

Title

What might an entrepreneurial university constitute?

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Abstract

In this paper, we analyse those elements that characterize entrepreneurial universities in a context of action-reaction such as changes in the environment which imply some type of threat, as financial threats, the assumption of a new culture that question the traditional role of the university as a somewhat conservative creator and transmitter of knowledge, the establishment of new structures, etc. For that purpose, we present a review of some of the indicator systems proposed by some OECD studies to characterize entrepreneurial universities. After capturing the entrepreneurial character of universities, we propose what we consider to be fundamental features of these kinds of institutions and associated them with indicators.

Keywords

Entrepreneurial universities; quantitative/qualitative indicators; market/non-market activities.

1. Introduction

Since the mid-1980s, the traditional role of the university as a somewhat conservative creator and transmitter of knowledge has been questioned in the new globalized context (Gornitzka, 1999; Gumport, 2000; Kogan and Hanney, 2000; Mok, 2005). Experts in the field of higher education (HE) have emphasized the influential role of HE in the construction of knowledge economies and democratic societies (World Bank, 2002; EC, 2003), and Higher Education Institutions (HEIs) (universities and HEIs are used interchangeably in this paper) are being forced to make important readjustments to respond to society's demands (EC, 2010; EU, 2011). Competitiveness, productivity, quality and efficiency have become 'buzz' words in the context of the organization and daily operations of universities, although they generally refer to the short term (Sporn, 1999). Now, the long term functioning of universities as independent institutions is being questioned and universities are being subjected to political and economic pressures (Sanyal, 1995; OECD, 1999, 2007; Uyarra, 2010).

HEIs' responses to new societal demands are having implications for their structure and administration (Gumport and Pusser, 1997; Slaughter and Leslie, 1997; OECD, 1999). Responses differ according to the particular regulations and social circumstances of the university (Graffikin and Perry, 2009). Nevertheless, their responses can classify into three broad groups. The least disruptive change involves **adoption of more efficient internal procedures, by "readjusting the relationship between academics and administrators"**. This type of administrative structure requires the incorporation of professional administrators and more and different responsibilities for academic managers. Lindsay (1995) argues that such restructuring has strengthened universities as institutions, but has provided a rival source of power to academic authority. Kogan (1999) lists the major university management structure changes that such initiatives

entail: (i) increase in the total administration and management workload, at both university and supra-university level; (ii) changes in the tasks and power balance between the academics and the administration; (iii) a wider range of administrative tasks for both academics and administrators: academia is being bureaucratized. Kogan (1999) argues that there is a fundamental tension between these two parties, whose stances are different: academic work is underpinned by a disinterested search for truth while administrators regard public accountability as key to their activities. Most academic staff in faculties and departments are not inclined to give priority to processes that do not directly benefit their research or teaching.

A second type of response to these new conditions is the **adoption of new administrative methods, commonly termed “new management”**, which implies deeper cultural change, with the extension of the universities’ activities to new fields related to the sale of services in the market and the introduction of new organizational structures. Braun and Merrien (1999) describe the application of new management to university systems as encompassing four areas: (i) a new corporate image; (ii) strengthened university administration; (iii) new priorities in the financial relationship between university and government; and (iv) orientation towards the customer. Managerialism involves replacing one kind of organizational structure and culture with another (Kogan et al., 2000). The traditional structure, based on bureaucracy and the collegium, is replaced by a system and outlook imported from the private sector and the marketplace (Teichler, 1996; Amaral et al., 2002). In most cases, the introduction of organizational structures and behaviours borrowed from the business world has weakened collegiate and participatory structures. These have been replaced by strong management structures, a change that has been resisted by academics, though generally without outright confrontation (Franzoni and Lissoni, 2009). Though this may add a

new dimension to the way universities work, it raises a number of problems that are not easy to resolve. From the standpoint of many departments and university units, the benefits to be derived from the new concept of universities as service providers are by no means clear (Fitzsimons, 2004; Casani and Esparrells, 2009). This is particularly true in the case of departments and units that are not linked to technology or that may have difficulty in operating within a competitive environment. Internal conflict may ensue, and require a readjustment to the way that university units are linked, in order to maintain cohesion. There is also a risk that universities will abandon some of their traditional functions whose results are long term, in favour of work that is immediately profitable in economic terms (Molas et al., 2002).

