

The Role of the Triple Helix in Promoting the Academic Entrepreneurship

دور الهيليكس الثلاثي في تعزيز المقاولاتية الأكاديمية

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Abstract: The importance of entrepreneurship education has gained momentum in recent years. Indeed, it can be observed on a global scale that there is a growing trend in a government's policy to defend the entrepreneurial spirit. The purpose of this paper is to better understand the concept of "triple helix", which represent the relationship between academia, industry and government in promoting and training entrepreneurship. The propeller thesis of the concept is that these relationships can generate new institutional and social formats for the production, transfer and application of knowledge. Hence the interest shown on this paper, to the paradigm of academic's entrepreneurship. A review of the literature is conducted on the concepts, and the results of research carried out on the subject, are discussed.

Keywords: triple helix, academic entrepreneurship, entrepreneurship, entrepreneurial spirit.

Résumé : L'importance de l'enseignement de l'entrepreneuriat a pris de l'ampleur ces dernières années. En effet, on peut constater à l'échelle mondiale que la politique des gouvernements en matière de promotion de l'esprit d'entreprise prend de plus en plus d'ampleur. Le but de cet article est de mieux comprendre le concept de «triple hélice», qui représente la relation entre les universités, l'industrie et le gouvernement dans la promotion et la formation à l'esprit d'entreprise. La thèse de l'hélice du concept est que ces relations peuvent générer de nouveaux formats institutionnels et sociaux pour la production, le transfert et l'application des connaissances. D'où l'intérêt porté dans cet article au paradigme de l'entrepreneuriat académique. Une revue de la littérature est réalisée sur les concepts, et les résultats des recherches effectuées sur le sujet sont discutés.

Mots-clés : triple hélice, entrepreneuriat académique, entrepreneuriat, esprit entrepreneurial.

ملخص: اكتسبت أهمية تعليم المقاولاتية زخماً في السنوات الأخيرة. في الواقع، يمكن ملاحظة وجود اتجاه متزايد في سياسة الحكومة للدفاع عن روح المبادرة. الغرض من هذه الورقة هو فهم مفهوم "الخلزون الثلاثي" بشكل أفضل، والذي يمثل العلاقة بين الأوساط الأكاديمية والصناعة والحكومة في تشجيع وتدريب المقاولاتية. أطروحة المروحة لهذا المفهوم هي أن هذه العلاقات يمكن أن تولد أشكال مؤسسية واجتماعية جديدة لإنتاج ونقل وتطبيق المعرفة. ومن هنا الاهتمام الموضوع لنموذج المقاولاتية الأكاديمية. في هذا المقال، تتم مراجعة الأدبيات والمفاهيم، وتناقش نتائج البحوث التي أجريت حول هذا الموضوع.

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I- Introduction :

The decrease in the number of enterprises and the increase in the number of young people entering higher education have led to more and more voices, both in the school system in general and in particular at university level, demand to re-establish contact with society and instill notions of entrepreneurship (Kim and al, 2012). For some authors, it is legitimate to ask whether entrepreneurship can really be taught (Lindquist, Sol and Van Praag, 2016). The strong increase in the number of entrepreneurship training programs indicates that there is general consensus that entrepreneurship can be taught. From the political point of view, it is a treaty thought. The idea that entrepreneurs are not necessarily “born”, but can also be developed, creates a window of opportunity for governments to strengthen the entrepreneurial spirit within society.

Indeed, the importance of using and capitalizing on knowledge for the development of society has become more crucial in the competitive environment of globalization. Previously, government policies and social efforts focused on the creation and production of knowledge. But the quantitative increase in the production of knowledge does not always accompany the qualitative and utilitarian growth of the latter. It is more crucial to produce useful knowledge and understand the context of knowledge capitalization for the development of society (Lee and Ngo, 2011).

