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ENTREPRENEURIAL UNIVERSITY AND ACADEMIC CAPITALISM: AN INTERNATIONAL DEBATE

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Abstract

The aim of this note is to explore the international debate actually occurring within the community of entrepreneurial university development supporters and critics on such a model, stigmatizing its openness to marketing, defining it as Academic Capitalism, according to various ethical principles. This debate implies a change as for the university missions (particularly, the third one). This note also examines the most recent bibliography in this field, as a record of the increasing interest coming from the academic world, regarding the traditional Humbolt's model of university evolution.

Keywords

Entrepreneurial university, academic capitalism, triple helix.

Resumen

El objetivo de este trabajo es analizar el debate internacional actual entre los partidarios del desarrollo de una universidad empresarial y los que critican ese modelo, estigmatizando la apertura al mercado de la universidad como *capitalismo académico*, sobre la base de diferentes principios éticos. Este debate implica un cambio respecto de las misiones de la universidad (sobre todo la tercera). Este trabajo también busca profundizar en la más reciente bibliografía en este sector, como símbolo del interés creciente, por parte del ámbito académico, hacia la evolución del modelo tradicional de Humboldt.

Palabras clave

Universidad empresarial, capitalismo académico, triple hélice.

Introduction

In scientific literature¹, there is an ever-growing interest in coping with the so-called Entrepreneurial University (EU). This term was born in the 1980s, in the United States, thanks to the publications² of sociologist Henry Etzkowitz, who since a long time has been pursuing research on this subject, becoming an indisputable point of reference for the international debate. In 1993, Etzkowitz introduced and discussed the concept of the triple helix³, and in 1995 developed it fully with Loet Leydesdorff⁴.

The concept of the triple helix, repeatedly elaborated and based on a collaborative relationship between university, government, and enterprise, arises primarily from the new relationship born in the US between universities and business. It is well characterized by the evolution of the Massachusetts Institute of Technology (MIT), founded in 1861 as an institution dedicated to the teaching in the field of engineering⁵. In the early 20th century, and until the 1930s, even before the Second World War, MIT progressively merged his teaching mission with scientific research, initially not recognized by

1. On the Web of Science, we find 282 papers dealing with the topic “Entrepreneurial University”, and dating from 1985 to 2017. On Google Scholar, we find 16.600 items, including articles, books, and quotes. We will quote some of the most relevant papers in the following pages of our paper. Here, our main concern is to mention some volumes which have by now the function of handbooks, and in certain cases are even conferred a procedural nature to clarify EU-related administrative and legal aspects: J. Bercovitz, M. Feldmann, “Entrepreneurial Universities and Technology Transfer”, in G. D. Libecap, (ed.), *University Entrepreneurship and Technology Transfer: Process, Design, and Intellectual Property*, Jai press, Emerald, 2005, pp. 335; G. P. West, E. J. Gatewood, K. G. Shaver, (eds.), *Handbook of University-wide Entrepreneurship Education*, Edward Elgar Publishing, Cheltenham, 2009, pp. 256; J. D. Toma, *Managing the Entrepreneurial University*, Legal Issues and Commercial Realities, Routledge, Taylor & Francis, New York, 2011, pp. 248; A. Fayolle, D. T. Redford (eds.), *Handbook on the Entrepreneurial University*, Edward Elgar Publishing, Cheltenham, 2014, pp. 496; A. Fayolle, P. Kyro, F. Linan (eds.), *Developing, Shaping and Growing Entrepreneurship*, Edward Elgar Publishing, Cheltenham, 2015, pp. 348; D. Audretsch, E. Lehmann, M. Meoli, S. Vismara (eds.), *University Evolution, Entrepreneurial Activity and Regional Competitiveness*, Springer International Publishing, Cham, 2016, pp. 447; M. Peris-Ortiz, J. A. Gómez, J. M. Merigó-Lindahl, C. Rueda-Armengot (eds.), *Entrepreneurial Universities. Exploring the Academic and Innovative Dimensions of Entrepreneurship in Higher Education*, Springer International Publishing, Cham, 2017, pp. 310.

2. H. Etzkowitz, “Entrepreneurial Scientists and Entrepreneurial Universities in American Academic Science”, in *Mimerva*, 21, 2-3, 1983, pp. 1573/1871. H. Etzkowitz, “Entrepreneurial Science in the Academy: A Case of the Transformation of Norms”, in *Social Problems*, 36, 1, 1989, pp. 14-29.

