et al., 2001).

Each country creates a different policy mix based on the general objectives that it looks to fulfil. However, there exist differences in the implemented programmes in each case, because even though the countries have similar instruments in general, each one has particularities that allow for some to be successful and some not to. In fact, the selection of policy instruments constitutes a part of policy design and the instruments themselves form part of the implementation of the policy (Borras and Edquist, 2013).

Regarding Spain, it is a country of more than 40 million people with the commercial aperture that is implicit in being part of the European Union since 1986, and that in spite of inciting the homologation of policies, it also receives financial incentives and assessment from the supranational organism for the design of strategies which allow it to implement policies of economic growth relying on science, technology and innovation. Nevertheless, the crisis it currently faces has an interesting experience in the design and implementation of policy instruments that support the development of its capabilities of innovation.

The country has worked a lot on the de-regulation of its economy in order to boost the entry of Direct Foreign Investment, which is low, achieving in 2012 a mere 2.5% of GDP with an industrial value added of 13% of the GDP for the same year (<http://datos.bancomundial.org/>), also low for a member of the EU. Its population faces alarming levels of unemployment, which is accentuated by the crisis due to a large flow of migrants, which is why it has bet on a strategy of promoting the incubation of new companies. Notwithstanding, it possesses a GDP that is over 24 thousand dollars per year per person, up to 2012, in constant dollars from 2015 (<http://datos.bancomundial.org/>).

Due to tradition and cultural closeness, derived from the inheritance of the Spanish language, Mexico usually turns to Spain as a model to follow in many fields and CT&I (Science Technology and Innovation) policy is no exception, even more so when there is a reference that both countries, in the decade of the 80's, shared similar economic and technological levels of development. Now, three decades later, the performance in innovation of the Iberian country is much more important, which is why analyzing their policy mix becomes relevant to identify policy instruments which can be subject of implementation in Mexico.

2. The condition of Mexican innovation policy

The country has traditionally destined less than half a percentage point of the GDP to R&D activities (of which two thirds are distributed by the government), which shows the poor effort it makes and the lack of consciousness of Mexican entrepreneurs in regards with the effectiveness of using innovation as leverage for competitiveness. The following is a diagnosis which shows the current status of policy instruments that have been designed and implemented in Mexico in the last decade.

Mexico counts with State Councils of Science and Technology serving the political division of the country, but lacks regional institutions that can encompass different States, in order to solve common problems and integrate efforts to take advantage of opportunities in terms of innovation. The scant link between companies and the creating centers of knowledge has been identified as one of the main weaknesses of the innovation system.

Its legal framework counts with a Law of Science and Technology, notwithstanding in 2009 it abrogated the section in the Law which included fiscal stimuli for the carrying out of R&D projects in companies, and as a result this support instrument ceased to be implemented. Were revoked due to the fact that an important part of the program's resources were given to foreign companies (around 70%) and to some nationals that were already developing R&D projects, which is why their effectiveness to promote the majority of national companies to carry out innovation projects came into question. After the crises experienced in past decades, Mexico keeps a cautious fiscal system for indebtedness which is why tax benefits for companies are hard to conceive.

The country lacks a specific regulatory framework for universities where the guidelines to carry out linking actions with society through technology transfer and entrepreneurship can be established, consequently the associations university-company are very few, given the academic focus that favors teaching, research and the promotion of culture, to which we can add the fact that their regulatory framework does not correspond to that of an organization focused on commercialization research results, and therefore creates a conflict when they have to charge and share profits, create spinoffs as a result of a science project and even when providing some consulting services.

Mexico has a severe problem of "freezing" the research positions inside universities and public research centers that inhibits the hiring of new highly qualified personnel that is aware of the importance of networking that can make the centers of creation of knowledge more dynamic. They

also face generational change considering the upcoming retirement of their personnel, which is why it is necessary to establish hiring policies, emphasizing the possibility of focusing their research toward ends that are closer to the necessities of society.

There have been attempts at solving the problem of the scarcity in links between public research centers, universities and companies for R&D projects through the criteria of (CONACYT) which favors linked projects in the assessment process in order to grant them monetary support. The creation and certification of knowledge transference offices through the FINNOVA program (Secretaría de Economía-CONACYT) has also been promoted, under which, 117 offices in research centers, public and private universities and consulting firms that act as intermediaries promoting innovation in society up to the year 2015 have been certified.

