

## La vinculación entre agentes heterogéneos para la producción de conocimiento e innovación

*The link between heterogeneous agents for the production of knowledge and innovation*

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### Resumen

El objetivo de este artículo es mostrar la forma de vinculación entre los agentes heterogéneos (universidad o Instituciones de Educación Superior, empresa, gobierno, organismos intermedios, sociedad civil), para la producción de conocimiento e innovación, debido a las exigencias de la globalización y las tendencias internacionales, son fenómenos que requieren de cambios cada vez más apremiantes, una alternativa viable, como el fortalecimiento de estructuras innovadoras de colaboración. Se aborda algunos casos exitosos de vinculación entre agentes heterogéneos en el contexto internacional y la percepción de la construcción de los vínculos en México.

**Palabras clave:** Conocimiento, innovación, universidad, vinculación, empresa y gobierno

### Abstract

The aim of this article is to show the link between heterogeneous agents (University or Higher Education Institutions, business, Government, intermediate bodies, civil society), for the production of knowledge and innovation, due to the demands of globalization and international trends, are phenomena that require changes ever more urgent, a viable alternative, such as the strengthening of innovative collaboration structures. Addresses some successful cases of linking heterogeneous agents in the international context and the perception of the building of linkages in Mexico.

**Key words:** Knowledge, innovation, University, bonding, business and Government.

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## Introduction

The theme of this research has acquired great relevance in recent years, due to globalization, the international demands and trends, are phenomena that require changes ever more urgent, a viable alternative, as the strengthening of innovative structures for collaboration between heterogeneous agents that involves the University-Industry-Government and even to civil society and intermediate agents, as main source for economic growth of a country, this type of collaboration or linkages of heterogeneous agents from the years 90's have been expressed as the second academic revolution (Etzkowitz, Webster, & Healey, 1998), since the first academic revolution was characterized only between teaching and research, meanwhile this second academic revolution would mean a knowledge capitalization and recently spoken of a "third academic revolution" (Rickne, Laestadius, & Etzkowitz, 2013), in which the University plays a crucial role not only as a generator, but also as a transmitter of knowledge to the productive and social sectors, in other words, the University its function is to contribute to economic and social development through transfer of technology, scientific knowledge and innovation, so that it is valuable to analyze successful cases of linking heterogeneous agents internationally on the form that has been given the linkage comprising the triple helix - University-Industry-Government- model, a model that coined Etzkowitz & Leydesdorff, (1995), which has been implemented in developing countries for economic growth, which you can taken to the Mexican context, because it seems that Mexico is still in its infancy.

It notes that recently in the National Development Plan (NDP-2007-2012 NDP 2013-2018), both issued in different presidential administrations by the government of the Mexican Republic, have scored some key points about the importance of higher education

institutions (IES) to get involved in the activities of productive and social sector, however it is perceived that is still under construction this type of interaction between heterogeneous agents, as the authors note (Cabrero & Orihuela, 2012) in the National Survey Institutional Linking (ENAVI) in 2010, there is a weakness in that HEI involved in productive activities in the productive and social sector, in this sense other crucial points that are still pending is the lack detonate some institutional policy of strong linkage to guide this process of linking academia, the productive sector and the government and consequently innovation, where innovation is another of the "pending" in Mexico as in developed countries, innovation is generated and applied as a decree, as mentioned in the international literature for regions to be competitive, you have to create innovation and transfer of scientific and technological knowledge via cooperation or bonding, to this problem the following question proceeded to develop What It is what inhibits the construction of networks and strategic alliances between heterogeneous agents to generate knowledge and innovation in Mexico? This question will be answered along the article.

The methodology of this investigation stems from a review of literature, analyzed various international, national and regional authors, and also plans and programs of education, just as the law of science and technology and innovation in Mexico was revised, in order to know the relationship between heterogeneous agents, so as to achieve reaching detonate innovation, also successful cases of linking based on the Triple Helix model, reflecting strong best practices that have been used in the addresses developing countries and which may serve to developed countries such as Mexico.

The article is divided into 5 sections; The first section is the introduction where roughly explains the problems you have in Mexico and the type of methodology, section two reviewing detailed specialized literature taking into account the triple helix model as a linking strategy In paragraph three successful cases of linking is addressed referring this model of the triple helix and section four some attempts to build collaborative networks of heterogeneous agents in Mexico and in the final section points out some conclusions that rotates addresses environment linkage between heterogeneous agents.