3. The first expert to use the term “triple helix” was C. U. Lowe, “The Triple Helix - NIH, Industry, and the Academic World”, *The Yale Journal of Biology and Medicine*, 55, 1982, pp. 239-246, while the term “triangle” was introduced by J. Sábato, *El pensamiento latinoamericano en la problemática ciencia-tecnología-desarrollo-dependencia*, Paidós, Buenos Aires, 1975; J. A. Sábato, M. Mackenzie, *La producción de tecnología. autónoma o transnacional*, Nueva Imagen, México, 1982. Also, the first considerations on the relationships between universities, states, and businesses are in J. Sábato, N. Botana, “La ciencia y la tecnología en el desarrollo futuro de América Latina”, in *Revista de Integración*, 3, 1968, pp. 15-36. Etzkowitz corroborates the existence of his forerunners in M. Ranga, H. Etzkowitz, “Triple Helix Systems: An Analytical Framework for Innovation Policy and Practice in the Knowledge Society”, in *Industry and Higher Education*, 27, 4, 2013, pp. 237-262. The 1993 is by H. Etzkowitz, “Technology transfer: the second academic revolution”, in *Technology Access Report*, 6, 1993, pp. 7-9.

4. H. Etzkowitz, L. Leydesdorff, “The Triple Helix of University-Industry-Government Relations: A Laboratory for Knowledge Based Economic Development”, in *EASST Review*, 14, 1, 1995, pp. 11-19.

5. H. Etzkowitz, “Imprenditorialità degli scienziati: conflitto di interessi e cambiamento normativo nella scienza”, in *Quaderni di Sociologia*, 43, 20, 1999, pp. 7-28.

all professors. The first research laboratories were set up separated from teaching and started scientific advice practices with industry. Professors helped to set up businesses, and an administrative office was inaugurated to deal with industry conventions. The patent process developed along with an organization capable to mediate the transfer of knowledge from universities to enterprises. Originally a state-run institution dedicated to teaching, MIT became a private university focused on both research and connections with industry. Patents were not sufficient to ensure a valuable economic return: it was necessary to follow the subsequent developments of industrialization. In this way, a technology transfer model was created. Besides, the demands for emergency technological applications (i.e. radars, atomic bombs, computers), linked to the development of the War, pushed researchers/professors to work in groups. Etzkowitz (2003)⁶ considers the first research groups as “quasi-firms”, and considers them as the beginning of the EU. In a short time, universities such as Stanford and the University of Wisconsin followed the example of MIT: in Stanford, engineer Frederick Emmons Terman, who came from MIT, started to push graduate engineers to found businesses nearby universities: after a few years, The Silicon Valley would be born.

However, most US universities did not follow the example of MIT. The average attitude of the academic body was foreign to the connection with industry, as he was used to producing scientific publications that could only indirectly affect businesses. A small transformation took place in the postwar period, since federal research funds demanded in return at least the chance to process an application product, starting from scientific results. To observe the first public birth act of the EU, we have to wait for the Federal *Patent and Trademark Law Amendments Act* of December 12, 1980, known as the Bayh-Dole Act, from the names of the two proponent senators. This law allows universities and research entities to grant their inventions exclusively to companies, even if the research is federally funded. The main purpose was to make academic patents used by businesses. But the general outcome led to change the Humboldtian model⁷ of the university, based on the flavor of knowledge and on knowledge free movement, into a business model in which universities can orient themselves towards companies, leaving some discoveries secret and enabling entrepreneurs to exploit them, economically and exclusively. As already mentioned, the real problem were not patents, for which competitive and industrial uses require a certain applicative adaptation time (sometimes

6. H. Etzkowitz, “Research groups as ‘quasi-firms’: the invention of the entrepreneurial university”, in *Research Policy*, 32, 1, 2003, pp. 109-121.

7. See W. Von Humboldt, *Università e umanità*, Guida, Napoli, 1970, an Italian translation by Fulvio Tessitore of the 1809 essay “Über die innere und äußere Organisation der höheren wissenschaftlichen Anstalten in Berlin”.

even very long), but the fact to acknowledge universities as entrepreneurial actors, on different basis and according to different levels.