Consistent with this new understanding, a number of academic studies have recognized that collaboration among the three institutional spheres of industry, academia and the state is essential to the improvement of regional and international innovation systems. (Klofsten and al., 1999, Etzkowitz and al., 2000, Etzkowitz and Leydesdorff, 2000). In fact, several authors have argued that among the factors that influence entrepreneurship and the entrepreneurial spirit, the concept of “knowledge society” is the starting point for any development (Foray and Lundvall, 1996). Thus, we find the introduction of the triple helix model of university-industry-government relations. In the triple-helix model, universities and other knowledge-producing institutions can play a new role in society by focusing on the dynamics and usefulness of knowledge. In addition to traditional missions such as teaching and research, universities can now organize technology transfer and entrepreneurship activities (Etzkowitz and al., 2000, Leydesdorff and al., 2006, Powell and DiMaggio, 1991).

Specifically, the model gives essential bits of knowledge into the comprehension of advancement with regards to steady connections between university-industry-government performers (Etzkowitz, 2003, Etzkowitz and

Leydesdorff, 2000). (Etzkowitz, 2003, Etzkowitz and Leydesdorff, 2000). However, despite its valuable contributions to the understanding of regional innovation and economic growth, in-depth empirical explorations of the function of the triple helix model and interrelationships between university-industry-government components in regional entrepreneurial activities are uncommon (Kim Y, Kim W, & Yang, 2012).

This paper aims to better understand the triple helix model, as well as to put into the concept of academic entrepreneurship. Namely, the university is an inventor and a cost-effective and creative transfer agent of both knowledge and technology.

II– Academic Entrepreneurship:

With the shift to a knowledge-based economic structure and innovative movement that began in the 1990s, universities start to place more emphasis on pioneering local and national development organizations by producing and transferring new knowledge and technologies skills to the industrial sphere (Tether and Tajar, 2008, Shane, 2004, Bekkers and Freitas, 2008). Empirically, it is clear that the identification, creation and commercialization of intellectual property has become an objective within many academic systems. An entrepreneurial university, including a “third mission” in addition to teaching and research, is an agent contributing to economic development (Readings, 1996).

Etzkowitz and al. (2000), consider the entrepreneurial paradigm, not only as a means to push for intensive research, but as a means to introduce innovation in teaching and research. Thus, it is a two-way flow of influence that is created between the university and a society increasingly based on knowledge and business creation, the distance between the institutional spheres will be reduced. The content and format of teaching, research and the link itself will also be affected. As stated by the authors, the assumption of an active role in economic development leaves the present academic missions in situ, however it additionally encourages them to be achieved in other ways. In addition to translating research into economic development through various forms of technology transfer, the traditional role of education is reinterpreted as the university assists with the modernization of businesses, especially in the technological field.

Etzkowitz (2008) argued that for a traditional university to become an entrepreneurial university, it will have to go through four stages:

- 1- Internal transformation: At this stage, universities are redefining their traditional academic missions and expanding their scope. In particular, the educational function of the university community evolves through the orientation of research, the elaboration of the methodology and the interrogation of current knowledge. This internal change is triggered by the direction of newly acquired practical knowledge. For example, faculty members can identify opportunities for students to serve as interns in

companies where their temporary role as an apprentice transcends original educational intent.