Finally, the most extreme response to the new context is what Clark (1998) calls “**entrepreneurial universities**”; this implies global changes in the culture, organization and operational forms and relationships of the universities in response to the pressures from the environment in which they operate. These changes are the basis for a typology of measures taken by universities to improve their institutional opportunities and how they are managed. Although the universities in Clark’s case study were under different kinds of pressure from the environments in which they worked, their responses were characterized by a number of common threads such as: universities cease to be privileged institutions and lose their monopoly to other organizations and companies that can undertake the same activities and in a more efficient way. As a result, they are in competition in bidding for public and private funds. This assumes the imposition of a new market or quasi-market system in which the ability of universities to compete becomes in vital for their survival (Michael and Holdawya, 1992; Levin, 1998; Van Vught, 2000). Furthermore, it should be remembered that one of the key factors influencing developments in the public HE system is the steady decline in the share of

operating support provided by state governments (Catanzaro and Arnold, 1989). This steady but inexorable trend has led to a spate of proposals that are changing the relationships between states and their public institutions, and generally entailing greater freedom from state regulation and autonomy to organize tuition without state control (Breneman, 2004; Gulbrandsen and Slipersaeter, 2007). In the extreme, this policy shift is referred to as privatization, which exaggerates the dimension of the change, but accurately reflects the direction. Public universities are also being driven to compete for external research grants and contracts, and private gifts and endowments (Ryan, 1989; Molas et al., 2002), what Slaughter and Leslie (1997) coined as academic capitalism.

In this context, in this paper we analyse those elements that characterize entrepreneurial universities in a context of action-reaction, and to suggest a set of indicators to enable the tracking and management of entrepreneurial university activities. The paper is organized as follows: Section 2 focuses our concern about the meaning of entrepreneurial university; Section 3 provides a better understanding of the elements that characterize entrepreneurial university; in Section 4, we propose a set of indicators associated to be fundamental features of these kinds of institutions; finally, Section 5 presents the discussion and conclusions.

2. What does entrepreneurial university mean?

In the literature there are more than ten definitions that have been identified for entrepreneurial universities (see Figure 1), which show the effort to explain the meaning of this phenomenon, but the evidence reveals that there is not a consensus for using one of them consistently.

Figure 1. Main Definitions of Entrepreneurial University

Year	Author	Definition
1983	Etzkowitz	Universities that are considering new sources of funds like patents, research under by contracts and entry into a partnership with a private enterprise
1995	Chrisman, Hynes and Fraser	The entrepreneurial university involves the creation of new business ventures by university professors, technicians, or students
1995	Dill	University technology transfer is defined as formal efforts to capitalize upon university research by bringing research outcomes to fruition as commercial ventures. Formal efforts are in turn defined as organizational units with explicit responsibility for promoting technology transfer
1998	Clark	An entrepreneurial university, on its own, seeks to innovate in how it goes to business. It seeks to work out a substantial shift in organizational character so as to arrive at a more promising posture for the future. Entrepreneurial universities seek to become “stand-up” universities that are significant actors in their own terms.
1998	Röpke	An entrepreneurial university can mean three things: the university itself, as an organization becomes entrepreneurial; the member of the university are turning themselves somehow into entrepreneurs; and the interaction of the university with the environment.
1999	Subotzky	The entrepreneurial university is characterized by close university-business partnerships, by greater faculty responsibility for accessing external sources of funding, and by a managerial ethos in institutional governance, leadership and planning.
2002	Kirby	As at the heart of any entrepreneurial culture, entrepreneurial universities have the ability to innovate, recognize and create opportunities, work in teams, take risks and respond to challenges.
2003	Etzkowitz	Just as the university trains individual students and sends them out into the world, the entrepreneurial university is a natural incubator, providing support structures for teachers and students to initiative new ventures: intellectual, commercial and conjoint.
2003	Jacob, Lundqvist and Hellsmark	An entrepreneurial university is based both commercialization (customs made further education courses, consultancy services and extension activities) and commoditization (patents, licensing or student owned star-ups.
2003	Williams	...is nothing more than a seller of services in the knowledge industry....
2008	Shattock	Entrepreneurialism is a reflection both of institutional adaptiveness to a changing environment and of the capacity of universities to produce innovation through research and new ideas.

Source: Own elaboration for Guerrero Cano (2007) adaptation.