The debate about the process of affirming an EU model

It is very lively the scientific debate sprung up from this transformation of university missions (not just teaching and research, but also a third “entrepreneurial” mission, at any rate, open to society). Many voices have contributed and still are contributing to improve or redefine the EU⁸ model. On the other hand, there are also authors who stigmatize this openness to market, defining it as Academic Capitalism⁹, also in the name of the four ethical principles of the pure science defined by Robert K. Merton: disinterest, epistemic communism, organized skepticism, and universalism¹⁰.

8. Many agree that the first true contribution to the definition of an EU model is in B. Clark, *Creating Entrepreneurial Universities: Organizational Pathways of Transformation*, Pergamon Press, New York, 1998, pp. 180. An institutional contribution is in A. Gibb, “Exploring the synergistic potential in entrepreneurial university development: towards the building of a strategic framework”, in *Annals of Innovation & Entrepreneurship*, 3, 2012. A group of Spanish scholars, with the help of authors from other countries, presents articles that describe a sort of update in the literature of EU models: M. Guerrero-Cano, D. Kirby, D. Urbano, “A literature review on entrepreneurial universities: An institutional approach”, in *Third Conference of Pre-communications to Congresses*, University of Barcelona, 2006. Available at: <http://webs2002.uab.es/dep-economia-empresa/jornadas/papers/2006/maribel.pdf>; D. A. Kirby, M. Guerrero, D. Urbano, “Making Universities More Entrepreneurial: Development of a Model”, in *Canadian Journal of Administrative Sciences*, 28, 2011, pp. 302-316; M. Guerrero, D. Urbano, “The development of an entrepreneurial university”, in *The Journal of Technology Transfer*, 37, 1, 2012, pp. 43-74; M. Guerrero, D. Urbano, “Entrepreneurial University in Two European Regions: A Case Study Comparison”, in *The Journal of Technology Transfer*, 39, 3, 2014, pp. 415-434; M. Guerrero, J. A. Cunningham, D. Urbano, “Economic impact of entrepreneurial universities’ activities: An exploratory study of the United Kingdom”, in *Research Policy*, 44, 2015, pp. 748-764; F. Liñán, A. Fayolle, “A systematic literature review on entrepreneurial intentions: citation, thematic analyses, and research agenda”, in *International Entrepreneurship and Management Journal*, 11, 4, 2015, pp. 907-933; M. Guerrero, D. Urbano, A. Fayolle, M. Klofsten, S. Mian, “Entrepreneurial universities: emerging models in the new social and economic landscape” in *Small Business Economics*, 47, 3, 2016, pp. 551-563; D. Urbano, A. G. Dandolini, J. A. de Souza, M. Guerrero, “Innovation and entrepreneurship in the academic setting: a systematic literature review”, in *International Entrepreneurship and Management Journal*, 13, 2, 2017, pp. 369-395; a recent anthology, quoted in note 1, is M. Peris-Ortiz, J. A. Gómez, J. M. Merigó-Lindahl, C. Rueda-Armengo, which presents different EU situations in the Hispanic and Latin American world, and includes a comparison with the Italian situation (A. Riviezzo, F. Liñán, M. R. Napolitano, “Assessing the Entrepreneurial Orientation of University Departments. A Comparative Study Between Italy and Spain”, pp. 35-46).

9. See as a minimum these writings: S. Slaughter, L. L. Leslie, *Academic Capitalism: Politics, Policies and the Entrepreneurial University*, Johns Hopkins University Press, Baltimore, 1997, p. 296; S. Slaughter, G. Rhoades, *Academic capitalism and the new economy: markets, state, and higher education*, Johns Hopkins University Press, Baltimore, 2004, p. 384; S. Slaughter, B. Cantwell, “Transatlantic moves to the market: the United States and the European Union”, in *Higher Education*, 63, 2012, pp. 583-606; I. Rubins, “Risks and rewards of academic capitalism and the effects of presidential leadership in the entrepreneurial university”, in *Perspect Public Aff*, 4, 2007, pp. 3-18; G. Delanty, “Ideologies of the knowledge society and the cultural contradictions of higher education”, in *Policy Futures in Education*, 1, 1, 2003, pp. 71-82; B. Jessop, “Varieties of academic capitalism and entrepreneurial universities. On past research and three thought experiments”, in *Higher Education*, 73, 2017, pp. 853-870.