**Heterogeneous building for the production of knowledge and innovation in the international context agents.**

Building networks between heterogeneous agents is crucial in this century, as globalization and internationalization required to build collaborative networks to build new policies on science, technology and innovation, this type of collaboration networks between public-private through public policies including national and international levels have been regulated to some form a space for interaction in corresponding, academia, business, public research centers, civil society and governments (Casalet, 2009), the interaction between these It consolidates heterogeneous agents through research, publications and even the direction of policies in science, technology and innovation (STI)

In this regard it is considered transcendental use of an alternative model, who has served in developing countries to build heterogeneous agents in the production of knowledge and innovation is the model "triple helix" which includes the university, the company and the government, Etzkowitz and Leydesdorff in the 90s. This model assumes triplex mode 1 and mode 2 Gibbons in the 90 years of the twentieth century, a period of time that has been discussed in recent years as a way to identify knowledge production and consequently generating innovation In this sense a new way aiming. Mode 3 knowledge production (Carayannis, Barth, & Campbell, 2012; Acosta & Carreño, 2013), which goes beyond a simple relationship between universities and businesses, is committed to civil society as a fourth helix care the natural environment as fivefold helix, see Table 1.

Table 1. Production of knowledge

MODO 1 y MODO 2	MODO 3
<ul style="list-style-type: none"> <li>• Triple Hélice</li> </ul>	<ul style="list-style-type: none"> <li>• Cuadruple Hélice</li> <li>• Quintuple Hélice</li> </ul>

Source: Prepared based on (Gibbons, et al., 1997; Etzkowitz y Leydesdorff, 2000;

Carayannis, Barth, & Campbell, 2012; Acosta & Carreño, 2013).

In this sense authors like Acosta & Carreno (2013) in its conclusions relating to Mode 3, effectively bet on a propeller quadruple and quintuple propeller that can be pronounced as transcultural, that is, not enough mode 1 disciplinary and mode 2 transdisciplinary but need to include other forms of knowledge to solve problems of social actors, and the natural environment or the care of the natural environment, you bet to Community Innovation (rederes collaboration between heterogeneous agents).

The triple helix model is intended that the shares of the University is a creator of knowledge and strengthening of human capital, which plays a key role in the relationship between industry and government and how they are developed to create the innovation among the triad, such as creating knowledge source (Etzkowitz and Leydesdorff, 1995). It is a oriented intellectual process viewer evolving relationship between the university and society, characterized by the intervention of the university in economic and social processes already mentioned Vessuri (2008), higher education and research are the way forward for global development. It also provides a link between the disciplines and knowledge, where the university has a strategic role and is the basis for generating relations with the company (Etzkowitz and Leydesdorff, 2000), another of the slopes factors in the knowledge economy is precisely the link between science and technology for economic development (Canales, 2011), ie, on the agendas of government has been a priority science, technology and innovation in developed countries.

That's why the triple helix model seeks the complexity of the concept of partnership, taking into account the environment in which the relationship between liaison officers based or heterogeneous, so Etzkowitz and Leydesdorff (2000) proposed three different aspects evolution of the Triple Helix, which have already referred to some authors in their research (Etzkowitz, 2002; Farinha & Ferreira, 2011): These three types of models of the triple helix, present them to differentiate the role and structure of each evolution of the model at the time of construction, which are shown below:

- a) The first model refers to the "Triple Helix I", where the state covers, monitors and coordinates industry and academia and from then regulates the relations between the institutional level, since it referred authors and Canales (2011) that science, technology and innovation has been a priority for the government, precisely to control other heterogeneous agents as the university and the company.
- b) Triple helix II The second model, the separation of the institutional sphere has strong division boundaries. "Laissez-Faire" derived French word meaning "to stop and let go", that is, each institution or propeller completely independent and free to act in their own markets, no one is imposed.
- c) Triple helix III as a third model that even the participation of academia, government and industry are generating a whole different knowledge infrastructure aimed at innovation in terms of institutional overlapping areas, each in the role of the other and with hybrid organizations emerging recently can no longer work alone like the model II "Laissez-Faire", as the phenomenon of globalization brings a range of skills, innovations etc. Obliges actors from academia, industry and government support each other to achieve obtain a competition with international markets, ie recently in developed countries perceived to work and interact in a collaborative network between heterogeneous agents (University, public research centers, business and government) that point to a new understanding, I referred authors Casas & Dettmer (2006), that knowledge is learning by doing and using, while innovation is learning by interacting, in this sense these agents heterogeneous interacting, generating and applying scientific, technological and innovation

