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Breaking out of the TTO; turning measurements into indicators

Justin Hugo Axel-Berg^{*}, Sara Aragão^{**}, Daniel Pimentel Neves^{*}, Guilherme Manços Rosso^{*} and Guilherme Ary Plonski^{*}

^{*} justin.axelberg@usp.br, plonski.usp@gmail.com, guilhermerosso.m@gmail.com, danielpimentelneves@gmail.com Faculdade de Economia, Administração e Contabilidade, Universidade de São Paulo, Avenida Professor Luciano Gualberto, 908 - Butantã - São Paulo/SP - 05508-010, Brazil

^{**} sarajamile@gmail.com; Programa de Pós-Graduação em Administração, Universidade Federal Fluminense Campus Valonguinho
Rua Mário Santos Braga, 30 - Prédio 2 da Administração- 4º andar
Centro - Niterói - RJ CEP: 24020-140

Introduction

Collecting the right data to represent research impact is only half of the battle for policymakers and researchers. Only when it has gained broad acceptance among stakeholders, and is placed into the right part of a university's organisational structure can institutional data become indicators, drivers of institutional change and measures of performance. This paper details a four stage process for constructing and implementing new indicators for entrepreneurial activity in universities. The first is the consolidation of the concept, or vision of the university. The second is the formation of indicators following academic research, here exemplified by the GEUM initiative. The third is building public awareness and acceptance of indicators, in this case by way of a university ranking. The final stage is building the institutional structures for implementing indicators and collecting and presenting results.

The paper begins with a study of the evaluation structure of Brazilian higher education, using experiences from the Global Entrepreneurial University Metrics (GEUM) project (a brief description of this initiative is available online.¹ Parting from the principle that what is represented is what is valued, this article contends that the particular organisational structure of Brazilian higher education impedes the growth of entrepreneurial activities, even where funding is available, and desire is there.

For many years, measurement of entrepreneurial activity at a national level was absent in mainstream economics, due to the difficulty of finding representative indicators (Baumol, 1968). A similar effect can be observed with representation of academic entrepreneurship in the study of scientific performance. Etzkowitz (2016) warns that the system of existing indicators to evaluate educational institutions have not accompanied the changes that have occurred in these organisations since the second academic revolution, which introduces entrepreneurial capacity into the university's traditional role.

¹ <https://www.triplehelixassociation.org/helice/volume-5-2016/helice-issue-1/tha-news/global-entrepreneurial-university-metrics-initiative-geum>

The expected roles for a public university in the 21st century have changed significantly from those that sustained her through the 20th century, which in turn are different to those of the 19th century, which are in turn different to the ecclesiastical schools of the early middle ages. Universities are often considered immutable and permanent structures, but are in fact in constant evolution, both as drivers of societal change and adapting to wider sociopolitical and economic conditions around them. Today, universities are expected to be proactive drivers of change, participating in global research communities and generating benefits for the society around them. They do this by producing technological innovation that transfers into societal benefits, by forming public policy and opinion, forming a critical and empowered qualified labour force ready to insert themselves into a global knowledge economy. Amidst this diversity of new roles, alongside the old, the public university finds itself needing to be able to represent the impact it exerts upon the world, to represent what the huge public investment in them returns to societies, as the cost of doing science grows ever larger.

1. The Entrepreneurial University

There is cloudiness and sometimes conceptual confusion about the very notion of "entrepreneurial university". It differs from "university extension," although it has affinities with it. Nor is it confused with the generation of companies by the university community, although this creative movement is an important component of the entrepreneurial university. The Guiding Framework for Entrepreneurial Universities, published by the Organization for Economic Co-operation and Development (OECD) (2012), addresses this conceptual issue and concludes that there is no concept agreed by the theory of what entrepreneurial universities would be, but rather a plurality of approaches. This same document brings a conceptual bibliographic review outlined below:

Table 1. Definitions of an Entrepreneurial University

YEAR	AUTHOR	DEFINITION
1983	Etzkowitz	Universities that are considering new sources of funds like patents, research funded by contracts and entry into a partnership with a private enterprises.
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	Seeks to innovate in how it goes to business, to work out a substantial shift in organizational character, to become "stand-up" universities that are significant actors in their own terms.
1998	Röpke	Mean three things: the university itself, the members of the university – faculty and the interaction of the university with the environment.
1999	Subotzky	Is characterized by closer 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	Have the ability to innovate, recognize and create opportunities, work in teams, take risks and respond to challenges (...).
2003	Etzkowitz	Is a natural incubator, providing support structures for teachers and students to initiate new ventures: intellectual, commercial and conjoint.
2003	Willians	Is nothing more than a seller of services to the knowledge industry.
2003	Jacob, M, Lundqvist and Hellsmark,	Is based both on commercialization (custom made further education courses, consultancy services and extension activities) and commoditization (patents, licensing or student owned start-ups).
2006	Guerrero-Cano, Kirby e Urbano	"(...) Entrepreneurial University is defined as a university that has the ability to innovate, recognize and create opportunities, work in teams, take risks and respond to challenges (Kirby, 2002a), on its own, seeks to work out a substantial shift in organizational character so as to arrive at a more promising posture for the future (Clark, 1998). In other words, is a natural incubator that provides support structures for teachers and students to initiate new ventures: intellectual, commercial and conjoint (Etzkowitz, 2003)."

Given that there is still much active debate at a conceptual level, the absence of a framework of indicators for universities has contributed to a lack of public understanding and discussion on the subject.

A recent European commission study by Jonkers et al. (2018) suggested a framework of indicators to track university progress over time, being able to choose indicators relevant to local economies and development levels, that take into account

- Education and capital development
- Research, technological development knowledge transfer and commercialisation
- Entrepreneurship and support to enterprise development
- Regional orientation, strategic development and knowledge infrastructure.

2. Current situation in Brazil

Brazil's current situation can be explained by Campbell's Law (1979), which states that the more restrictive a set of quantitative indicators, the more they tend to distort behaviour and promote gaming behaviour. Overly rigid evaluation practises have led to the overvaluing of a few, very limited forms of academic activity. This in turn forms a culture in which productivity of articles in peer-reviewed journals is excessive, to the detriment of other forms of publication. This means that very often, other forms of academic activity in Brazil become obscured, and absent from discussion, or form a misleading picture of the state of affairs.

Brazil's innovation law, approved in 2004 and enacted in 2005 required universities to form technology transfer offices (*NITs*), which are measured by way of annual reports (*FORMICT*) to the Ministry of Science, Technology, Innovation and Communication. These reports consist of descriptive, qualitative assessments of the functionality of the unit, and very few indicators of their actual level of production. According to Andrade (2016), even though it is an official instrument, FORMICT merely reports the evolution of the NITs and their compliance with Law No. 10.973 / 2004, now updated by Law No. 13.243 / 2016. This means that NITs are not required to gather or report data, and tend to do so of their own volition, with no standardised performance indicators. These data are not often required by university administrations, and do not generally form part of the evaluative matrix. Where they do, it is rare that data extends beyond a count of the patents granted to the university itself.

The consequence of the federal evaluation system's lack of indicators that go beyond journal based impact measures of articles is that Brazilian universities are broadly lacking in data recording and collection structures common in countries with better established policy frameworks. As there is no incentive to collect data on entrepreneurship, technology transfer or social impact, and so they tend not to be collected. Where they are, they tend to be collected in an unstandardised format at departmental level, or remain siloed inside the NIT. Some NITs have extremely well developed data gathering and presentation policies in operation, the Inova in the State University of Campinas (Unicamp) being the prime example of a unit that produces a wide range of indicators for public attention. Because these practices

are not repeated in other universities, it is difficult to compare Unicamp's performance to its peers.

3. Determining indicators – GEUM

The GEUM project gathered data from 40 universities in Brazil, at a depth never before attempted in the country. For many universities, however, collecting data to respond was difficult, if not impossible. Once these data were gathered, they tended to stay within the TTO (*NIT*). This means that data were often incomplete or missing, and very rarely have an impact on university decision-making. Reverting a culture that regards institutional accountability principally in terms of endogenous growth and financial stability allows for the proliferation of new indicators, giving academics more flexible ways to represent the impact of the work that they do.