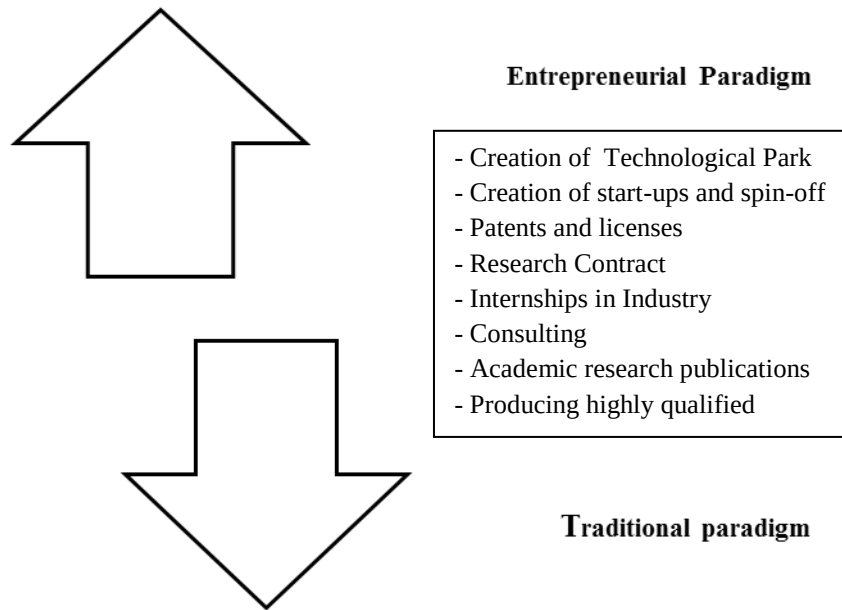
2- Interaction between institutions: At this stage, the government has adopted several regulations on university-industry cooperation. In order to develop university-industry collaboration, legal adjustments have attempted to abolish the conditions of unfair competition and to establish relations between academic organizations and private sector organizations on a clearer legal basis. The United States Research and Development Cooperation Agreement is a prime example. These types of agreements foster more concrete collaboration, cultivate more solid joint effort, permit networking amongst various institutions, and lay the preparation for less demanding access to investigate financing and start-up creation (Kaymaz and Eryiğit, 2011).

3- Interface Process: The entrepreneurial university needs increased capacity for intelligence, monitoring and negotiation with other institutional spheres, particularly industry and government. Beyond the capacity of the senior management of the university to engage with their counterparts in other institutional spheres, a middle level organizational liaison capability allows the university to identify the convergence of interest between external organizations and their academic counterparts (Etzkowitz, 2000).

4- Establishment of organizations: Beyond the establishment of links with existing organizations, the university as an entrepreneur also develops capacities to help the creation of new organizations. This can take various forms, such as the formation of research-based enterprises, and leadership in the formation of organizations meeting regional needs, bringing together different institutional spheres with the common goal of raising innovation.

Thus, for the university to be able to concretely contribute to the promotion of the entrepreneurial spirit and to inspire students to embark on the creation of enterprises, it should itself adopt this entrepreneurial spirit, and no longer summarize its mission to formal education (Philpott and al., 2011). The entrepreneurial activities that a university can undertake to achieve this goal exist through a range of initiatives ranging from “soft” to “hard”, illustrated in Figure 1.

Figure (1): The spectrum of activity of an entrepreneurial university



The source: Philpott et al. (2011)

The soft-hard spectrum refers to the perceived level of entrepreneurial sophistication of individual academic activities (Klofsten and Jones-Evans, 2000). “Difficult” activities (such as patents, licensing and spin-offs) are generally considered as the most substantial outcomes (Rasmussen and al., 2006) of mature entrepreneurial universities (Klofsten and Jones-Evans, 2000). In addition, difficult activities can frequently be viewed as more entrepreneurial in light of the fact that they have a tendency to be less compatible with the role of ‘classical’ academics (Louis and al., 1989). Smarter initiatives (such as publications, grants and research) are more in harmony with traditional academic culture (Klofsten and Jones-Evans, 2000) and cannot even be considered entrepreneurial activities by the university community.

According to previous research on university-industry relations, institutions closer connections to industry generate more spin-off companies and more entrepreneurial activities, such as faculties doing consulting, and the participation of academics in the creation of startups (Cohen and al., 1998, Roberts and Malone, 1996). The results of the research conducted by Cohen and al. (2002) indicate that the best way for universities to transfer knowledge to industry is to use more flexible channels, including publications, conferences, informal exchanges and consultations. In addition, it has been demonstrated that the generation of college graduates can significantly affect the economy. One study found that MIT graduates had established 4,000 businesses, which accounted for 232 billion dollars in annual revenues worldwide (BankBoston, 1997). The creation of spin-off companies based on university intellectual property is positively financially advantageous; notwithstanding, giving people the vital aptitudes to begin organizations after graduation from universities is probably going to have a significantly more prominent economic effect.