Model III is considered to be more consolidated for successful bonding, this can generate knowledge through innovation and economic development, I said Muñoz (2010), for higher education and research today form the cultural, socio-economic and ecologically sustainable development of individuals, communities and nations. Albert and Laberge (2007) analyze this model triple helix III as a model whose general framework is evolutionary and institutional economics, as explained Canales (2011), there are different stages of economic development, moving from the era industry to a contemporary, in this sense Schumpeterian approaches in economic theory, supplemented by a sociological

perspective on innovation processes (Casalet, 2012), which have focused the attention of researchers and policy makers of innovation, is to the fact that knowledge of the economic value requires the intervention of the actors in areas previously considered separate and unrelated: the academic world (IES, research centers, laboratories etc.), industry (employers) and government agencies.

Etzkowitz (2008) notes that the relationship between these helices have a focus on innovation --a innovation that derives from the university-industry-government-thanks to these hybrid or heterogeneous elements fill the gaps in the process of technology transfer system and aim at innovation. This phenomenon is discussed in the Triple Helix model as an evolutionary co-interactive network, which helps at all stages of the innovation process and development (Penksa, 2010; Geels, 2005).

That's why Etzkowitz (2008) traces the paths to the triple helix, where a reciprocal agreement signed by the university, industry and government is built. For example, these agreements could be a council of technology or creating a center of excellence as part of this agreement, each sector contributes according to their traditional roles, for example: the university provides education and research, financial resources and government incentives and regulatory reform or the rules of the game (Etzkowitz and Leydesdorff 2000), the company provides the means for the commercialization of research and development (Penksa, 2010).

In the model of the triple helix twist changes since the production of new knowledge and technology becomes more important (Etzkowitz 2008). The strategy then focuses on improving the production of knowledge to create and improve the "stock" of intellectual capital, whether that occurs through R & D in universities, in government or company laboratories. It implied that the cooperation between heterogeneous agents explicitly recognizes the importance and involvement of higher education for innovation (Rickne, Laestadius and Etzkowitz, 2013), however there is a new addition of knowledge became the basis for the creation of star spin off or up (start-ups), which is replaced in the center of the spiral of the university and other knowledge institutions that may arise.

Thanks to this interaction between heterogeneous agent, taking as a basis has been established spiral of innovation, the dynamism of these propellers and this can be called a fourth helix (Ahonen & Hämäläinen, 2012;. Arnkil et al, 2010) this fourth helix or quadruple helix, known as the "civil society", ie, one intermediate people to regulate the participation of the three actors or propellers to generate innovation.

This quadruple helix or civil society was a project to optimize the benefits of globalization and innovation of small and medium enterprises (SMEs). In addition the project was to strengthen the policy of local and regional authorities and their ability to support innovation more effectively (Ahonen & Hämäläinen, 2012). The role of the fourth helix in recent years has been as a co-evolution of the knowledge economy and the knowledge society (Carayannis, Barth, and Campbell, 2012;)

In this sense authors like Carayannis, Barth, and Campbell (2012; Carayannis & Campbell (2014) resume from the triple helix Etzkowitz and Leydesdorff (1995) and the quadruple helix "civil society" in Ahonen & Hämäläinen (2012); Arnkil et al., (2010) to generate a new propeller, so the authors had not considered in their texts, they call the "Fivefold Helix".

This Fivefold Helix supports the formation of win-win between ecology and innovation, the creation of synergies with the economy, society and democracy, that is, this propeller quintuple is one of the quadruple helix "plus extension", and which it represents further development and evolution in the thinking that integrates ecology and environment in the era of the knowledge society and innovation. Also refers to this propeller quintuple is seen beyond sustainable or sustainable development can mean and imply an eco-innovation and eco-emprendurismo (Carayannis & Campbell, 2014), that is, they are based on natural environments of society and economics, social ecology and socio-ecological transition, also considers social responsibility (De la Fuente & Didrikson, 2012) of public and private universities and even the social responsibility of companies.