10. See R. K. Merton, *The Sociology of Science. Theoretical and Empirical Investigations*, University of Chicago Press, Chicago, 1973, p. 605.

In many of the EU models elaborated so far, some of the most distinctive indicators are those related to technology transfer: i.e. technology parks creation (as Silicon Valley), patents, licenses and contracts. Another important element are spin-offs, which are university companies that leverage academic knowledge to enter the market, and the startups promoted by graduates and PhDs both in collaboration with professors, both pushed by them. These five indicators are strongly criticized by those who censure Academic Capitalism¹¹. This issue dates back to the first three-partition between basic, applied and industrial research, enunciated by Vannevar Bush¹² in 1945, and which had major implications until the introduction of the quadrant scheme of Stokes¹³. The author imagined one quadrant called “Bohr” for pure research, one “Edison” for applied research, and one “Pasteur” for quasi-base research, aimed at understanding the possible uses at an application level. Most recently, as for the EU, Mendoza¹⁴ recalled this topic, in an effort to undermine the negative connotation of Academic Capitalism. Etzkowitz¹⁵ rephrases the theme of the Pasteur quadrant, pointing out that base research does not have a linear approach, but a dynamic one. This is because while responding to industrial and applied research needs, new research questions arise, creating a circuit that does not limit to commercially available applications the work of Scientists who adhere to an entrepreneurial model of the university.

The process of affirming an EU model has led to a strong debate, especially as regards ethical conflicts between advocates of public research commercialization, and advocates of public research purity. Again, Etzkowitz¹⁶ argues that the nature of these conflicts concerns the process of transforming the very structure of scientific research, which even in the medieval model was kept separate from teaching. Even the passage to the first academic revolution, which saw teaching and scientific research in close contact, previously led to ethical conflicts¹⁷, subsequently overcome. The successive transition to the second revolu-

11. In particular, we refer to S. Slaughter, L. L. Leslie, *Academic Capitalism: Politics, Policies and the Entrepreneurial University*, Johns Hopkins University Press, Baltimore, 1997, p. 296.

12. V. Bush, *Science: the endless frontier. A report to the President by Vannevar Bush*, Director of the Office of Scientific Research and Development, Government Printing Office, Washington DC, 1945. Available at: www.nsf.gov/od/lpa/nsf50/vbush1945.htm.

13. D. Stokes, *Pasteur's quadrant: Baste science and technological innovation*, Brookings Institution Press, Washington DC, 1997, p. 196.

14. P. Mendoza, “Academic capitalism in the Pasteur's quadrant”, in *Journal of Further and Higher Education*, 33, 3, 2009, pp. 301-311.

15. H. Etzkowitz, “Anatomy of the entrepreneurial university”, in *Studies of science/Etudes sur la science*, Social Science Information 52, 3, 2010, pp. 486-511.

16. H. Etzkowitz, “Imprenditorialità degli scienziati: conflitto di interessi e cambiamento normativo nella scienza”, in *Quaderni di Sociologia*, 43, 20, 1999, pp. 7-28.

17. An interesting point of view is the paper by J. Sábato, N. Botana, “La ciencia y la tecnología en el desarrollo futuro de América Latina”, in *Revista de Integración*, 3, 1968, pp. 15-36, which, by anticipating the times, also outlines future developments.

tion¹⁸, the entrepreneurial one, structurally due to the increasing complexity of research themselves, in need of substantial funding and of comparisons with competitive applications, has led to new ethical conflicts, this time also of a regulatory nature. For example, in this sense, the radical change that has occurred because of the shift from research based on individual researchers to those necessarily animated by research groups, according to Etzkowitz¹⁹, asks by its very nature a rethinking of contemporarily individuals and regulatory frameworks. Therefore, we would be in a phase of transformation that involves shakes and changes aimed at finding a new global equilibrium, though not immediately.

On the other hand, at this stage, it is difficult to predict a situation of isomorphic development²⁰ of the EU, which does not have a single implementation model but has many and different²¹. However, at least two further levels of diversity must be considered: the one related to the history and peculiarity of each university (including the different composition of the faculties and of subjects taught: scientific or liberal arts, etc.), and that of countries where universities are located, with their economic, political and cultural specificities.