The creation of new companies and the generation of new businesses of greater added value through the implementation of Centros Mexico Emprende program (Secretaría de Economía) has been the biggest bet in order to fight against unemployment, but has unfortunately been weak due to the scarce resources with which it counts as well as the complex management of resources, in addition to the tax calendars of the federation. In the same manner, the Fondo PYME (of INADEM) supports entrepreneurship, incubation of companies, modernization and commercialization of resources, which are many times incompatible with the activities that are being financed. There is still a need for a greater boost in terms of consolidating company incubation programs to bring them closer to private financing; to do so it is of the outmost importance that an institution focus on creating risk investment funds for early stages and consolidation of companies, an issue in which Mexico is quite behind.

CONACYT has implemented a Company Incorporation program consisting of graduated personnel from Masters and PHD studies in order to better the innovation capabilities of companies, which has not worked in the expected manner given that as soon as the public support program ends the companies do not hire the specialists on their own.

As part of the country's pending aspects regarding public policy instrument management, there is still a great deal of work to be done in terms of giving follow-up to projects that are supported by public programs, given the fact that they only focus on verifying the right execution of the financial resources and only in very few occasions is the real fulfillment of the project's objectives verified or the program impacts evaluated, and therefore the learning surrounding the design and implementation of programs is limited.

3. Main findings of the innovation policy from Spain

The innovation policy of Spain has particularities; first of all, belonging to the European Union has decisively boosted the activities of innovation, thanks to the reception of funds from the Union for this context and to the fact that ambitious shared objectives have been established, which we must admit, have not been entirely reached by the country, but that without a doubt place the topic of innovation in the public agenda in a decisive manner. In addition to this, the government that is kept with the political division in the Autonomous Communities implies the coordination of efforts as well as the obtaining of differentiated financing and consequently, heterogeneous results among regions. It is in this context where the institutional complex, greatly determined by the Communities, that makes up its innovation system occurs and that is important in order to understand the role of the Government in the promotion of innovation and given this particular political configuration, there prevails a permanent negotiation on the public policies to be implemented. Consulting institutions have been created through which participative processes are implemented for their design in order to favour the achievement of agreements (OCDE 2009).

Autonomy in matters related with the implementation of resources for institutions and infrastructure for the technical progress of their regions is likewise maintained, a condition which necessarily impacts the innovation policy. Molero points out that the typology of regions is very important given that from it, funds are granted to the regions which need them most (interview with José Molero, Universidad Nacional Autónoma de México, 13 March 2006). However, one of the main challenges has been the improvement of government mechanisms and the coordination between those responsible for the policy, inasmuch as the central administration as in the Autonomous Communities. As a matter of fact, the greatest challenge that Spain faces in terms of the functional structure of innovation policy is determining with clarity the role of the Autonomies within the national strategy and to make sure that the institutional coordination and planning are directed towards the national interest since there exists a risk of unnecessary duplication and superposition, or lack of synergies and even conflicts between different objectives, given that each Autonomy possesses its own universities, science parks, innovation agency, etc. In practical terms, this structure in two levels, the national and the autonomous systems, makes it difficult for companies, especially small and medium size and other individual agents, to exploit synergies between national and autonomous policies (OCDE: 2007:111).

In its recent history, the country has gone through several configurations in the institutional framework that integrates its Innovation System; the Advising Commission of Scientific and Technical Research (CAICYT) was created since 1958, and it preceded the Office of Science and Technology of 1998, that was the agency on the subject under the Presidency, which later became the Ministry of Science and Technology in the year 2000, which integrated the functions of the Ministry of Education and Culture as well as those of the Ministry of Industry and Energy. In 2004 it changes its name once again to the Ministry of Innovation, being the institution in charge of the design and execution of policy in matters of scientific research, technological development and innovation in all sectors, as well as the coordination of the public organisms of state ownership research. It elaborates the proposal, management, follow-through and assessment of the national programmes and strategic actions of the National Plan of Research Development and Innovation (MICINN, 2011). These functions currently fall on the Ministry of Economy and Competitiveness, created at the end of 2011 which operates under the Deputy Secretary of State of Research, Development and Innovation.

In the same manner, Spain has implemented a diversity of instruments of innovation policy in the last decades, such as: company subsidies, non-recoverable subsidies or via the cost reduction of financing (soft credits), tax reductions to R&D, the support for infrastructure of general use (useful to diverse sectors and agents), sector-based plans centred in determining industries, the training programmes of personnel qualified in R&D.