**Successful experiences of linking heterogeneous agents in the international context**

Linking academia with the company in the United States, reflecting efforts to persuade colleges to help private interests first "Morrill Act" in 1872 (Rivera and Cuellar 2013 was achieved ). High linking universities with private companies, mainly in high technology, began in the late seventies and has accelerated this trend since at that time until today of this century.

First, universities resisted during the early 80'sa maintain federal funding for research and the situation only worsened with cut military research in the nineties, after the collapse of the Soviet Union. However universities needed to develop new sources of funding for research funds and the private sector was the one who took the place of military research. Second, with the challenging Japanese industry in the seventies and American industry in decline, many politicians demanded an increased return on investment of most universities (Rivera and Cuéllar, 2013), for projects between companies and incubators Office "Technology Licensing" of Stanford University, who is currently producing between 150 and 180 discoveries per year, where Professor Henry Etzkowitz founder and president of the international association of the Triple Helix participates.

According to the investigations of Acworth, (2008) documents the process of linking heterogeneous agents specifically university-industry-government in the UK, in order to generate innovation in their research describes an alternative model to solve problems the productive sector, a model that articulates the University of Cambridge and the Technological Institute of Masachusett (Cambridge-MIT Institute (CMI)), which was created in 2000, as a vehicle and model specifically for the integration of knowledge in community ( Knowledge Integration Community (KIC)), to enhance the development of links between university-industry-government, this model was created by the UK government, as tenía knowledge of the needs of the productive and social sector, which is why a model that can connect universities, the productive sector and the government to improve the competitiveness, productivity and the entire enterprise with a focus on

innovation, this partnership between the Cambridge-MIT Institute (CMI) is created cost millions of euros, part government and part financed by the private sector funded.

All activities are done in Cambridge-MIT Institute (CMI) for the industry is supported by the UK government, for example the transfer of technology to the productive sector, and in this collaboration are the political representatives of the UK government, on the side of the academy teacher-researchers and industry representatives, meet in an effort to identify and seek joint solutions to common problems facing each of the parties cooperate under the model Knowledge Integration Community (KIC) that described above, for a comprehensive solution to the problems whether technological, economic and social. In this sense it was cited in the investigations of D'Este & Patel (2005) where he concluded that in the UK, the role of the university plays a crucial role in society as a transmitter of knowledge and helps economic development. Cambridge-MIT Institute (CMI) can interact in different levels or channels with industry, that may be creating new physical facilities, consultancy, research, training and conferences.

Likewise Yang (2009) documented the case of Korea on the importance of linking the heterogeneous agents where the country of Korea was known as one of the countries most marked up in economic growth since the 60's, in which Universities and Institutions of Higher Education (IES), have played an important role in the process of transition for the economic growth of Korea. The higher education institutions, research centers mentioned by the author have contributed in a brutal manner, until they came to have no control over the technological development in that country, one of the functions of these IES was supplying human resources to be invested in education with private companies, on the other hand private companies had their research centers spent more than college to prepare human capital, however the main source of science and technology came from the university to support businesses.

Contributions from universities to companies were not only students, but also teachers of Korean science projects, technology and innovation, in which the teachers acted as advisers to the government and even as consultants and advisers to the Korean companies. The

contributions were linearly under a connection between heterogeneous agents to basic research and industrial innovation.

Increasingly an ecosystem that provides human capital to produce cutting-edge research, that is, the network of agents heterogeos form a capacity to strengthen policies on science, technology and innovation, in this case, Korea has implemented forms some policies based on the results of science and technology thanks to the collaboration of these heterogeneous agents. Within the innovation ecosystem includes Korean and making references to universities as essential because they provide the human capital and meet the needs of the productive sectors.

Yang (2009) focuses on two key points to the importance of university-business in Korea: the first refers to the link by itself is a sustainable ecosystem and the second is how to contribute to the more innovative society . All this is thanks to government policies that were implemented in all universities in Korea, namely, the Korean government has made stress upon the importance of science, technology and innovation for a long time, that is why we included as areas regional development, development of science, technology and innovation, which could be controlled directly through the ministries, gubertamentales agencies, industry and universities.

