



# Innovation Lodestar: The entrepreneurial university in a stellar knowledge firmament

Henry Etzkowitz

International Triple Helix Institute, 1520 Sand Hill Road, A210, Palo Alto, CA 94304, USA



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## ABSTRACT

This article analyzes the stages and phases of development of the entrepreneurial university, incorporating the classic Humboldtian dualistic academic model that unites teaching and research, into a Triple Helix of university–industry–government interactions. The MIT and Stanford cases provide empirical data for the extrapolation of a knowledge-based regional development model that has become increasingly widespread in the US and globally. The societal implications of the dialectic between the ‘capitalization of knowledge’ and the ‘cogitization of capital’ are explored, in conclusion.

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Providing trained persons, preservation of cultural inheritance and advancement of knowledge about nature and societies have heretofore provided the main justifications for universities. Economic legitimating themes are becoming as important as cultural ones as politicians, industrialists, academics and ordinary citizens increasingly view universities as focal points of technological innovation and regional development (Peters, 1989). The original rationale for the founding of Harvard University in 1636 was to guarantee a source of future clergy to guide the spiritual life of the community. Over time, this remit was extended to other professions like law and medicine. By the early 19th century, the academic remit in the U.S. included agriculture and was extended to industry later in the century.

As the university expands its role in society, its image as an “ivory tower” fades and a new image is projected of a font of technological innovation and economic development. In the late-19th-century, MIT followed by Stanford in the early 20th century, entered into a collaborative relationship with growing science-based electrical industries. Their industrial interactions engendered an entrepreneurial approach to managing the practical consequences of research, including patenting and spin-offs, while broadening the input into the creation of academic knowledge. The progression is non-linear since entrepreneurship can also be generated from the teaching mission of the university and humanistic knowledge, even in the absence of an entrepreneurial research tradition.

The university is a resource to create a regime of knowledge-based economic and social development in economic and academic systems at different stages of development. A variety of interpretations of academic entrepreneurship are thus expected rather than simple imitation of MIT and Stanford, inspiring as their examples may be. Entrepreneurial

experiments, with a variety of motivations and sources of support, follow from awareness of innovation potential in the academy and at the interface. As the entrepreneurial university model spreads, it is no longer an outlier on the academic scene; it becomes modal and even taken for granted. In the following we define the entrepreneurial university and discuss its sources and impetuses.

## 1. The entrepreneurial university vision<sup>1</sup>

The ability to set a strategic direction is the first step towards an entrepreneurial university, the necessary but not the sufficient condition. The second step is a commitment to seeing that the knowledge developed within the university is put to use, especially in its local region. This can take a variety of forms, including developing internal capabilities for technology transfer and commercialization of research as well as playing a collaborative role, with government business and Civil Society, in participating in establishing and implementing a strategy for knowledge-based regional development.

The entrepreneurial university enhances the research university by joining a reverse linear dynamic moving from problems in industry and society, seeking solutions in academia, to the classic forward linear model, producing serendipitous innovations from the meandering stream of basic research. The key elements include (1) the organization of group research, (2) the creation of a research base with commercial

<sup>1</sup> The growing literature on the drivers, dynamics and consequences of academic entrepreneurship shows the global diffusion of the entrepreneurial university model. See, for example, Bozeman, Barry Technology transfer and public policy: a review of research and theory, *Research Policy*, vol. 29, issue 4–5, pages 627–655, 2000; and Rothaermel, Frank; Shanti D. Agung and Lin Jiang, “University entrepreneurship: a taxonomy of the literature”, *Industrial and Corporate Change*, Volume 16, Number 4, pp. 691–791, 2007.

E-mail address: [h.etzko@gmail.com](mailto:h.etzko@gmail.com).

potential, (3) the development of organizational mechanisms to move research out of the university as protected intellectual property, (4) the capacity to organize firms within the university and “graduate” them (5) integration of academic and business elements into new formats such as university–industry research centers.

The first two elements are within the framework of the research university; the third is part of the transition from the research to entrepreneurial academic models; fourth and fifth elements are special features of the entrepreneurial university. The entrepreneurial university model may also be expressed as four interrelated propositions:

**Proposition 1.** Interaction

The entrepreneurial university interacts closely with the industry and government; it is not an ivory tower university isolated from society.

**Proposition 2.** Independence

The entrepreneurial university is a relatively independent institution; it is not a dependent creature of another institutional sphere.