Entrepreneurial University implementation models

Concerning EU implementation models, we should consider another set of indicators, not related to the aspects of public research commercialization. We refer to teaching methodology²², which in an EU has to deal with greater experiential activity, capable of introducing business world structured and tacit knowledge, in a broader way, inside undergraduate courses. For instance, this methodology must include internship²³

18. H. Etzkowitz, "The second academic revolution: the role of the research university in economic development", in S. Cozzens, P. Healey, A. Rip, J. Ziman (eds.), *The research system in transition*, Kluwer Academic Publishers, Boston, 1990, pp. 109-124; an interesting approach to understanding changes in the university is present in P. Kyrö, J. Mattila, *Towards Future University by Integrating Entrepreneurial and The 3rd Generation University*, 2012, available at: <http://pyk2.aalto.fi/ncsb2012/Kyro.pdf>, DOI: 10.04.2013.

19. See H. Etzkowitz, "Imprenditorialità degli scienziati: conflitto di interessi e cambiamento normativo nella scienza", in *Quaderni di Sociologia*, 43, 20, 1999, pp. 7-28, and H. Etzkowitz, "Research groups as 'quasi-firms': the invention of the entrepreneurial university", in *Research Policy*, 32, 1, 2003, pp. 109-121.

20. K. Philpott, L. Dooley, C. O'Reilly, G. Lupton, "The entrepreneurial university: examining the underlying academic tensions", in *Technovation*, 31, 4, 2011, pp. 161-170.

21. See note 8 for the references on EU models.

22. M. Guerrero, J. A. Cunningham, D. Urbano, "Economic impact of entrepreneurial universities' activities: an exploratory study of the United Kingdom", in *Research Policy*, 44, 2015, pp. 748-764.

23. M. della Volpe, A. Siano, A. Vollero, F. Esposito, "Exploring Curricular Internships in Italy: Towards Entrepreneurial Universities", in *International Business Research*, 9, 9, 2016, pp. 150-167.

among its training tools, or it should cover highly educative group activities, in view of the access of graduates into the world of work.

Another indicator is the presence of specific courses, at different levels and with different forms, useful to educate in management and entrepreneurship²⁴. Regarding the role of professors/researchers and administrative staff, it is worth considering the existence of specialized technology transfer and fundraising offices, characterized by the presence of university structured staff and professionals capable of receiving funding from abroad (grantsmanship). The role of professors within Departments can be decisive, both in the EU trend and in a more traditional vision, based on their entrepreneurial orientation: Todorovici, McNaughton, and Guild²⁵ have coped with the situation in Canada; Riviezzo and Napolitano²⁶ with the one in Italy, while Riviezzo, Liñán, and Napolitano²⁷ have compared Italy and Spain.

Philpott et al.²⁸ have conceived an EU variable model (see figure 1) in which harder activities (upward) and soft activities (downwards) are represented. Depending on their nature and contextual conditions, universities may decide to proceed by stages and begin, for example, with soft activities. If we consider MIT, Stanford and the University of California²⁹, all having a solid experience, we can observe that all activities are present.

24. OECD, *Entrepreneurship in higher education*, OECD, Paris, 2008.

25. W. Z. Todorovic, R. B. McNaughton, P. D. Guild, "ENTRE-U: An entrepreneurial orientation scale for universities", in *Technovation*, 31, 2, 2011, pp. 128-137.

26. A. Riviezzo, M. R. Napolitano, "Orientamento imprenditoriale: un'indagine tra le università italiane", in *Sinergie. Italian Journal of Management*, 93, 2014, pp. 193-212.

27. A. Riviezzo, F. Liñán, M. R. Napolitano, "Assessing the Entrepreneurial Orientation of University Departments. A Comparative Study Between Italy and Spain", in M. Peris-Ortiz, J. A. Gómez, J. Merigó-Lindahl, C. Rueda-Armengo (eds.), *Entrepreneurial Universities*, 2017.

28. K. Philpott, L. Dooley, C. O'Reilly, G. Lupton, "The entrepreneurial university: examining the underlying academic tensions", in *Technovation*, 31, 4, 2011, pp. 161-170.