4. Gaining consensus – Entrepreneurial Universities Index

Given the power of a ranking to capture public attention, alternative rankings are a powerful tool to introduce pertinent topics to public discourse. In 2016, five student entrepreneurship organisations joined together to conduct a nationwide process of data gathering to form an Entrepreneurial Universities Index. . Using a network of 77 volunteers inside universities across Brazil, the index mixed student perception of entrepreneurial stance with quantitative indicators taken directly from NITs and government public data. The first edition was launched at the Ministry of Education and attracted widespread media attention. The second edition was published in November 2017, and progress in this ranking has since become an institutional goal in a number of universities around the country.

The concept of “Entrepreneurial University” created and developed by these student organizations from thousands of answers all over Brazil consists of

"an academic community, inserted in a favorable ecosystem, that develops society through innovative practices".

This project aims to capture the entrepreneurial activity inside Brazilian universities in six dimensions: entrepreneurial culture of the student body and faculty, via a student opinion survey, extension projects undertaken by the university, innovation and intellectual property, infrastructure available, exchange and mobility options available to students and extra-budgetary resources available for research. The indicators and weighting were determined by way of a nationwide poll to present a reflection of student opinion.

In 2016, the report evaluated 42 Brazilian universities, this was extended to 55 institutions in 2017. Inclusion is based upon the presence of interested volunteers able to collect and confirm information. This means that the project is progressively increasing its coverage and impact upon discourse on entrepreneurship in Brazilian universities.

The 2017 edition also affirmed that 75% of respondents thought that a diverse student body was an important element of an entrepreneurial university, and wished to see more inside their own institutions (BRASIL JÚNIOR, 2017).

As such, grassroots initiatives with rankings can become powerful articulators of constructive student demand; for more engagement with society, for more entrepreneurial opportunities and support, for more opportunities to travel, and for a more diverse student body.

The dominant university model in higher education remains that of the World Class University (Salmi, 2009). This is broadly a research intensive, well-financed university with a strong focus on the exact sciences, a concentration of highly cited faculty and researchers and international prestige and reputation. By studying the way in which this model came to dominance, we can point first to the wealth of literature around the beginning of the twenty first century, and then to Project 985, which in turn spawned the Shanghai Jiao Tong ARWU ranking, an attempt to discover how far the emergent C9 Consortium was from this definition (Liu, 2015). The ranking captured the imagination of policymakers, scholars and researchers the world over, sparking an expensive, zero-sum arms race towards this model (Hazelkorn, 2014). In geopolitical terms, it became the exercise of soft power not just of the United States over the rest of the world, but of the model of university most associated with it (Lo, 2011). This is a movement described by Pusser and Marginson (2016) in terms of the power relations personified by rankings. By conferring prestige on the universities that most closely fit this model, they exert pressure to conform to it, first in institutional changes, and then in changing academic culture itself, to become the accepted vision of what a university is. In other words, university rankings are powerful mobilisers of bias.

Despite their myriad methodological and ethical issues, university rankings are the way in which the majority of the public, both general and academic, engage with research indicators. They have the effect of turning complex, multifaceted issues into one-dimensional ordinal lists. They contribute to expensive prestige arms races, and present university performance as a zero-sum game in which one university's gain is the loss of another. This is highly problematic for university decision making, and a deeply questionable way of assessing the quality, or otherwise, of a university. Despite a multitude of shortcomings in the model, and a variety of alternative models gaining certain popularity, the World Class University is the only to mobilise widely accepted university rankings, and therefore has captured a significant enough proportion of lay opinion to claim dominance as a model.

While this can be seen as broadly negative given the strong biases present in most of the dominant rankings that followed, such as the Times Higher or QS, the construction of rankings for alternative visions of the university can be a useful way of promoting agendas and emphasising other characteristics of the university. For example, the UI Greenmetric ranking assesses universities on the basis of sustainability and attention to ecological issues, while the Webometrics ranking assesses universities on the basis of their web presence and commitment to open data.