In addition, for an academic entrepreneurship to really exist, the university must create an university-industry interface mechanisms, such as a liaison or transfer office to assist existing enterprises or create new ones (Etzkowitz and Zhou, 2006).

III- The Triple Helix :

The Triple Helix concept of university-industry-government relations was initiated by Etzkowitz (1993) and Etzkowitz and Leydesdorff (1995), referring to the early work of Lowe (1982) and Sábato and Mackenzi (1982) on the shift from industrial and government dominance in the industrial society to a growing triadic relationship between academia, industry and government in society.

The thesis advocated by the Triple Helix is that the potential for innovation and economic development in a society lies in a greater role for the university and in the synergy of the roles of the university, industry and government to generate new institutional and social formats for knowledge generation and translation. This vision embraces not only the creative destruction that appears as a natural innovation dynamic as stated by Schumpeter (Schumpeter, 1942), but also the creative rebirth that occurs in each of the three institutional spheres - university, industry and government - as well as their connections (Etzkowitz and Ranga, 2015).

Leydesdorff and Etzkowitz (2001) use the sociological perspective of symbolic interactionism “when they argue that the transformation of relations between these three agencies consists in adopting the role of others” (Crespo, 2003). As a result, the university plays the role of the industry when it collaborates in the creation of spin-off companies in its incubators. The state takes the role of the industry in supporting these developments through funding programs and regulatory changes. Industry, on the other hand, can play the role of the university in promoting research and training (Leydesdorff and Etzkowitz, 2001). The fundamental consequence of this taking of the role of others is the emergence of networks comprising actors and actions of these three agents. In addition, the triple helix does not have a single book charter that guides and is easy to apply and quote. Rather than rejecting institutional differentiation, this approach highlights the emergence of a new layer of “knowledge development”, a stratum in which specific groups from academia, industry and government meet to address emerging issues raised by a rapidly changing economic, institutional and intellectual world. For Shinn (2002), the triple helix is conceived as the sociological expression of what has become a social order increasingly based on knowledge.

In short, the relationship between industry, government, and education can be viewed as a sort of dance - a triple helix dance has three essential stages – “learning”, “knowing” and “innovation” (Matlay and Mitra, 2002). It is executed as a major aspect of a dynamic ritual called “entrepreneurship” and its choreography is shaped by a group of actors and institutions, including academics,

small and medium-sized enterprises (SMEs), services and policies. This dance produces its own impact on the environment in which it is performed, and it does not only help to build and maintain a competitive advantage for businesses, but also to push the economic advantage for the environment, regional and / or national.

The majority of existing triple helix studies has used the quotation of academic research by industry (and firms) or the participation of academics in industrial R & D as a measure of the link between university and industry (Mansfield and Lee 1996, Tijssen 2006, Zucker and al. 2002), while using industrial support (subsidies) for university R & D as a measure of industrial influence on the university field (Campbell and Guttel, 2005, Mansfield and Lee, 1996). Some studies have found alternative ways of exchanging information and knowledge, such as conferences and informal contacts, beyond academic research (Cohen and al., 2002). Researchers have suggested that university-industry interaction positively affects the performance of both entities as quantified by the commercial impact of university research (O'Shea and al., 2005, Shane, 2004), patents (Zucker and al., 2002) and economic performance (Mueller, 2006). However, few or no empirical studies have endeavored to study the cooperating effects of the university-industry-government relationship, including both university-government and industry-government relations, on regional entrepreneurial activities, including businesses training (Kim and al., 2012).