29. The appellation University of California includes around 11 different university institutions.

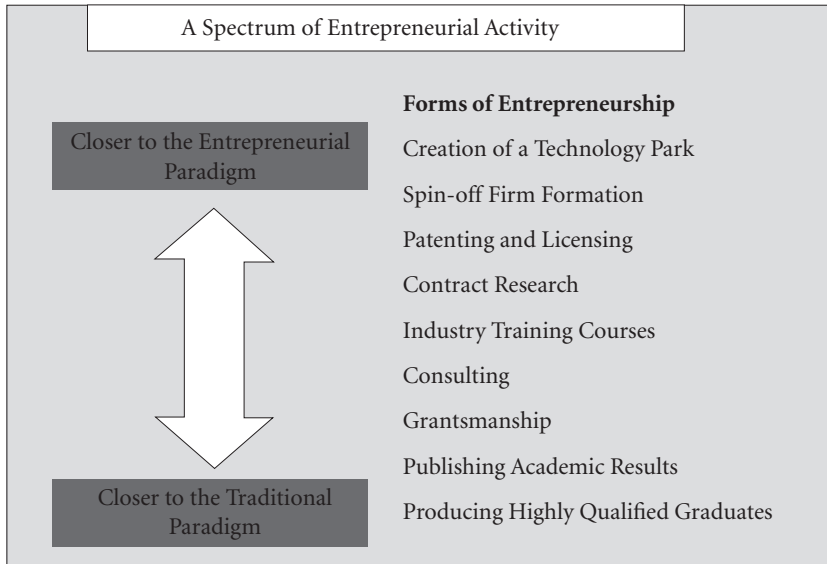


Figure 1 - A Spectrum of Entrepreneurial Activity (from Philpott et al., 2011, p. 162³⁰)

However, Philpott points out that in the more entrepreneurial universities, such as those just mentioned, the most important aspect is the high quality of graduates who are capable of founding new businesses, rather than the value of patents or licenses, as the quantitative analysis of Leydesdorff and Meyer³¹ confirms. This means that investments in the quality of human capital, i.e. graduates, are becoming the dominant strategic element. Among other factors, EU soft aspects cannot be easily criticized as macroscopic examples of Academic Capitalism. This kind of attention to the business world by universities can play a decisive role in enriching undergraduate formation, in favoring an attractive placement to graduates, and in energizing inside students the desire to be entrepreneurs or managers, by means of innovative teaching forming the necessary skills.

Although at different speeds, undoubtedly the EU is expanding in the academic world. The existence of several possible models, some theorized, others emerged due to concrete achievements, shows that it is not possible to speak of a homogeneous EU diffusion. Certainly, from the point of view of the harder aspects, we may find the most

30. K. Philpott, L. Dooley, C. O'Reilly, G. Lupton, "The entrepreneurial university: examining the underlying academic tensions", pp. 162.

31. L. Leydesdorff, M. Meyer. "The decline of university patenting and the end of the Bayh-Dole effect", in *Scientometrics*, 83, 2, 2010, pp. 355-362.

advanced models and experiments in the US. However, we must confirm that in Europe there is a rush to try to match, if not to exceed, the US model. At least from Lisbon 2000, the resolutions of the European Commission clearly testify this, and the Horizon 2020 program goes straightforwardly in this direction. In addition, we should remember that despite the strong awareness of the EU, Sweden, Finland, and Italy, for example, although in different ways, did not fully accept the Bayh-Dole model, coming to recognize that intellectual property must be awarded to researchers, not to universities. However, despite all great or small differences, the idea is quite widespread that there is a useful academic knowledge that can be marketed. As already stated in our previous pages, this idea was born in the United States during World War II, but we have also repeatedly referred to the ethical, theoretical and political critiques pointing the finger against the birth and spread of an Academic Capitalism.

Academic Capitalism

It is necessary to distinguish three types of anti-capitalist criticism towards the EU. The first criticism is clear and is represented by Slaughter³² and Rhoades³³, who contrast the very concept of knowledge commercialization in the name of Humboldtian and Mertonian liberty and pureness, mainly addressed to the harder aspects of the EU. Perhaps, this criticism comes originally from Baycan and Stough³⁴ who, while recognizing a highly negative aspect in knowledge marketing, see a possible challenge for the future, in both universities and businesses, and state that:

Commercialization and research excellence can go hand in hand, if the current focus on profit making, maximizing revenue, short-term benefits, tangible results of commercialization, and centralized structures could be shifted toward value making, maximizing the volume of innovation, long-term benefits, intangible results of commercialization, and decentralized structures³⁵.