The following chart summarizes some of the characteristics of Spanish innovation policy.

Table 1. Innovation policy profile summary

Integrating element of the NIS(National Innovation System)	The guidelines of the European Union with emphasis on the link between the agents of the innovation system.
General Strategy of Innovation	Focused on the link between companies and universities and research centres.
Planning on science, technology and innovation	Perform integral planning exercises which incorporate innovation system diagnostics as well as recommendations of the European Union
Legislation and innovation	Favourable to linking. It counts with the Law of Science and Technology since 1986 and diverse regulations which favour linking such as the Organic University Law, the Law of Pubic Contracts and the General Law of Grants.

Support to clusters	Have implemented numerous programmes focused on the linking of university-company in the clusters.
Strategic support in branches and strategic sectors	Numerous funds with ample definition of the sectors.
Tax Incentives for innovation	Very favourable, with ample categories of deduction which include, besides the outlay of experimental R&D, the expenditure in innovation activities towards commercialization.
Support to the incubation of technology based companies	Broad dissemination in universities and integration of science technological parks.

Source: Prepared by the author.

The 2014 report of the COTEC states that in 2012 the expenditure in R&D was 13.392 million euros, which in reference to the 14.184 million executed in 2011 means a reduction of 5.6%, said figure corresponds to 1.30% of the GDP, an inferior sum to 2011 where 1.36% was reported, which has to do with the crisis that Europe, Spain in particular, is currently going through, that causes this contraction in the financing of the Spanish innovation system. The private sector executed in Spain 53.2% of the R&D expenditure in 2012 which manifests the great influence of the Spanish public sector in the development of basic and applied research at a national level. The pattern of participation in autonomous communities has remained as it had been, with the communities of Madrid and Cataluña which contribute almost half the expenditure, 25.6% and the 22.3% of the total respectively, followed by Andalucía (11.1%), the Basque Country (10.7%) and the Community of Valencia (7.5%), these five communities represent the 77.2% of the total R&D expenditure of the country (COTEC, 2014:15, 16).

4. The method of identification of best practices

The research had, in the comparative method, a main resource of analysis. It is in this contrast, analysing the differences, where we can observe the different policy mixes implemented in other countries with the objective of identifying the best practices.

For the development of the research we employed a composed method which allowed us to integrate a set of diverse elements: in first instance, we retook the reports of the specialists which had previously evaluated the performance of the instruments, in the form of articles or institutional reports, which permitted us to count with an inventory of the implemented policy instruments. In the Spanish case we relied on the analyses performed by Buesa (2003) and (1999), Fonfría (2002), Barajas *et al* (2009), Herrera y Nieto (2008), Escorsa (2004), Cabrer-Borrás and Serrano-Domingo (2007), Huergo *et al* (2009), Tejeda (2003), OCDE (2010) and (2007), The European Commission (2006), CEET (2002), AEC (2008), as well as the annual reports of the COTEC Foundation and interviews to qualified informants.

The analysis of multiple indicators that would allow us to ratify the performance of the combination of policy instruments was integrated from said information. Firstly, indicators which allowed us to verify the profile of innovation policy, showing us the prevalence that each country has in order to implement a specific type of instruments (for example, the fiscal kind), minimizing the use of other instruments, which allowed us to make assessments regarding the experience they possess of implementing the programmes and institutions which were the basis for the search of best practices.

The result indicators of science, technology and innovation activities were subsequently analysed which provided elements for the search and identification of instruments which have favourably intervened for the betterment of the diverse topics analysed: to be specific, we took the data from the

Community Innovation Survey (CIS). A comparison of the World Economic Forum indexes was also performed; it contains several items related with innovation policy and which we, in the same manner, linked with some of the instruments implemented in Spain.

Additionally, the design of the policy instrument was analysed in such a way that those who present new solutions to the barriers that hinder innovation are recognized. This way, all these elements acted together in order to deduct the best practices of policy instruments implemented in Spain which are set out below.

5. Instruments considered best practices

13 best practices that stand out due to their performance and functional design were identified with regard to the institutions that form the Spanish innovation system.