In other investigations the Korean case, according to Eom & Lee (2009) conducted a survey of innovation, which was the third survey taking references definitions Oslo Manual available OECD to observe the determinants on the cooperation between heterogeneous agents especially universities, businesses and Korean government, which found that the magnitude of firms had to watch a insignificant strength in research and development (R & D), some of the hallasgos was that companies performed innovation through nodes cooperation with heterogeneous agents in general came to the conclusion that the cooperation between heterogeneous agents can not guarantee success that is technological innovation without being articulated.

Also happened in Japan in the 90's, was forced to fundamentally transform university-business-government, the main cause was the lack of competitiveness against the United States in key sectors such as information technology and biotechnology. Competition from China and South Korea that have industrialized at accelerated speeds were representing threats to the Japanese industry, the answer to these new challenges did not wait by their companies, starting these to show greater interest in learning generated by their universities. The Japanese private sector currently makes heavy investments in Research and Development, has 64 cooperative research committees university-industry that are operating (Rivera, 2006).

In Latin America and the Caribbean, according to the document "Ibero Spaces: Links between universities and businesses for technological development" of the Economic Commission for Latin America and the Caribbean (ECLAC) by a group of researchers (Bárcena et .. al, 2010; 59), allude that there are several factors that can facilitate the creation and strengthening between the University-Enterprise, is why we proposed two main elements:

- a) Elements of convergence: University-business, are primary actors for innovation processes and the two institutions have skills besides scientific and technological capacities for the generation of knowledge. Of course, the knowledge generated in companies are not the same as generated in the IES, everything is different but both are complementary, both require financial resources, infrastructure, and human capital.
- b) Elements of divergence: University-Industry carry different powers, on the side of the university dedicated to training and knowledge generation in science and technology through basic research, establishing a virtuous synergy between these functions, the university publicly funded and its purpose is purely academic. And on the side of the companies they need to pursue innovation processes to increase productivity and competitiveness.

In these aspects of convergence and divergence, is where heterogeneous actors can participate in collaborative projects, I mentioned Romo and Correa (2011) that should create policies aimed at changing the structure relationship between the IES, the society and the state. In Latin America it is possible that acting together can reduce costs, share knowledge, the productive sector as a source of practical knowledge and the university as a generator of theoretical knowledge and even take advantage of the financial resources available to the government, because the university and the productive sector can not continue to work individually, the financial and human resources are increasingly limited and the only alternative is linking factors to strengthen convergence and reduce divergence factors that have the institutions.

### **Perception of building links between heterogeneous agents in Mexico**

Higher education in Mexico has become one of the most important for the impact of globalization and internationalization given that you have to strengthen their institutional structures aiming at innovation arenas and the international authors address some successful cases showed the previous section, which has set the pace to continue building cooperation between heterogeneous agents, also the convergent space happens in the European Community (Amaral & Neave, 2014) "European Paradox" after the Bologna process where various experts in higher education they have wanted to create strategies to follow the model of the Bologna process for the construction of a Latin American space that has left a lesson for Mexico.

During the early 90's, new trends in Mexico, has started a process of institutional restructuring due to the international and national context, in addition to the requirements of the OECD, World Bank, European paradox, proposed new operating rules Academic such as strengthening the development of a curriculum of higher education, in order to facilitate the learning of college students and positioning in a competitive manner, developing skills and abilities that can compete in domestic and international markets, to solve problems to productive and social services for the strengthening of local, national and international level (Taylor, 2008) sector.

Certainly during the learning process of the university students, curricula are challenges that have to develop during his college career, --a dual education, the practice time and part-time in aulas-- it is why the task of Higher Education Institutions (IES), is to facilitate access and student learning in the globalized world that exists today, the advent of globalization and internationalization have been factors affecting yet challenges for IES and this has been reflected in the report as the Delors in 1996, "The Treasure Within", including reports from the World Bank and other official documents to position the student learning.