These definitions, outlined in Figure 1, provide evidence about some elements that characterize an entrepreneurial universities, for example: the organizational adaptation to environmental changes (Clark, 1998), the managerial and governance distinctiveness (Subotzky, 1999), the new responsibilities of their members (Etzkowitz, 1983), the new activities oriented to the development of an entrepreneurial culture at all levels (Clark, 1998; Kirby, 2002; Etzkowitz, 2003), the contribution to economic development with the creation of new ventures (Chrisman, et al. 1995; Röpke, 1998) or commercialization of the research production (Dill, 1995; Jacob, et al. 2003), etc. Additionally, apart from new business ventures, other innovative activities such as developing new products, services, technologies, administrative techniques, strategies and competitive postures

are presented (Antoncic and Hisrich, 2001). In this sense, entrepreneurialism in universities is a reflection both of institutional adaptiveness to a changing environment and of the capacity of universities to produce innovation through research and new ideas (Shattock, 2008). Thus, according to these authors, the entrepreneurial university can be understood as a flexible organization that interacts with its social and economic environment adapting itself to the changes and looks for additional sources of funds for research, teaching, technology transfer, and commercialization, etc.

In this context, Etzkowitz (1998, 2003, 2004) argued that the actual university presents the effects of the second academic revolution and for this reason an entrepreneurial university needs to fulfill three missions simultaneously: (i) teaching mission defined as the preservation and dissemination of knowledge; (ii) research mission considered as a legitimate function of the university; and (iii) entrepreneurial mission produced by the collapse of the inevitable production of research results with practical implications and the external demand of greater utility from public funding. Moreover, Schulte (2004) mentioned that the entrepreneurial university's goals are oriented: (i) to provide the society a graduate who must become not only a job-seeker but also above all a job-creator, (ii) not only to publications but should be the sources of innovations in the economy and society, and the starting point for the development of business ideas for new companies, and (iii) to cope with difficulties that may arise during the growth periods of new companies.

Then, it could be said that the literature reflects the lack of a common description of the entrepreneurial university phenomenon. For this reason, in this paper the approximations proposed by Clark (1998), Kirby (2002), Etzkowitz (2003) and Shattock (2008) are adopted. Hence the definition of an entrepreneurial university is a university that have the ability to innovate, recognize and create opportunities, work in

teams, take risks and respond to challenges, and which seeks to work out a substantial shift in organizational character to arrive at a more promising posture for the future. In other words, an entrepreneurial university can mean three things: (i) the university itself, as an organization, becomes entrepreneurial; (ii) the members of the university – academic and non-academic staff, students – are turning themselves somehow into entrepreneurs; (iii) the interaction of the university with the environment, the structural coupling between university and region, follows entrepreneurial patterns. Thus, in the next section, we consider adequately to explain which factors underpin the notion of an entrepreneurial university.

3. Factors which underpin the notion of an entrepreneurial university

Some theoretical models of entrepreneurial universities have been identified and, in each one, there are elements associated with formal and informal factors, following the idea of North (1990 and 2005) that suggests three formal factors: governance structure, organizational structure and support; and two informal factors: rewards and culture. For instance, **Clark (1998)** suggested the first model examining five European universities. He identified that, for a university to become entrepreneurial, it has to follow five pathways during its institutional transformation. The first three are related with formal factors (a strengthened steering core, an expanded developmental periphery, and a diversified funding base), and two informal factors (an integrated entrepreneurial culture and a stimulated academic heartland).

Sporn's (2001) model analyzes HEIs in order to connect the university structure and the environmental forces through management, governance and leadership. She concluded that there are six formal factors; missions and goals, the structure, the management, governance and leadership, one informal factor; organizational culture, and one moderator; the environment that influence the adaptation of higher education

and the university structure. The model proposed by **Etzkowitz (2004)** was integrated by a set of five inter-related propositions derived from his analysis of entrepreneurial academic development in the USA, Europe and Latin America. This is a guideline for institutional renovation that includes the following formal factors: capitalization of knowledge, interdependence with the industry and government, other institutional spheres, hybrid organizational forms and renovation in time.

Kirby (2006) proposed seven strategic actions intended to promote an enterprise culture in universities. The factors that have been identified as formal are strategic actions related with the organization, endorsement, incorporation, implementation and communication. The factors identified as informal are related to promotion, recognition and reward, and endorsement. **Shattock (2008)** proposed that entrepreneurialism, through the generation of new and innovative activities, makes a distinctive contribution to the knowledge society. The factors identified as formal are: a diversified income base and institutional competitiveness which would be forcing houses for new ideas and new programmes.