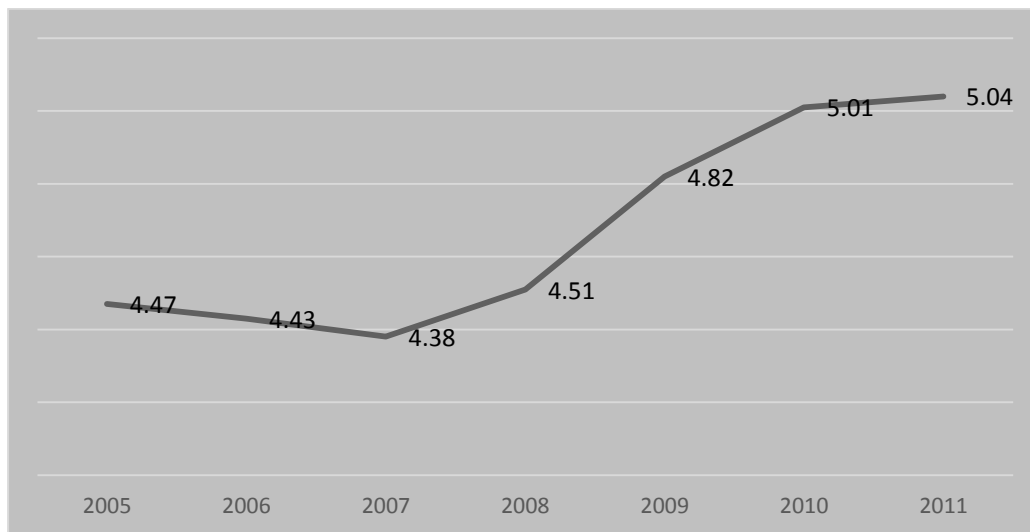
5.1 The Centre for Industrial Technological Development (CDTI in Spanish)

It has contributed to the construction of a culture of innovation by financing and promoting the participation of small and medium-size companies affiliated with Research Centres for innovation, integrating productive chains. It was recognized as a best practice by the Organization for Economic Cooperation and Development in regards with the construction of a culture of innovation (OCDE 1999) and by the integration of productive chains through diverse support programmes (email with Pere Escorsa, November, 2011). Since the year 2009 the CDTI is the one who channels the financing and support applications for research projects, development and innovation of Spanish companies in both state and international scopes, providing the company with support to internationally exploit its technologies, to whom it offers assistance for technological promotion, innovation projects and technology transferring, a wide exterior network of commercialization and multi-lateral and bilateral cooperation projects (with programmes like Eureka and Iberoeka) with Canada, Japan, China, South Korea, India and South Africa. In addition, the CDTI has been enabled as a competent body to emit the Binding Motivated Reports of the projects it finances in any of its lines, which provide companies that have an approved and financed project by the CDTI with greater legal security when obtaining tax reductions for the outlay incurred in R&D activities of said projects. In this sense, the assessment of the Evaluation and Quality Agency (AEC, 2008) highlights the experience of the consultants at CDTI to assess projects of innovation and technological transference. In fact, many companies that work closely with the CDTI to boost support applications of R&D have developed competences to affiliate themselves with European associates in projects of great importance to boost innovation in Spain.

5.2 Regional Development Agencies

The work of these agencies has stood out by implementing networking actions between the different levels of government in the country, the national and the autonomous systems, which demand a good coordination in order for companies to get the maximum benefit of the possible synergies between both political levels (AEC, 2008). The good functioning of the aforementioned agencies can also be related with their support of the effectiveness of the decentralization strategy that relies on the development of the autonomous regions, which we can observe in the Index of Local Availability of Research and Training Services (of the Global Competitiveness of the World Economic Forum, 2012), which stands out for being progressive, locating itself at a 5 (on a scale of 0-7). (Graph 1)-

Graph 1-The evolution of Spain in its position on the Global Competitiveness Index in the category of local availability of research and training services



Source: Prepared by the author with information from the World Economic Forum, Global Competitiveness Report (2012).

5.3 Centre of Corporate Development and Innovation

This centre distinguishes itself for offering a wide range of services to entrepreneurs and for promoting the association with other funds and investors, creating new societies that focus on risky investments at early stages of development of the companies, with the idea of attracting greater resources from private investors (Tejada, 2003). It is operated by the Catalan government and it operates a number of capital fund provision schemes and advisory to start-ups that have contributed to the establishment of innovative businesses.

5.4 University-Company Foundations

An important part of the Spanish strategy is the encouragement of the link university-company to invigorate the transference of university based technological developments into the market, making use of the mediation organs like these University-Company Foundations, which are non-profit organizations created by the public or private sector, that have yielded good results in favouring the linkage for innovation. This is associated with the increase of universities being considered as a source of information for company innovation, as it is shown in European innovation surveys where an increase of 2.7% to 3.2% in the years 2000 and 2006 is reported respectively (CIS 2000 and 2006).