32. S. Slaughter, L. L. Leslie, *Academic Capitalism: Politics, Policies and the Entrepreneurial University*, Johns Hopkins University Press, Baltimore, 1997.

33. S. Slaughter, G. Rhoades, *Academic capitalism and the new economy: markets, state, and higher education*, Johns Hopkins University Press.

34. T. Baycan, R. Stough, "Bridging knowledge to commercialization: The good, the bad, and the challenging", in *The Annals of Regional Science*, 50, 2, 2013, pp. 367-405.

35. *Ibid.*, p. 398.

Figure 2 clarifies their point of view, placing the retrospect on the left side, and the prospect on the right side.

Retrospect		Prospect
Profit making	→	Value making
Maximizing revenue	→	Maximizing the volume of innovation
Short-term benefits	→	Long-term benefits
Centralized innovation	→	Descentralized innovation
Single office (TTO)	→	Different organizational modes and modules, cross university initiatives
Focus on patenting and licensing	→	Focus on other forms of innovations including non-patenting innovations, publications
Patent-licensing model	→	Volume model
Secrecy	→	Openness
Closed innovation	→	Open innovation
Focus on commercialization	→	Focus on balancing commercialization and university identity
Tangible results	→	Tangible and intangible results
Focus on commercial issues	→	Focus on social issues and quality of life

Figure 2. Retrospect and prospect in commercialization of knowledge (from Baycan and Stough³⁶).

The second criticism is represented by Slaughter and Cantwell³⁷, who point out that the useful knowledge found in the EU essentially pertains to the disciplines of the group they call STEM: Science, Technology, Economics, and Mathematics (actually, the last one refers to Computer Science). This objective preference insists and condemns the decline of all the disciplines associated with Liberal Art and Humanities, together with a part of Social Sciences, creating a dry loss of classical academic knowledge, unless it finds a survival path penetrating inside more or less commercially available applications (as for instance those of storytelling and augmented reality). This type of criticism finds a good answer in the assessments by Rullani³⁸, for whom new forms of knowledge can

36. T. Baycan, R. Stough, "Bridging knowledge to commercialization: The good, the bad, and the challenging", p. 399.

37. S. Slaughter, B. Cantwell, "Transatlantic moves to the market: the United States and the European Union" in *Higher Education*, 63, 2012, pp. 583/606.

38. E. Rullani, *Economia della conoscenza*, Carocci, Roma, 2004, pp. 397 and 440.

no longer come from a “rationalized linear process” but must be plunged into creative and emotionally valid processes, otherwise, the strength of the new cognitive capital will not trigger. Agreeing with the author, we can reconsider critically the excessive separation of disciplines, and the success of STEM group disciplines as a temporary one. Since new forms of knowledge have to be projected on innovation, breaking the established patterns, Liberal and all minor Arts might play a decisive role in revitalizing the entire knowledge of the future.

Well represented by scholars like Jessop³⁹, the third criticism is the most radical one. It identifies the EU as the accomplishment of a new neoliberal social model, built not on knowledge society (KS), but on knowledge-based economy (KBE). In this negative picture, analyzed with various methodologies (including those of Foucault-originated governmentalities⁴⁰), even the softest components of the EU are seen as the expression of a neoliberal model based on the exploitation of cognitive capital. Such model would irradiate also inside the training of students suitably skilled for entering into the world of work provided by the KBE. With reference to a so radical criticism, which has several supporters, it is not possible here to indicate a simple exit perspective. We can only observe that it pushes to go along with lines of study and deepening that go far beyond the boundaries of the Academic Capitalism or the EU, and hence beyond the limits set out in this paper. Audretsch⁴¹, which has followed the evolution of the EU from the outset, argues that the EU is only a stage in the development of collective knowledge (in its broadest sense) launched by universities. According to Audretsch, if economy has evolved from a physical capital phase to a cognitive capital one, society has also evolved and is becoming entrepreneurial:

“As the university has evolved from the purity of the Humboldt model, to the demands placed on it as first a source for knowledge fueling economic growth and subsequently as a hothouse for technology transfer and startups, and finally as a leader for thriving in the entrepreneurial society, the complexity and ambiguity in the mission of the university has also increased. Perhaps, it is the ability of

39. B. Jessop, “Varieties of academic capitalism and entrepreneurial universities. On past research and three thought experiments”, in *Higher Education*, 73, 2017, pp. 853-870.