In addition, a lot of empirical studies have emerged about entrepreneurial universities. The main considerations are related with objectives, theoretical frameworks, methodology and most important findings about the entrepreneurial university. The objectives of these studies were focused to explain entrepreneurial activities, entrepreneurial vision, transformation process, strategies, structural changes and alliances with other institutions. The theoretical frameworks utilized were the academic entrepreneurship approach; academic capitalism approach, and the theoretical model proposed by Clark in 1998. The methodology used was case study approach that reveals the embryonic nature of the topic, and the lack of a robust theoretical framework to understand it. The data collection was integrated by interviews, observation,

secondary data, and questionnaires. Thus, according to Van Vught (2000), Klosfen and Jones-Evans (2000), Jacob et al. (2003), and Zhao (2004) an Entrepreneurial University could be analyzed following the academic entrepreneurship activities. Other approximations are the publication in mainstream journals (Bernasconi, 2005), and the diversification of the funding base using typologies of universities by income streams: pure entrepreneur, semi-entrepreneur and public funds (De Zilwa, 2005). In the Spanish context, there are a few studies that have investigated formal factors such as the organization and governance structure related with the innovation (Villarreal, 2001), the new university styles (Mora, 2001), and tendencies of European universities towards quasimarkets (Agasisti and Catalano, 2006). Finally, Ruiz et al. (2004) suggested a typology of universities based on the entrepreneurial initiatives.

There has been very less research about entrepreneurial university that studied the informal factors. The main objective of those investigations was to analyze the influence of cultural factors on the transformation process. The theoretical approaches used were entrepreneurial scholarship and strategy. The methodology and data collection were similar to formal factors utilizing case study and multiple data sources. The main contributions were the critical factors during the adaptation process, and the university community perception. In Spain, the informal factors have been focused on entrepreneurial intention of university students (Veciana, et al. 2005; Toledano, 2006; Urbano, 2006; Liñán and Chen, 2006; Guerrero et al., 2008).

In summary, these empirical studies have contributed to the literature with some important findings. However, there are gaps identified that need to be filled for a better understanding of the university entrepreneurial phenomenon. For example, the requirements and barriers to make universities more entrepreneurial, and the most

appropriate criteria to measure an entrepreneurial university. In the next section, we propose some indicators to measure entrepreneurial universities.

4. Indicators to measure entrepreneurial universities

To capture the entrepreneurial character of universities, we have defined what we consider to be fundamental features of these kinds of institutions and associated them with indicators.

Changes in the demand are characterized by being radical and rapid. Such changes can include diversification in the fields of study, new specialities, different objectives that are in line with sponsoring bodies (for instance, government or companies may request particular directions in applied research or technology transfer, or new teaching programmes to meet demands for human capital to improve economic development).

The indicators we propose should assess to what extent courses or degrees are aligned to societal demands and requirements (see Table 1):

Table 1. Demand indicators and their evolution

Item	Description: Growth of... $(t / t-n)$	Characteristic	Type
1	Freshman applicants in all higher education system	General increase of the demand	Environment
2	Freshman applicants by university	Evolution of the demand by university	Teaching
3	Students accepted according their first-choice preference	Evolution of the demand by university	Teaching
4	Number of degrees offer	Diversification of the demand	Teaching
5	Number of students enrolled by number of degrees	Diversification of the demand	Teaching
6	Number of post-graduates in all higher education system	General increase of the demand	Environment
7	Number of post-graduates by university	Evolution of the demand by university	Teaching

Source: Own elaboration

The proportions of freshman and transfer applicants accepted are basic indicators of institutional selectivity. Rates of acceptance are influenced by a wide range of factors, both internal and extrinsic to the institutions. They may signify increase or decrease in demand from students or potential students resulting from changes in the local population of university-aged students or changes in admission requirements.

In terms of student demand, in most European countries, the population of traditional university-age students has declined, and the fastest growing cohort is aged 25 years and older. As a result, many universities are offering more part-time degrees to accommodate the demand from adults who are already employed. Part-time students affect an institution in a variety of ways. Often, services need to be tailored to non-resident students who have not been involved in formal education for some time. These individuals may be more interested in career-oriented programmes than their younger, full-time counterparts; demand for many of the traditional facilities and services such as libraries and halls of residence may be different and the more traditional student activities, such as cultural and academic organizations may decline as part-time enrolment increases.