IV- Triple Helix and Entrepreneurship:

Campbell and Guttel (2005) examined relationships between the three spheres of the triple helix and found that consulting activities (88% of global relationships), grants or research contracts (59%) and researcher training (38%) are major points of intersection between university and industry. As for the link between government and industry, advice, public funding and R & D value positions have been archived as significant contact activities. Therefore, and as indicated by Kim and al. (2012), it is critical to examine the part of the triple helix and its interrelation fixated on R & D-related factors such as subsidies or contracts, which assume essential parts in various circles. On the other hand, it is additionally imperative to consider the components that speak to the inherent capacity of every sphere in local business enterprise, so as to comprehend their particular part in this activity. In addition, an environment and policies conducive to academic entrepreneurship also favor business creation through the university (Shane, 2004, Welsh and al., 2008). Previous studies have also suggested the beneficial outcome of university R & D on business start-ups (Goldstein and Drucker, 2006).

Regarding newly graduated academics, it has been suggested that well-educated people have a greater ability to recognize feasible business opportunities and take the risk of starting a business. In addition, they seem to be able to support their business longer than people with lower levels (Lee and Wong, 2004). Several studies support this positive relationship between the proportion of highly educated people in the region and the development of microenterprises or SMEs (Goldstein and Drucker, 2006, Lee and al., 2004). However, the work of Otto

(1999) advanced a deficiency among entrepreneurs with a scientific background, according to the author; they have a tendency to focus on the technical aspect at the expense of the business aspect. This suggests that it may be necessary to have a different set of support measures, going beyond just financial support. For this reason, we note the existence of entrepreneurship centers that are promoted by universities to increase the number and quality of university start-ups (Finkle and al., 2006). One of the key activities of the Entrepreneurship Centers is to empower close joint effort with industry partners to enhance the Center's activities, including business plan competitions, incubation and mentoring programs, to provide broad viable business knowledge to potential entrepreneurs (Finkle and al, 2006).

Although there's still very little research on the impact of triple helix interaction on entrepreneurial activities between university and government, it is often inferred that each entities specialize in basic analysis in science and technology innovation and therefore the government usually provides R & D funding for the university to push basic analysis instead of applied analysis in several scientific and technological fields. However, basic analysis can't be simply remodeled or applied to technology or product which will function as a platform for a start-up (Archibald and Finifter, 2003). On the opposite hand, sure parts comparable to patents are often transferred to existing businesses and marketed once a major transformation occurs (Di Gregorio and Shane, 2003), which may improve the property of existing businesses.

Finally, Kim and al. (2012) suggest that the roles of universities, government, and industry vary in promoting entrepreneurial activity, according to specific national and regional characteristics. In addition, the heterogeneous effects of the interaction between the triple helix spheres on entrepreneurship suggest that systematic policy approaches are needed to make local business strategy compelling. The role of the university is particularly important as it intervenes in the interaction between the spheres in the triplex helix system and creates synergistic effects on the regional entrepreneurial activity. Furthermore, the positive and critical impact of the higher education level of a region on entrepreneurial action additionally stresses the vital part of the university in entrepreneurial advancement.

V- What place for academic entrepreneurship in Algeria?

Overall, entrepreneurship in Algeria has emerged as a solution against the problem of unemployment, the Algerian government has put a strategy based on tax benefits and economic subsidies attributed to young entrepreneurs as the financial and technical support provided through programs allocated by the government, such as the National Youth Employment Support Agency (ANSEJ), the National Agency for Microcredit Management in Algeria (ANJEM) and the National unemployment insurance fund (CNAC). These programs support young people in general and university graduates, in particular, because they are most affected by unemployment, and also, because they have the specific knowledge

and skills to create projects and are able to innovate. This strategy of entrepreneurship in Algeria depends essentially on the integration of entrepreneurship within this target.