5.5 Research Result Transfer Offices (OTRI in Spanish)

As in the previous case, the OTRI are intermediary bodies whose mission is to invigorate relations and to encourage the connections that will stem the technological transference to the productive apparatus; they were configured as the nucleus of the university-company linking strategy supported by the State, they have stood out in the promotion of technological transference (AEC, 2008). The creation and consolidation policy has given as a result the existence of an OTRI in almost every university and Research Centre as well as in the University-Company Foundations and in many Spanish Technological Centres that strengthen the institutional structure for the transference of technology

(OCDE, 2007). They are an example of good public policy in terms of mediation among universities and research centres and in the productive sector.

5.6 Company and Innovation European Centres (CEEI in Spanish)

They emerge with the country's integration into the European Union, to invigorate the local resources and to stimulate and favour the creation and development of new innovative companies or the diversification of existing companies. Their legal status is private, lucrative or non-lucrative, but with public ownership mainly, that carry out the creations of markets and the promotion of associations. They also count with the participation of company associations, big companies, chambers of commerce and technological centres. They have proven their usefulness in supporting start-ups in the first stages of their life, since new entrepreneurs particularly appreciate finding adequate venues with low rents. Without a doubt they have shown their worth in promoting the development of the regions (Escorsa, 2004), which is why they are an example of a good public policy instrument.

Regarding the legislation related with science, technology and innovation, there exists an outstanding instrument of innovation policy:

5.7 Organic University Law (LOU in Spanish)

This law is cutting edge by putting in place rules to encourage the association and establishment of technological base companies on behalf of researchers. Thanks to this, public university professors can opt for a five year sabbatical to create a company, while keeping the right to hold their position in the university without the risk of losing it; these activities are also considered positively in their performance evaluations. Said law creates a National Accreditation System with regularized quality levels, providing universities with greater autonomy (OCDE, 2007; AEC, 2008).

In regards with direct support programmes to strategic sectors, Spain has an exemplary programme that we shall discuss below.

5.8 The Avanza Plan

This programme focuses on boosting the information society, and has had a good administration, standing out in its efforts of providing a detailed follow-up and assessment of projects, it is an example for other instruments in this sense, besides maintaining a close link with the autonomies which has allowed them to reach agreements of 135 million euro in regional help additional to the 38 million provided by the General Administration of the State (AEC, 2008; OCDE, 2007). Regarding the tax incentive programmes, the country stands out by counting with a very interesting scheme of benefits for innovative companies.

5.9 Tax incentive scheme

Spain is at the cutting edge by including in the category of deductions for innovation activities not only R&D, but also the acquisition and implementation of information and communication technologies, considering current expenditure as well as capital outlay as susceptible to recovery. It is one of the most generous systems with tax reductions that stands out in terms of the design of the policy instrument, of which between 40 and 50% of innovative companies who do R&D are benefited. This system has had a positive effect on the number of companies that use it (AEC, 2008; Warda, 2002). In order to improve the absorption of R&D, the Government continues to introduce changes in the tax incentive system through the administration of these tax reductions which, since 2003 the Ministry of Industry, Tourism and Commerce (MITYC in Spanish), is the one in charge of confirming the

companies expenses with the intention of increasing legal security before the Tax Administration (OCDE, 2007).

In terms of the instruments that boost the dissemination of innovations through incubators and clusters, or promote the commercialization of R&D results, Spain counts with one that greatly stands out:

5.10 Innocash

This programme has had a very good impact since it provides researchers with a free of charge thorough report on their project (which includes novelty analysis, patentability, market potential, existing competitors, etc.) from which their research can be directed at feasible niches of opportunity and, in case it is relevant, they may look for companies interested in acquiring the technology, providing risk capital, etc. The studies are conducted by certified consultants who receive payment directly from the Programme. Besides this, it may be complemented with other aid in proportion of how promising each project is (email with Pere Escorsa, November, 2011). In this sense the design of the programme turns out to be novel, besides having proved its benefit for the environment of technology based businesses of the country.

When it comes to the promotion of specialist networks and highly qualified training programmes, Spain counts with two instruments considered as best practices of public policy.