With respect to admissions requirements, all institutions have mission statements, strategies, and standards that define the number and type of students that are acceptable. Demand for the programmes being offered may increase or may fall off and, in the public sector, admission rates may be affected by enrolment caps resulting from reduced funding. Retention rates of upper class students affect the number of “slots” available to new students, and residential and other space on campus may become scarce or in excess. Allowing more foreign students can improve enrolment numbers, enhance the diversity of the student body, and absorb significant resources for language instruction, counselling and pastoral care services.

Moreover, the admissions yield is the proportion of accepted applicants who matriculate. Yield is a function of a variety of competing factors that influence potential students’ choices of institutions. These include the relative attractiveness of the institution compared with say a private institution, in terms of programmes provided, location, campus facilities, and extracurricular training; the number of other institutions

to which applicants apply and are accepted; and the total net cost of attending, taking into account availability of financial aid.

On the other hand, the proportion of students who are awarded a degree is a measure of student progress and thus of an institutions productivity. Degree rates can be affected by many factors, including students' choices. For example, part-time students may take longer to complete their degree than full time students. Recently, there has been concern about the time being taken to degree completion due to the inability of some institutions to offer a sufficient number of courses to satisfy demand. Some universities are beginning to look at ways to improve "learner productivity" by making changes to their admissions requirements. The goal is to enable students to complete their degrees in a shorter time and at a lower cost.

Changes in demand are often accompanied by **changes in the environment**. These include the appearance of private initiatives in both teaching and research, and the development of new ICTs, all of which influence how teaching and research are carried out. They also have an effect on the universities' revenue structures. It is generally believed that a university whose revenue is derived from several independent sources will enjoy greater flexibility and stability. By contrast, reliance on one or a very few sources, such as tuition or government grants, will likely constrain the breadth of activities and result in less security. Where a university is dependent on a single revenue source that is not completely reliable, it should seek greater funding diversity and make efforts to develop new or enhanced sources of revenue.

On the other hand, fields of study have become increasingly important for labour market outcomes and lifestyle differences, because of the decreasing variation in educational levels (De Graaf, 1986; García-Aracil, 2008). The expansion of education has not only raised the average educational level and reduced its variance (Hauser and

Featherman, 1976), but it has also resulted in a larger number of people trained in specialist fields. However, the distribution of job opportunities for higher education graduates is not homogeneous across fields of study.

It is clear that the degree field is a relevant part of the credentials that graduates bring to the labour market and, consequently, it enables some screening in the allocation of jobs to HE graduates. Employers prefer to hire graduates whose expertise fits the requirements of the job. For certain occupations it is a legal requirement for the postholder to have a certain qualification. For instance, a degree in Medical Sciences is required to practise as a physician, graduation from a law school is required in order to practise as an attorney, and so on. The consequence is that the labour market for graduates is to some extent segmented by the field of graduation. This field-related segmentation is confirmed by indicators such as labour force participation rates, unemployment rates, and the proportion of temporary labour contracts, which does vary widely among different fields of study (García-Aracil, 2008). Therefore, it would be worthwhile for future research to explore the relevance of field of study to the labour market and to social inequality.

Taking account of all these characteristics, we propose the following indicators for changes in the environment (see Table 2):

Table 2. Indicators for changes in the environment

Item	Description	Characteristic	Type
8	Number of higher education institutions set up (public versus private)	New higher education institutions	Environment
9	Ratio of students enrolled in public higher education institutions and private ones	New higher education institutions	Environment
10	Distribution of students by field of study.	Changes in labour market requirements	Environment
11	Percentage of funds from contracts in total funds	Financial changes	Funding / Transfer
12	Percentage of tuition fees in total funds	Financial changes	Funding / Teaching
13	Percentage of funds tied to objectives in total public funds	New requirement tied to public funding	Funding

Source: Own elaboration

In addition, we should consider the **restrictions** that HE systems face in responding to changes in demand. We consider three different types of restrictions: financial, normative and institutional. Financial restrictions refer to the reduction or freezing of available public funds for HEIs (see Table 3). The most radical is a straight reduction in the available budgetary funds. Funds can also be restricted as a result of conditions attached to their use for special purposes or new activities. Both these actions result in less flexibility for the HEIs. The second type of restriction is normative. In most countries normative limitations have decreased, and the autonomy of universities has increased. However, in some countries the degree of government intervention has increased and is limiting the possibilities for universities to respond to new demands. The third type of restriction is institutional. These restrictions are not related to laws; in most cases they are the result of the status-quo that has come to be accepted by the institution. Aspects such as excessive bureaucracy, government requirements and academic individualism associated with freedom in teaching, reduce the flexibility of universities and affect the introduction of changes.