Algeria has gradually opened up partnerships with business schools, universities, public-private collaboration in education and vocational training, as well as mentoring programs for entrepreneurs. The attention ought to be on advancing youth business and in addition constructing the initiative limit of existing business visionaries. The connections between the scholarly community, industry, and government are fundamental for the improvement of present-day aptitudes and learning to ideally prompt competitive enterprises. In addition, access to finance, and knowledge (could be accomplished through preparing, presentation to best practices, institutional improvement programs) and skills are essential pillars for entrepreneurship as suggested by the study conducted by Izzrech and al. (2013).

However, the current finding is that the development of an academic entrepreneurship that can be combined with the synergy that can be provided by a triple helix seems rather utopian and this for many reasons:

- One of the main reasons is that the Algerian economy has long operated on an irrational basis that did not favor research and the imperative integration of scientific and technical knowledge into production processes and methods of organization and organization management. The organization of the production system around the objective of “satisfaction of social needs” has relegated the requirements of quality, reliability, efficiency, rationality, profitability, and productivity (Sadoudi, 2006). It is the liberalization of the economy that has been progressively pursuing for more than a decade, which has revealed the shortcomings of the economic system and it's lagging behind the great scientific and technological advances in the world. Indeed, it can now be realized that industrial technologies and processes are outdated, management and organizational methods are not in line with universal requirements. Therefore, the training system in general and the socio-economic environment -economic are called to rebuild their "natural" relations so as to restore the harmony of their complementarity so necessary to the realization of development.
- The second reason is the contribution of the ANSEJ system, the results of which go against the technological development. Indeed, various university studies on the contribution to innovation and the national economy of the investments supervised by the Ansej system have led to the same observation: more than 50% of the micro-enterprises are involved in non-market services (hairdressers, cybercafés, fast-foods ...), subsistence activities that abound in almost all cities in the country. Transportation ranks second with almost 30%, with BTPH companies in third place with close to 10% and less than 1% for the industry. Indicators show that from the point of view of purely economic rationality, the majority of funded projects do not contribute very much in terms of wealth creation, innovation or jobs

- Another reason, and not least, is that entrepreneurship education in our universities remains at the academic stage. The discourse pushes young students to ambition in the creation of a company to have an independent work. However, the latter is considered as the simplest form of the entrepreneurial spirit, developed in the organizational and social framework. The topic of self-employment may be seen as the disposition of some subjects to create another source of work and income for themselves by starting new entrepreneurial activities (Hamilton, 2000, Parker, 2004). In addition, the partnership with ANSEJ has established a certain image among young graduates; receive funding but without obligation of result. Risk taking is thus completely absent from the minds of these students, while the link between risk and entrepreneurship is one of the fundamental elements of the field. As Cantillon puts it, the entrepreneur: “buy at a certain price and sell at an uncertain price, therefore operating at a risk” (Hisrich and Peters, 1998).

We note that, on all types of entrepreneurship education established in Algeria, innovation is regularly truant since we teach and extol the utilization of existing models of business, frequently contending that the use of these models diminish the risk of failure. A greater part of our students' plans are not founded on a really imaginative item or administration. Considerably more missing is advancement in business models. This leaves us in the situation of extraordinary propagation of existing types of business and, along these lines, levels the current types of economy.

VI- Discussion and Conclusion

Impregnated with entrepreneurial attitudes and strategic vision, the alleged entrepreneurial university teams-up with other actors to promote entrepreneurship, regional and then national innovation. More fundamentally, faculties need to consider their research and teaching in a new light, seeking to contribute to technology transfer, the bases of corporate training, as well as the teaching of its students and the advancement of knowledge.

The triple helix is a concept that has emerged with the rise of the university as an agent of change and development, equal to economics and politics, when knowledge-based societies have integrated academia-government and academia-industry in, lateral relations. The evolution of the university no longer summarizes it as an agent of preservation of knowledge, but as a producer of new knowledge, and the use and practice of the latter.