**Proposition 3.** Hybridization

The resolution of the tensions between the principles of interaction and independence are an impetus to the creation of hybrid organizational formats to realize both objectives simultaneously.

**Proposition 4.** Reciprocity

There is a continuing renovation of the internal structure of the university as its relation to industry and government changes and of industry and government as their relationship to the university is revised.

Propositions One and Two may also be basic principles of a research and teaching university; it is the confluence of all four elements that make for a full-fledged entrepreneurial university. The Ivory Tower and entrepreneurial university models may be used to analyze “actually existing universities” as occupying a point on a continually shifting spectrum. Table 1 shows the extreme endpoints. Of course, most universities are in between.

*1.1. Impetuses of entrepreneurial academic transition*

We explain the entrepreneurial university's emergence, recognizing its creative and cost effective role as inventor and transfer agent of knowledge and technology. To be a strategic actor, a university has to have a considerable degree of independence from the state and industry but also a high degree of interaction with these stakeholders. As knowledge assumes increased significance as a factor of production, in both high tech and older manufacturing industries, universities are invited to participate in regional growth coalitions (Feldman, 1994). Industry

typically becomes active and takes the lead during economic crises in working with university and government partners to renew regional and sectoral economies.

Universities assume an entrepreneurial role and identity due to perception of opportunity, civic duty and external pressures (OECD, 2012). The first step towards an entrepreneurial academic ethos is increased sensitivity to the economic potential of knowledge, whether scientific or humanistic, followed by a willingness to realize this potential. When a university first essays entrepreneurship, it may be inspired by an important discovery that was not patented, like a significant advance in Nuclear Magnetic Resonance Imaging Technology at Stony Brook University, a proverbial, “big fish that got away” according to John Marberger, the University's then president. A technology transfer office may then be created to protect intellectual property and market inventions.

The university's potential as a generator of discontinuous innovation opens the way to policy initiatives encouraging academic institutions to realize economic value from their research. Impetuses also include loss of industry as in New England, Singapore and Finland. On the demand side, a local firm, industry association or government may request assistance in solving a production or governance problem. On the supply side, devolution of the academic enterprise includes change from block funding as a matter of right in academic systems based on this principle to competitive research grants. Paradoxically, expanded research funding as well as financial stringency increases uncertainty for existing players as teaching universities, incentivized by regional authorities, aspire to get into the game. Less research-intensive regions press for funding increase, recognizing its salience to economic growth, while research-intensive regions struggle to maintain pre-eminence.

Demand for knowledge to promote disease cures and technological fixes for environmental crises create a hypercompetitive struggle for resources. An academic “steady state” envisioned by John Ziman (1994), following significant post-war expansion, is unlikely as contraction and expansionary forces oscillate, disrupting traditional academic structures. A turbulent environment encourages academic researchers to manage risk by fund raising from multiple sources, introducing an entrepreneurial element into the faculty role as a matter of academic survival. There is also a shift in the center of academic gravity from departments of individual scholars to networks of research groups and centers to capture larger funds, often only available to such collaborations.

*1.2. From informal to formal technology transfer*

The first step is the development of organizational capacities to work with firms in solving their specific problems, through consultation arrangements that may be formalized in longer-term contracts. This phase typically winds down when formal arrangements offer little beyond what individual faculty members informally provide. Archives of letters of intent, Memoranda of Understanding are created, and payments may be made, but too often content is missing in these

**Table 1**  
Contrast between Ivory Tower and entrepreneurial university.

No.	Ivory Tower University	Entrepreneurial university
1	Isolated from the society	Open and serve to the external society
2	Teaching on campus	Teaching on/off campus
3	Knowledge production for own sake	Polyvalent knowledge produced
4	Meandering stream of basic research	Multiple sources of input into research direction
5	Useful knowledge as accident	Useful knowledge sought
6	No organizational technology transfer capability and no firm formation	TTO, Incubator integrated into innovation strategy to foster start-ups
7	Discipline-based departments as primary units	Departments and inter-disciplinary centers have equal status
8	Single internal stakeholder	Multiple stakeholders –internal and external
9	University administration only from academia	University administration from multiple sources, including industry and government
10	Funding as matter of right	Funding as matter of exchange, something to be earned
11	Operation for self sustainability	Make significant contribution to regional development as well
12	Only academic mind-set	With entrepreneurial ethos

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