Table 3. Indicators related to restrictions

Item	Description	Characteristic	Type
14	Percentage of public funds in total funds	Decrease of public funds	Funding
15	Percentage of funds related to results	Public control on results	Funding
16	Percentage of budget that is unrestricted	Autonomy in management	Management

Source: Own elaboration

In line with the new situation in Clark's (1998) entrepreneurial universities, we propose indicators related to: a strong central management unit or a strengthened steering core; the creation of a new developmental periphery; an increase in the number of funding sources; an academic structure prepared to accept and, indeed, initiate change; and an entrepreneurial culture.

HEIs with a **strengthened steering core** possess a heightened autonomy. These institutions can be centralized, decentralized or some kind of combination. The key to a

strengthened steering core lies in adaptability combined with an administrative ability in the institution to fuse together new managerial values and traditional academic values such that all levels of the institution work towards an improved and more efficient academic culture. The management of HE involves three distinct features: governance, leadership and management. Governance refers to the structure and processes of decision-making. Leadership implies the role of senior executives in taking responsibility for the overall institution. Management refers to the operational activity of running the institution, i.e. the structures and processes involved in decision making, implementation and control.

Furthermore, the proportion of employees who are classified as executive, administrative or managerial can be a function of the institution's emphasis on administration, oversight, and other professional activities, versus those functions that typically are performed by faculty members. A high proportion of professional and managerial staff can also indicate that an institution has some complexities that require more management. On the other hand, the proportion of a university's employees who are faculty reflects the institution's academic focus, as well as its choices about the division of labour between faculty and staff. Over the past few decades, institutions have been increasing their numbers of professional staff in areas such as admissions, student services, information technology and consultancy, areas that previously were served by faculty. In research intensive institutions, other technical and administrative positions have been incorporated to support faculty work. This is reflected in the indicators presented in Table 4.

Table 4. A strengthened steering core

Item	Description	Characteristic	Type
17	Implementation of a strategic plan	Adaptation to the new environment conditions	Management
18	Existence of planning and control departments	New ways of management and governance	Management
19	Percentage of administrative staff in total staff	New ways of management and government	Staff
20	Change of skilled jobs among administrative staff	Good and appropriate qualification	Staff
21	Implementation of quality plans	Internal management improvements	Management
22	Specific groups or experts to fund raise	Diversifying funding sources	Funding

Source: Own elaboration

HEIs with **expanded developmental peripheries** cross academic-industry boundaries to form mutually beneficial relationships. Through an entrepreneurial periphery, linkages with outside organizations and groups at the borders of institutions help to break down the traditional boundaries. The resulting partnerships enable a variety of functions such as knowledge transfer, industry exchanges, intellectual property development, continuing education, and fundraising and alumni activities (Clark, 1998). In order for these institutions to preserve their educational integrity, Clark maintains that outreach in the context of a collective institutional capacity to make choices based on educational values is essential. We propose indicators that comprise of a range of activities undertaken by universities, their departments, staff members and students to set up and manage new firms, organizations, foundations and so on, either to exploit existing university capabilities or to carry out new research (see indicators in Table 5). These activities can include the financing of new firms from university resources (spin-offs and commercial arms), thereby increasing academics' awareness of entrepreneurial opportunities and offering them support to start their own companies (start-ups), and the provision of physical space and expert financial, legal and marketing support (incubators and science parks).

Table 5. Creating an expanded developmental periphery

Item	Description	Characteristic	Type
23	Number of institutes by activity sector	Developing institutes related to regional activity	Research
24	Number of firms, organizations, foundations set up in the last years.	Developing other organizations related to regional activity	Transfer
25	Personnel registered in institutes in total personnel	Staff exchanges and secondments	Staff
26	Personnel registered in firms, organizations and foundations in total personnel	Staff exchanges and secondments	Staff
27	Returns provided by institutes in total university funds	Economic importance of activities performed by the periphery	Funding / Transfer
28	Returns provided by firms, organizations and foundations in total university funds	Economic importance of activities performed by the periphery	Funding / Transfer

Source: Own elaboration

HEIs with a **diversified funding base** receive revenue from government, industry, and private sources. If one funding source is reduced, the effects are felt less intensely.