As declared by Etzkowitz and Zhou (2006), the creation of an entrepreneurial university requires “a “critical mass” of research with commercial potential, although limited entrepreneurial initiatives can also be created from a traditional base”. And although the lack of an entrepreneurial culture and an industrial environment are obstructions to the entrepreneurial transition, nor is an intrinsic obstacle. Internal culture and the external environment can be adjusted

through activities promoting entrepreneurship and local advancement (Etzkowitz and Zhou, 2006).

An entrepreneurial university has the potential to take on different roles in different triple helix configurations. For example, it can help revive regional innovation in a university-driven environment; in a model drawn by the government, it is a support for existing businesses and industries and can create new ones at the request of the government, by promoting its graduates; in an industry-driven context, the university typically collaborates in product and process innovation (Etzkowitz and Ranga, 2010). The development of the triple helix can evolve over time from a government system to a university-based system, and then run by the company or any other order.

The entrepreneurial spirit and the circulation in the institutional spheres of university-industry and government, rather than the pursuit of a single path, become the norm. The implications of the triple helix transcend innovation and influence the way we work and interact.

To be able to achieve this complementary relationship between the three spheres, in a country like Algeria, we offer these suggestions:

- To link the university's education curricula with the requirements of the real business world;
- The technological industry has emphasized its superiority over various industries. Therefore, the universities should integrate in their educational curricula more courses related to technology;
- Supporting and encouraging students to participate in various Social Entrepreneurship competitions;
- To enter into partnership agreements with industrial companies and governmental organizations, and send their students to work temporarily within a specific organization;
- To make entrepreneurship education more attractive, dynamic and effective, many universities have developed new ways by inviting business executives to teach and share their experiences with students;
- The University can earn profit by providing consulting services to private, public and even non-profit organizations. These services are provided by the professor and a team composed by his students;
- In an economy with high levels of unemployment such as the Algerian economy, there is nothing better than helping students create their own projects. Here, the university can work with government institution or industrial or Small Business Administration—to conduct market research, obtains financing, and creates viable businesses.

VII- Referrals and references:

- Archibald, R. B., & Finifter, D. H. (2003). Evaluating the NASA small business innovation research program: preliminary evidence of a trade-off between commercialization and basic research. *Research Policy*, 32(4), 605-619.
- BankBoston (1997). MIT : The impact of Innvation, Boston : BankBoston Economics Department.
- Campbell, D. F., & Guttel, W. H. (2005). Knowledge production of firms: research networks and the" scientification" of business R&D. *International Journal of Technology Management*, 31(1-2), 152-175.
- Clark, B. R. (1998). The entrepreneurial university: Demand and response 1. *Tertiary Education & Management*, 4(1), 5-16.
- Crespo, M. (2003). Une nouvelle révolution universitaire? L'échange des rôles de la triade «université-entreprise-État». *Revue des sciences de l'éducation*, 29(2), 375-396.
- Di Gregorio, D., & Shane, S. (2003). Why do some universities generate more start-ups than others?. *Research policy*, 32(2), 209-227.
- Etzkowitz, H. (2008). *The triple helix: university-industry-government innovation in action*. Routledge.
- Etzkowitz, H., & Leydesdorff, L. (1995). The Triple Helix--University-industry-government relations: A laboratory for knowledge based economic development. *EASST review*, 14(1), 14-19.
- Etzkowitz, H., & Ranga, M. (2010, October). A Triple Helix System for knowledge-based regional development: From "Spheres" to "Spaces". In *VIII Triple Helix Conference, Madrid*(Vol. 10).
- Etzkowitz, H., & Ranga, M. (2015). Triple Helix systems: an analytical framework for innovation policy and practice in the Knowledge Society. In *Entrepreneurship and Knowledge Exchange* (pp. 117-158). Routledge.
- Readings, B. (1996). *The university in ruins*. Harvard University Press.
- Etzkowitz, H., & Zhou, C. (2006). Triple Helix twins: innovation and sustainability. *Science and public policy*, 33(1), 77-83.
- Etzkowitz, H., Webster, A., Gebhardt, C., & Terra, B. R. C. (2000). The future of the university and the University of the Future: evolution of ivory tower to entrepreneurial paradigm. *Research policy*, 29(2), 313-330.
- Finkle, T. A., Kuratko, D. F., & Goldsby, M. G. (2006). An examination of entrepreneurship centers in the United States: A national survey. *Journal of Small Business Management*, 44(2).
- Goldstein, H., & Drucker, J. (2006). The economic development impacts of universities on regions: do size and distance matter?. *Economic development quarterly*, 20(1), 22-43.