While surveys of student opinion can be important reflections of education, the fact that this is at an undergraduate level means that impressions of actual activities may be somewhat limited, given that these students are not necessarily well connected to the research that the university produces. They are also not always the best judges of their own education, or the value of the knowledge that they are acquiring. For entrepreneurial education, the true value of what is being imparted is often not fully clear until long after the student has left formal education. Because data collection processes were carried out by student ambassadors, some of the data was not be fully validated by the universities themselves, and instead gathered through transparency portals, or from individual offices. This means that some of the data was be incomplete or not properly validated.

The role that rankings for entrepreneurship, ecological concern or commitment to open data can play on consolidating university missions should not be underestimated, as the promotion of a competitive dynamic is an important driver for institutional change.

The recent Clarivate Most Innovative ranking brings many of these missions to greater prominence, with an emphasis on the production of (international) intellectual property, patent citation and licensing agreements. The ranking, however, covers only the world's top 100, is heavily biased towards US institutions as a result of its definitions and valuing of US patenting. It is a positive step, but for most institutions, the entry requirements are too high for universities with less developed capabilities to harbour serious ambitions to become visible in this ranking. Therefore, more intermediate and accessible assessments are required in order to motivate a larger number of universities to participate.

5. Changing institutional practices – FAPESP Intelligence Unit Project

While indicators can be proposed through rigorous empirical research, gain public platforms through the proliferation of rankings, if they cannot be implemented and integrated in a uniform way, they are destined never to become fully implemented if universities are not capable of capturing data in a reliable and consistent way. The GEUM project demonstrated the lack of readiness even of TTOs in Brazil to provide consistent and reliable data, with a large amount of quantitative data missing, and many requiring significant time and investigation to provide the information requested.

A current research project funded by the São Paulo State research foundation (FAPESP) studies the readiness and capacities of the São Paulo state universities to incorporate measures of the university's new roles. By first carrying out an extensive review of current capabilities and limitations, it then seeks to implement units at the central administration level in order to gather and present these indicators.

6. Discussion

The process of consolidating research indicators for different forms of academic activity is a complex process, largely due to the multifaceted nature of indicators for economic and social impact. Where the state is not an active driver of change, in the form of imposing new indicators, universities and stakeholders themselves must become protagonists. There are three vital movements that must take place in order for this change to take place; first, indicators must be formed in a way that all data collectors have a reasonable chance of gaining or recording them. Second, these indicators gain consensus across multiple institutions as valid measures. Third, universities must build the capabilities to respond to these new challenges.

Besides being bottom-up approaches, these initiatives also share another common feature, they come from specified groups within the university, which understand that their activities haven't been represented or recognized by traditional policies and metrics.

Experience from the São Paulo state universities suggest that for as long as universities are not specifically asked for data, and interest in the area remains a marginal interest, it is unlikely that they will spontaneously begin to measure these phenomena. Furthermore, it is

doubtful that these values will be given due attention outside of HE policy debate, and come to form part of the publicly held concept of what a university ought to do. First of all, rankings, for all their failings, call upon the university to present data and react accordingly. Over time, alternative university rankings can help to normalise other visions of what a university is to the wider population.

Although the initiatives presented here count large numbers of participants between them, they all counted on a small number of ‘knowledge connectors’ participating from their beginnings at the University of São Paulo. Engaging and contributing to the GEUM project, led internationally by Henry Etzkowitz and in Brazil by Mariza Almeida at Unirio, acting as the consulting board of the Entrepreneurial Universities Index with Brasil Júnior, and as associate researcher in the FAPESP institutional research project, led by Jacques Marcovitch. This facilitates the flow of ideas, and a degree of coordination across projects. It avoids duplication of work, or of efforts working in opposing directions. The role of researchers engaged in multiple projects allows a multiplying effect of projects.

7. Conclusion

Implementing indicators to represent new university missions is a complex process when it is not led by state incentives. First, a conceptual framework must be determined, and indicators determined on the basis of this framework. Second, these indicators must be articulated in the form of demands of the university, for which grassroots ranking initiatives offer a promising alternative. Finally, universities must be helped to attend to these demands in the form of planned institutional change.

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