For this characteristic, we propose the following indicators (see Table 6):

Table 6. A diversified funding base

Item	Description	Characteristic	Type
29	Changes in the structure of funding sources	Changes in the financial structure	Funding
30	Percentage of private funds in total funds	Increase of non-public sources of funding	Funding
31	Total funds from new funding sources	Recent initiatives to find additional funds	Funding
32	Percentage of funds from knowledge transfer in total private funds	Increased funds related to knowledge transfer	Funding / Transfer

Source: Own elaboration

A **stimulated academic heartland** refers to the core academic functions of the institution. The academic units (the heartland of every university) need to be integrated, and respected for their central role as providers of teaching and research. Traditional values are most deeply rooted in academic departments (Clark, 1998). In order for the institution to fully engage in the entrepreneurial process, every department must accept and engage in the process. A stimulated academic heartland maintains the university's integral traditional values and practices while simultaneously integrating new managerial and market-related practices. Table 7 presents the indicators proposed.

Table 7. A stimulated academic heartland

Item	Description	Characteristic	Type
33	Number of academic staff working in entrepreneurial activities in total academic staff	Importance of entrepreneurial activities	Transfer
34	Total returns from contracts, projects, patents by academic departments	Importance of entrepreneurial activities	Research / Transfer
35	Implementation of incentives related to entrepreneurial activities	Importance of entrepreneurial activities	Management / Funding

Source: Own elaboration

An **integrated entrepreneurial culture** combines the first four elements to create a culture that embraces change and sustains the fundamental values of the institution. While a spirit of innovation and enterprise may begin with one department, an entrepreneurial institution facilitates the development of a culture that embraces these ideas on an institutional level. New belief systems need to be worked out between managerial groups and academics. A culture that supports change will provide a base for the entrepreneurial university. It may have small beginnings but should develop into a firm set of beliefs relating to new directions for the institution. The institutional perspective must extend beyond individual interests and act to transform the whole university. In this context, we propose the following indicators (see Table 8).

Table 8. An integrated entrepreneurial culture

Item	Description	Characteristic	Type
36	Implementation and diffusion of corporate programmes	Foundation of corporate entities	Management
37	Hiring in of staff to reinforce management and external relations	Spreading entrepreneurial culture	Staff
38	Implementation of entrepreneurial culture in study programmes	Spreading entrepreneurial culture	Teaching
39	Percentage of internal funds allocated by objectives	Incentives for entrepreneurial activities	Funding

Source: Own elaboration

Finally, the adoption of an entrepreneurial culture in conjunction with the characteristics described above implies the introduction of structural measures, which will affect the HEIs operations. Table 9 proposes indicators related to this issue.

Table 9. Structural changes due to the adoption of entrepreneurial culture.

Item	Description	Characteristic	Type
40	Flexible scheduling for academic staff	Rotation between teaching and innovative activities	Teaching
41	Percentage of expenditure by sub-central units in total university expenditure	Autonomy of sub-central units to manage resources	Funding
42	Implementation of rewards related to entrepreneurial activities	Incentives for maintaining entrepreneurial culture	Staff
43	Implementation of quality plans	Maintaining a quality culture	Management
44	Assessment of quality plans	Maintaining a quality culture	Management

Source: Own elaboration

In order to relate our proposed 44 indicators to universities' actual operations, we classify them into groups. Classification of indicators is frequently based on what is understood as the university productive process. Such classifications differentiate between indicators of inputs, activity, results (outputs) and impact (outcome). One of the flaws in this is that it tries to impose on university institutions a structure that is useful used to analyse the efficiency or the effectiveness of private firms, but for institutions whose objectives are not so clear cut or whose processes are not standardized, and whose funding systems are not market based, it is not really appropriate.

In our opinion, it is more useful to impose a classification that is related to effect of these indicators on the operation of HEIs. Therefore, we classify our indicators based on fields of performance, affecting the three main functions of teaching, research and knowledge transfer, and which take account of the three activities related to innovative transformation: personnel, financial and management. We include a seventh element to capture those indicators related to changes in the environment (see Table 10).