In the 2000s, Oslen quoted in Taylor (2008) and argued that the relationship between university and society is deteriorating because it has not received a response from the university to resolve or suggest alternative solutions for the development of society, certainly seen the university as a propeller that can generate critical approach to solving problems in society in general, we are certainly in a globalized world, in the era of knowledge or information society (Orozco, 2009) it must prepar students effectively to the resolution of any problems with the productive and social sectors in this regard should be to modify the curriculum based on the needs of society, because there is still the mystery of how to raise strategies for student learning and developing skills and abilities to act in the knowledge sociedad. Orozco (2009) suggests a number of elements of learning in the knowledge society or information society, which refer to documents such as the Delors report, the OECD, including UNESCO, on the four pillars of education " learning to do, learning to be, learning to live and learning to learn ", here missing add" learning by interacting "referring Homes & Dettmer (2006), to target innovation these pillars is the most breathtaking way to position the University for building a more just and equitable society, especially the development of the education of students to face the reality in which we live.

Following the demands of globalization and internationalization a Law of Science and Technology (S & T) was created in 2002 to strengthen the relationship between academia and the public and social sectors, this law was reformed in 2009 in order to strengthen transfer of scientific, technological and innovation knowledge and recently in 2015, there was another amendment by the Senate of the republic in order to force all academic collaborative projects with the productive sectors and social as in other countries 70%

academics are working on collaborative projects with industry and while Mexico 95% of academics remain in academia, this is essential to boost the development of scientific research instrument, technological development and innovation in Mexico, as well it also has a National Innovation Programme issued in 2011, an intersectoral committee, describing what expresses the international literature and even mentioned that organizations such as the OECD, ECLAC, UNESCO, for the realization of the cooperation between heterogeneous agents in Mexico.

In this regard, in 2010 two surveys of national links are applied by researchers at the Center for Research and Teaching Economics AC (CIDE, who called National Survey of Institutional Linking (ENAVI) and the National Survey Linking to Business (ENAVES), where did a great effort to HEIs and the productive sector proceed to answer, the result showed, for example ENAVI (2010), which corresponds to outreach activities more complex, the frequency with which observed ties between IES and representatives of SPPS significantly reduces a 54.54% of IES respondents conducted research, experimental development and innovation not commissioned by companies or agencies, while the 36.17% of IES respondents provide technological services to productive sector and only 16.31% one would have incubators, which often require the collaboration of the SPPS.

It was further noted that the activities of teaching, students and outreach, aimed to relations between productive IES-Sector (SP), only 18.36% had outreach activities, while the National Survey Linking Enterprises (ENAVES) 2010, won information on the activities of companies in linking SP-ies where 23.48% of the companies surveyed directly financed outreach activities with IES and 23.15% of the economic units report out research and development; the rest remains frozen and weak, is considered to represent an opportunity to find ways to strengthen ties between the IES-SP.

Consequently Cabrero et al., (2011) reported the results of the ENAVI in one of its articles, to see the conditions that HEIs are in collaboration with companies in Mexico face the challenges of this new substantive axis "linking" . There are likely to develop partnerships with industry stressing "the possibilities or conditions" in which IES are in Mexico, the

authors identified three conditions that inhibit collaborative activities which have to do with the internal organization, communication and resource availability. The first is given by mismatch between the school calendar and cycles of activities in companies, this means determining factor related to the lack of teacher training activities and the lack of supply of services has to HEI support businesses, because companies know these deals available to IES, the second coming together with this, improve communication between actors and the third on availability of resources it means that 9 out of 10 IES established in its mission collaboration with industry, have also noted that some institutional linkage policy purposes and about 75% have legal and institutional framework (organizational manuals, procedures etc.) to manage projects and exercise resources from companies or organizations for projects of linking.

In the research Casalet (2012) details a initiatives and programs have in Mexico to encourage university-industry linkage, in order to generate innovation, this initiative is coming series based on the Law on Science and Technology (S & T) which it was established in 2002 with a modificacion in 2009 and 2015, to consolidate the creation of linkage units and technology transfer with the aim of replacing tax incentives focusing on stimulating investment in Research and Technological Development and Innovation (RTDI) where small programs such as technological innovation to micro, and medium enterprises (Innovapyme), networking projects aimed at innovation (PROINNOVA) and technological innovation for large companies (INNOVATEC) were created, where recently the National Council of Science and Technology (CONACYT) coordinates these programs to strengthen the RTDI in Mexico.

Also it has the available on the website of CONACYT which has nine modalities to boost detection and generating business opportunities with high added value based on the application of scientific and technological knowledge "Advance" program, nine modalities are Next: new business, CONACYT-NAFIN Entrepreneurs Fund, Guarantee Fund, Support Patents, Technology packages, Office of Technology Transfer (OTT), Business schools Advancement and Strategic Alliances and Innovation Networks for competitiveness

(AERIS). All these programs are aimed at entrepreneurs, researchers, universities that scientific and technological research.