5.11 Programme I3

It was recognized as a best practice by the Evaluation and Quality Agency in terms of cooperation with the different autonomies (AEC, 2008). The programme implies the signing of agreements for the stable incorporation in universities and research centres of outstanding Spanish or foreign professors-researchers. An example of its success is that 64% of the hiring has stabilized of those incorporated through a sub-programme called Ramon and Cajal (OCDE, 2007).

5.12 The SENIOR Programme

It has contributed to increasing the level of Spanish research through the hiring of outstanding high ranking researchers foreign and Spanish who work abroad, attracting them with good income to work for several years in the universities or research centres, creating or boosting research teams in Spain. The design of the programme results novel and precise for the necessities of the country (email with Pere Escorsa, November, 2011).

In terms of support instruments to R&D activities, as well as association promotion activities in research centres and universities, Spain counts with one that greatly stands out:

5.13 The CENIT Projects

The CENIT projects have had a catalyst effect in the spirit of cooperation between companies, even in highly competitive sectors, generating a tractor beam effect on private investment, by identifying a better investment relationship in financed projects before public investment than the one existing in the whole of the national R&D. The first invite of CENIT projects in 2005 approved 200 million euro to finance 16 large R&D committees in strategic technological areas for four years, which were supposed to be complemented with an additional 230 million euro coming from the private sector. The approved projects in the first round included 178 companies, 51% of small and medium size companies and 49% of large companies, and 208 research groups among universities, Public Research Centres and Technological Centres, which led to the participation of more than 800 researchers (OCDE, 2007: 162). Another effect of this programme is the improvement of cooperation among regions, evidently in the participation of public research organisms all over Spain, if Madrid and Cataluña are the ones who

mainly participate, as a result of having greater industrial complexes, we can understand that in other regions the participation is lower due to their weak industry .

6. Pertinence analysis for Mexico

In this section we will analyse the pertinence of the implementation in Mexico of each one of the policy instruments identified as best practices in Spain. This is a first approach to the evaluation of their utility to contribute to solving some of the Mexican innovation policy difficulties.

In order to determine the pertinence of each instrument considered as a best practice, the author defined a three-level scale which summarizes the conducted analysis:

- ✓ High: implies a learning scope of the foreign instrument, which entails the modification-adaptation of an already existing instrument in Mexico to improve its efficiency. The country already has experience in this type of instruments for which little resistance is foreseen.
- ✓ Medium: it refers to the creation of a new instrument, which implies an ample debate among the country's decision makers in order to implement it.
- ✓ Low: resistance is foreseen regarding the implementation of the instrument due to cultural barriers surrounding the benefit of innovation for economy and society.

Considering these elements, the author obtained a list of innovation policy instruments that at a first stage can be suggested to be adopted in Mexico, particularly those classified of high pertinence, 4 shown in the following table, which are related to already existing instruments in Mexico, the idea of learning the best practices of this country is to improve their design or to boost the results of similar instruments implemented already in Mexico.

Table 2. Foreign instruments deemed of high pertinence for implantation in Mexico

Type of instrument	Instrument
National Innovation System Institutions	University-Company Foundations
	Research Result Transfer Offices (OTRI in Spanish)
Direct support to specific economic sectors and branches	The Avanza Plan
Innovation and Development Promotion and the link between Research Centers and Universities	Proyectos CÉNIT

Source: Prepared by the author

The innovation system's intermediary agent promotion policies that stand out are those which have been quite relevant to energize the Spanish research sector, and in which Mexico still finds itself in a maturing phase through the certification program of knowledge transfer offices. The Avanza program is also something to be learned from to carry out close follow-up to supported programs in order to correct possible deviations and make the use of public resources more efficient.

Six instruments were defined and deemed of medium pertinence, of which there are no similar instruments in the country, opting for one of them in Mexico would imply the taking of decisions on behalf of high level representatives and innovation policy designers to experiment new alternatives.

Table 3. Foreign instruments deemed of medium pertinence for implantation in Mexico

Type of instrument	Instrument
National System of Innovation Institutions	Regional Development Agencies
	Centre of Corporate Development and Innovation
Legislation on Science and Technology	Organic University Law (LOU in Spanish)
Innovation diffusion	Innocash
Highly qualified personnel training	Programme I3
	The SENIOR Programme

Source: Prepared by the author.