40. See I. Bruno, “The indefinite discipline of competitiveness benchmarking as a neoliberal technology of government”, in *Minerva*, 47, 2009, pp. 261-280. D. Pestre, “Understanding the forms of government in today’s liberal and democratic societies: An introduction”, in *Minerva*, 47, 2009, pp. 243-260.

41. D. B. Audretsch, “From the entrepreneurial university to the university for the entrepreneurial society”, in *Journal of Technology Transfer*, 39, 3, 2014, pp. 313-321.

university to both adhere to its traditional strengths as well as adapt to the needs and concerns of society that has made it one of the most resilient institutions in society”⁴².

Conclusion

Concerning at least the model level, which should follow appropriate policies, an important response to the third criticism by Jessop could come from Europe. An Open Innovation 2.0⁴³ approach is proposed, based on the Fourth Helix Model by Carayannis and Campbell⁴⁴. The authors recall that the traditional role of university research was based on a linear innovation model, which we have already mentioned, and that Gibbons et al.⁴⁵ called Mode 1, different from Mode 2, which is characterized by context-sensitive search and interdisciplinary applications. Carayannis and Campbell⁴⁶ had already identified a Mode 3, which emphasized coexistence and coevolution of different ways of innovation and knowledge, the pluralism of which is a growth factor for societies and economies. In the Quadruple Helix Model, the authors add a fourth public helix, in the sense of civil society-related media and culture: “This fourth helix associates with ‘media’, ‘creative industries’, ‘cultures’, ‘values’, ‘life styles’, ‘Art’, and perhaps also the notion of the ‘creative class’”⁴⁷. In this way, the authors narrow the Triple Helix model to the Knowledge-Based Economy, while expanding the Quadruple Helix model to Knowledge Society and Knowledge Democracy⁴⁸. Subsequently, Carayannis and Campbell⁴⁹,

42. Ibid., p. 320.

43. European Commission, “Open innovation 2.0”. 17th august 2017, available at: <https://ec.europa.eu/digital-single-market/en/policies/open-innovation>.

44. E. G. Carayannis, D. F. J. Campbell, “Mode 3 and Quadruple Helix: Toward a 21st century fractal innovation ecosystem”, in *International Journal of Technology Management*, 46, 3/4, 2009, pp. 201-234.

45. M. Gibbons, C. Limoges, H. Nowotny, S. Schwartzman, P. Scott, M. Trow, *The new production of knowledge. The dynamics of science and research in contemporary societies*, Sage, Thousand Oaks-CA, 1994, p. 192.

46. E. G. Carayannis, D. F. J. Campbell (eds.), *Knowledge creation, diffusion, and use in innovation networks and knowledge clusters. A comparative systems approach across the United States, Europe and Asia*, Praeger, Westport-CT, 2006, pp. 1-25.

47. Ibid., p. 206.

48. Ibid., p. 226.

49. E. G. Carayannis, D. F. J., Campbell, “Triple Helix, Quadruple Helix and Quintuple Helix, and how do knowledge, innovation and the environment relate to each other? A proposed framework for a transdisciplinary analysis of sustainable development and social ecology”, in *International Journal of Social Ecology and Sustainable Development*, 1, 1, 2010, pp. 41-69.

Carayannis et al.⁵⁰, and Carayannis and Grigoroudis⁵¹ propose a Quintuple Helix Model, which also takes into account the natural environment and its sustainability.

Using the attention given to the various voices cited in this note, we testify the vividness of the international debate on this subject: definitely, the EU is in a transitional condition, regarding both its theoretical and realization plans. In order to guide this probably epoch-making change, scientists and professors will have to observe and to be active players for all future developments.

50. E. G. Carayannis, T. D. Barth, D. F. Campbell, "The Quintuple Helix innovation model: global warming as a challenge and driver for innovation", in *Journal of Innovation and Entrepreneurship*, 1, 2, 2012, pp. 1-12.

51. E. Carayannis, E. Grigoroudis, "Quadruple Innovation Helix and Smart Specialization: Knowledge Production and National Competitiveness", in *Foresight and STI Governance*, 10, 1, 2016, pp. 31-42. DOI: 10.17323/1995-459x.2016.1.31.42.