Casalet same way, (2012) shows in his analysis some interagency partnerships for the development of collaboration that has to do with thematic networks for multi-disciplinary and inter-institutional cooperation partnerships and strategic alliances between companies, IES, CPI public and private , is also the S & T Sector Fund for Economic Development, the Programme for the Development of the Software Industry (participating Economy, CONACYT and government) also strategic alliances Networks Innovation for Competitiveness (Aeric) and finally CONACYT thematic networks that are inter and multidisciplinary platforms.

Effort has been made by a multidisciplinary team such as; experts from the UNAM, CONACYT and the Consultative Forum on Science and Technology (FCCyT) met to create a single document aimed effects of investment in science, technology and innovation to Mexico with a focus on university-enterprise supported by the government , have "programs to support research into general policy, state IES better research capabilities and links with the productive sector and the existence of an open and organized in networks (FCCyT, 2013, p scientific community. 18) further in this document and states that should boost ties with academia with their counterparts at institutional, national and international level, as there is a "dislocation which has caused a slight association of graduate programs in the sector production, leaving no area of application knowledge that trained human resources in S & T acquired during its preparation in the graduate "(FCCyT, 2013, p. 24).

Likewise, the efforts made by the government of the republic through National Development Plans (NDP), for example the previous NDP 2007-2012 specifically Axis 2 is raised: (i) Enhance the productivity and competition involving the three powers and the private sector, where commitments were made between political and social actors to promote the necessary reforms in the competitiveness agenda is carried out; (Ii) To facilitate the process of scientific research under the scheme adoption of technological innovation to increase the material well-being; (Iii) Coordination of the Science and Technology and the productive sector and (iv) Decentralization of scientific, technological

and innovation activities to the productive sector (Government of the Republic, 2007; Rivera and Rivera, 2013)

In the current presidency of Enrique Peña Nieto, through the National Development Plan 2013-2018 raises some actions, mainly on the axle 3: "Mexico with quality education" in its horizontal approach "democratize productivity" to strengthen capacities institutional linkage such as: (i) strengthen the institutional capacities of linking institutions of higher and higher with the productive sector average, and encourage ongoing review of educational provision; (Ii) Encourage the establishment of institutional linkages tips. (Ii) Increase public investment and foster private investment in innovation and development activities in research centers and companies, particularly in the creation and expansion of high-tech companies; (Iv) Establish a monitoring system of graduates of high school and higher level, and conduct studies to detect needs of employers sectors (Government of the Republic, 2013). Including linkage policies in the current National Development Plan, it was a recurring theme in some forums held with the aim of designing the current NDP 2013-2018.

## **Conclusions**

It was noted in this article that in developed countries, heterogeneous agents are strong allies for a joint learning and consequently the strengthening of research and innovation, by them decree countries have since their structures crucial to participate in collaborative projects paper between university, business, civil society, intermediate agents and especially the government, these heterogeneous agents in developed countries acquire a transcendental role in promoting programs and funding from cooperation agreements, this includes the new form of knowledge production, Mode 3 Acosta & Carreño (2013) as well as could be observed in the research initiative was done in UK joint two universities Cambridge-MIT Institute (CMI), to solve problems of the private and social sector, in Japan, in the years 90s pointed to technology and biotechnology.

Mexico must have a vision beyond search strategies in collaboration with the various heterogeneous agents, it is obvious that there are initiatives to generate collaborative networks for training and research in universities, public research centers and productive sectors already mentioned (Casalet , 2012) imposed on certain CONACYT building programs in collaborative projects; the actions of the government of the republic in the National Development Plans; the National Innovation Program; S & T law; the State Development Plans of each state to create public policies on science, technology and strong in the era of the knowledge society, innovation, as new demands that affect the production of knowledge not only looking for quality and excellence, also the transfer of scientific, technological and innovation knowledge, ie to generate different programs aimed at innovation in the regions.

It is also important to reweigh the organizational structures of the IES, and even companies, to perform cooperation activities in Mexico, as other countries have done, create a joint vision of heterogeneous agents also take into account the intermediary organizations, civil society, NGOs, etc.

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