It would behoove the country to focus on the development of its different regions as Spain does, as well as having an institution that can focus on creating risk investment societies to finance company development, an issue where Mexico lags behind. Likewise, it would be important to improve the legislation regarding universities in order to promote the link with society as it is pointed out by the LOU through legal disposition. In addition to the aforesaid, Mexico would benefit from counting with support for the carrying out of studies that redirect research from its universities and research centers as it is done with Innocash as well as talent retention and attraction programs in its universities facing the next generational change.

We were also able to define that out of the total of the identified instruments as best practices, there exist three, which we deem of low pertinence, given the resistance foreseen on their possible application in Mexico, mainly for idiosyncrasy and political culture motives that permeate the perception on their possible impact on innovation policy, shown in the following table.

Table 4. Foreign instruments deemed of low pertinence for their implantation in Mexico

Type of instrument	Instrument
National System of Innovation Institutions	The Centre for Industrial Technological Development (CDTI in Spanish)
	Company and Innovation European Centres (CEEI in Spanish)
Tax incentives for innovation	Tax incentive scheme

Source: Prepared by the author

In particular that related with fiscal incentives, in which Mexico had unfavorable results in the past and which is foreseeably difficult to be implemented again in the future, mostly in an ample manner toward innovation activities as Spain. In regards with both institutions, considering they receive financing from the European Union, which Mexico lacks, it does not seem feasible for Mexico to have similar support given the scarcity of such a source of financing.

7. Conclusions

If Spain is currently going through a hard economic situation, the country has bet on science, technology and innovation as fundamental pieces to drive their development. Nevertheless, the recent

changes to their government structure, which show interest for the redesigning of innovation policy, the country has designed and implemented diverse instruments (programmes as well as institutions) of encouragement of innovative activities which have resulted as favourable for the country, yielding good results, and others, also showing novel ways of promoting innovation.

From the 13 best practices identified in Spain, those that promote the association between Universities and Research Centres with the companies stand out, and have given as a result the existence of numerous agencies, transference centres and offices in charge of associating the productive sector with the knowledge generated centres, which in many occasions count with useful solutions for society, promoting the economy of the country through technology based businesses. By using this as their main strategy of public policy, they lean on the Organic University Law which favours this dynamic of association and furthermore that of entrepreneurship, managing to decisively boost technological companies, which as such, contribute by providing a solution to the crisis by being competitive, staying in the market, being tax contributors and generating jobs.

Other instruments that we must highlight from the experience in public policy of support to innovation in Spain are the fiscal incentives, highly cutting edge when considering, besides R&D expenditure as subject of fiscal exemption, other innovation activities as those that lead to associations with Universities and Research Centres, as well as patenting, are a clear example of the decision of the Spanish government to boost the improvement of their productive apparatus.

After conducting a pertinence analysis, it was specified that only four have high chances of being successful if they were to be implemented in Mexico, considering the differences in political, economic and cultural contexts, especially because the country lacks financial support such as the European Union to Spain.

In the case of Mexico, its main challenges are bolstering the private sector in investing on innovation and the academic sector on conducting research and development that the marked demands linking efficiently to provide solutions or strategic opportunities; both difficulties find a good option of public policy to find a solution. If the analyses of best practices at hand are used as a mechanism to identify innovation policy instruments that are subject to being repeated in other countries, it is important to conduct an in-depth analysis of the transference potential of the instrument as well as its adaptation to the national context.

References

- AEC (2008). Los programas de fomento a las actividades de investigación, desarrollo e innovación – INGENIO 2010. Agencia de Evaluación y Calidad. Madrid.
- APCTE (2011) Asociación de Parques Científicos y Tecnológicos de España. <http://www.apte.org/es/> (Accessed 17 November 2013).
- World Bank (2012) World Development Indicators 2012, <http://datos.bancomundial.org/> (Accessed 7 January 2014).
- Barajas, A., Huergo, E. y Moreno, L. (2009) Impacto económico de la participación en el programa marco de I+D. Evidencia empírica para el caso de las empresas españolas. CDTI and Universidad Complutense. Madrid.
- Borrás, S. Edquist, C. (2013) The choice of innovation policy instruments. Technological Forecasting & Social Change Volume 80, Issue 8, pp. 1513-1522. Elsevier.