- Hisrich, R. D., & Peters, M. P. (1998). *Entrepreneurship: Starting, Developing and Managing a New Venture*.
- Izzrech, K., Del Giudice, M., & Della Peruta, M. R. (2013). Investigating entrepreneurship among Algerian youth: Is it a knowledge-intensive factory?. *Journal of the Knowledge Economy*, 4(3), 319-329.
- Kaymaz, K., & Eryiğit, K. Y. (2011). Determining factors hindering university-industry collaboration: an analysis from the perspective of academicians in the context of Entrepreneurial Science Paradigm. *International Journal of Social Inquiry*, 4(1), 185-213.
- Kim, Y., Kim, W., & Yang, T. (2012). The effect of the triple helix system and habitat on regional entrepreneurship: Empirical evidence from the US. *Research Policy*, 41(1), 154-166.
- Klofsten, M., & Jones-Evans, D. (2000). Comparing academic entrepreneurship in Europe—the case of Sweden and Ireland. *Small Business Economics*, 14(4), 299-309.
- Lee, S. J., & Ngo, T. H. (2012). Riccardo Viale and Henry Etzkowitz (eds): The capitalization of knowledge: a triple helix of university-industry-government. *Higher Education*, 63(1), 161-163.
- Lee, S.H., Wong, P.K., 2004. An exploratory study of technopreneurial intentions: a career anchor perspective. *Journal of Business Venturing* 19, 7–28.
- Leydesdorff, L. (2013). *Triple helix of university-industry-government relations* (pp. 1844-1851). Springer New York.
- Leydesdorff, L., & Etzkowitz, H. (2001). The transformation of university-industry-government relations. *Electronic Journal of Sociology*.
- Lindquist, M. J., Sol, J., Van Praag, M., & Vladasel, T. (2016). On the Origins of Entrepreneurship: Evidence from Sibling Correlations.
- Lundvall, B. Å., & Foray, D. (1996). The knowledge-based economy: from the economics of knowledge to the learning economy.
- Mansfield, E., & Lee, J. Y. (1996). The modern university: contributor to industrial innovation and recipient of industrial R&D support. *Researchpolicy*, 25(7), 1047-1058.
- Matlay, H., & Mitra, J. (2002). Entrepreneurship and learning: the double act in the triple helix. *The International Journal of Entrepreneurship and Innovation*, 3(1), 7-16.
- Otto, J. (1999). Entrepreneurship skills for scientists and engineers: recent European initiatives. *The IPTS Report*, 37.
- Philpott, K., Dooley, L., O'Reilly, C., & Lupton, G. (2011). The entrepreneurial university: Examining the underlying academic tensions. *Technovation*, 31(4), 161-170.

- Sadoudi, M. (2006). Le partenariat université-environnement économique en Algérie: un peu de réalisme. *Revue CAMPUS*, (1), 38-44.
- Shane, S., (2004). *Academic Entrepreneurship: University Spin-offs and Wealth Creation*. Edward Elgar, Cheltenham, UK.
- Tether, B. S., & Tajar, A. (2008). Beyond industry–university links: Sourcing knowledge for innovation from consultants, private research organisations and the public science-base. *Research Policy*, 37(6), 1079-1095.
- Zucker, L.G., Darby, M.R., Armstrong, J.S., (2002). Commercializing knowledge: university science, knowledge capture, and firm performance in biotechnology. *Management Science*. 48, 138–153.