Table 10. Classification of the indicators in connection with the university performance

Type of indicator	Number
Environment (external indicators)	5
Teaching	8
Research	2
Knowledge transfer	7
Staff	6
Funding	15
Management and government	8

Source: Own elaboration

Although the results of applying a classification of this type are not clear cut, they demonstrate that to define the entrepreneurial universities implies the use of a number of indicators related to financing because they constitute one of the basic axes for building the entrepreneurial university. As Davies (2001) points out, a university can be flexible in responding to changes in the environment, but this does not make it an entrepreneurial university. This requires a degree of financial understanding, i.e., the capacity to commercialize its products and to generate a surplus that can be used to reduce deficits in other areas, or compensate for in the public funding.

Finally, it should be recognized that the definition of entrepreneurial universities places more emphasis on the role of administrative tasks, including personnel management, funding and governance, than the traditional functions of teaching or research. Thus, the concept of the entrepreneurial university refers to organizational, strategic, quality changes, and changes to current and future institutional projections.

5. Discussion and conclusions

The context in which universities operate has changed substantially since the 1980s. In the case of European universities, central governments have been the main sources of financing, and have become more and more interested in teaching demonstrated by the orientation of public service and education policies which imply a universalisation of the HE system to respond the labour market and social demands. Governments are also

becoming more interested in research activities and their contribution to society and in the productivity of the economy. In addition, there is more emphasis on activities related to the projection of culture and civic education.

Thus, the context is changing. The boundary between public and private responsibilities, and who should finance what, is changing. European governments have had increasing budgetary demands during the last decades some of which are due to the increasing cost of providing and maintaining good public services. This has led to a new environment of (i) deregulation that gives more autonomy to universities, and (ii) more restricted finance. In this new context, it is important to determine on what aspects universities can compete and how these characteristics can be diverted to entrepreneurial activities.

In this paper, we have tried to characterize entrepreneurial universities within a frame of action-reaction and to suggest a set of indicators that enable the tracking and management of entrepreneurial activities. However, given the multiple objectives of HE and the variety of principals and stakeholders involved, the choice of which indicators should be adopted is contentious. We suggest a subset of indicators that could be used to set the foundations for a measurement system, and try to justify our selection.

This type of study is not without its difficulties. Firstly, numerous indicators in connection with HE have been proposed - some designed to measure aspects that do not fit with the reality. Our methodology tries to define a series of realistic characteristics, relating to the entrepreneurial university, and to build a series of indicators that are directly related to these characteristics.

Another difficult is related to the heterogeneity of the indicators. Although there is a tendency to identify indicators with numeric relationships, the important issue is what constitutes an indicator. In Kells' definition (1994), indicators are factual information or

opinion gathered from the data available or “ex novo”, on the operation of the organizations or their constituent units and various purposes (control, support to the decisions, comparison, evaluation or improvements). Thus, indicators are often derived from the application of formulas or opinions to infer the existence or not of some of the defined characteristics.

It should also be pointed out that there is a degree of complexity in such a system of characteristics. The use of an indicator as a synthetic measure vanishes when it is applied to a complex entity such as a public university. A measurement system that adopts a holistic approach, and takes account of the variety of the relationships between universities and the rest of the society is needed.

On the other hand, we realize that the definition of an entrepreneurial university puts great weight on those indicators related to funding, management of personnel and governance, indicating that the concept of entrepreneurial university refers, mainly, to organizational and strategic quality changes.

Thus, there are no magic bullets in indicators of entrepreneurial activities. A variety of indicators is needed. Each will, by itself, be incomplete and its interpretation will be open to question; however, taken together, the result can be a powerful measurement system.

The suggestions in this paper can be considered only as preliminary, for instance many of the indicators proposed are new and will need to be precisely defined in an operational manner. A new conceptual and extended framework will be necessary that focuses on the wide range of interactions that bind universities to the rest of the society.

Further analysis should be engaged in studying whether measures of entrepreneurial university activities can be usefully incorporated into more specific analyses of performance indicators relating to the work of HEIs. To solve these problems is

fundamental both to the rationale for policy, and for the relevance and practical use of indicators. For that reason it is useful to discuss what indicators are the best ones since give rise to consensus among policy-makers and university community members. In this sense, it is expected that there will be a move towards greater coherence among quality systems in the coming decades.

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