- Buesa, M. (2003) Ciencia y tecnología en la España democrática: la formación de un sistema nacional de innovación. Documento de trabajo no. 39. IAIF, Universidad de Madrid. Madrid.
- Buesa (1999) "Economía de la innovación. Enfoque evolucionista" in Bote, V., Escot, L y Fernández, J. Pensar como un economista; homenaje al profesor Andrés Fernández Díaz. Pp.605-634. Delta publicaciones. Madrid.
- Cabrer-borrás, B. y Serrano-Domingo, G. (2007). Innovation and R&D spillover effects in Spanish regions: a spatial approach. Research Policy no. 36, pp 1357-1371. Elsevier.
- CEET, (2004) Experiencias innovadoras en los proyectos Equal 2001-2004. Buenas prácticas en Creación de Empresas y Adaptabilidad. Centro de Estudios Económicos Tomillo. Madrid.
- CIS (2006) Community Innovation Survey 2006. (Accessed 7 October 2010). en <http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/cis>
- COTEC (2014) Informe Cotec 2014: Tecnología e Innovación en España. Fundación COTEC. Madrid.
- Herrera, L. y Nieto, M. (2008) The national innovation Policy effect according to firm location. Revista Technovation no. 28, pp. 540-550. Elsevier.
- Escorsa, P. (2004) Innovación y competitividad: experiencias en España y Europa en la construcción de sistemas regionales de innovación. Ed. OEI. www.oei.es/salactsi/escorsa.pdf (Accessed 22 November 2011).
- Huergo, E., Trenado, M. y Ubierna, A. (2009) Impacto de los créditos blandos en el gasto en I+D empresarial. La empresa española y el apoyo del CDTI a la I+D+i. Universidad Complutense y CDTI. Madrid. http://www.cdti.es/recursos/publicaciones/archivos/6401_1313201012555.pdf (Accessed 22 November 2013).
- European Commission (2009) INNO Policy Trend Chart. Innovation Policy Progress Report. Spain.
- European Commission (2006) R&D and innovation policies in Spain. Policy Mix Peer Reviews. Country Report: Spain. Second Cycle of the Open Method of Coordination for the Implementation of the 3% Actions Plan. Report prepared for the CREST Policy Mix Working Group by Ken Gay, Wise Guys Ltd., in conjunction with IPTS. March 2006.
- Fernández, J. (2008) El Plan Nacional de I+D+I ¿un plan para España? Revista Madri+D, Monografía 21 http://www.madrimasd.org/informacionidi/revistas/monograficos/monografias/monografia21/21_1.pdf (Accessed 17 February 2013).
- World Economic Forum (2012). Global Competitiveness Report (2012). <http://www.weforum.org/issues/global-competitiveness> (Accessed 7 November 2013).
- Flanagan, k., Uyerra, E. y Laranja, M.(2011) Reconceptualising the 'policy mix' for innovation. Research Policy no. 40. Pp. 702-713. Elsevier.
- Fonfría, A. (2002). Análisis de las políticas públicas de fomento de la nueva innovación tecnológica en las regiones españolas. Instituto de Estudios Fiscales-Universidad Complutense de Madrid. Madrid. <http://www.minhac.es/ief/principal.htm> (Accessed 7 November 2011)

- Koschatzky, K., Kulicke, M., Zenker, A. (Eds) (2001) Innovation networks: concepts and challenges in the European perspective. Physica-Verlag, Heidelberg.
- Lundvall, B. y , Borrás, S. (1997) The globalizing learning economy: implications for innovation policy, European Commision, Bruselas.
- MICINN, (2011) Ministerio de Ciencia e Innovación <http://www.micinn.es/> (Accessed 12 february 2011).
- OCDE (2010) Science, technology an innovation Outlook. Organisation for Economic Cooperation and Development. París.
- OCDE, (2007) I+d e innovación en España. Mejorando los instrumentos. Organización para la Cooperación y el Desarrollo Económico. Madrid.
- OCDE (1999) Managing National Innovation Systems. Organisation for Economic Cooperation and Development, París.
- Sebastián, J. y Benavides, C. (2008) Ciencia, Tecnología y Desarrollo. AEI. Madrid.
<http://www.aecid.com/export/sites/default/web/galerias/cooperacion/Cultural/descargas/05-CienciaTecnologia.pdf> (Accessed 7 december 2012)
- Tejada, J. (2003) Formación profesional. Universidad y formación permanente. En el libro J. M. Martínez Selva y R. Cifuentes (Coords.). La universidad profesional. Relaciones entre la universidad y la nueva formación profesional. Consejería de Educación y Cultura. Murcia.
- Warda, J. (2002) Measuring the value of R&D tax treatment in OCDE countries. OCDE review 27, pp 185-212.