Contents lists available at ScienceDirect

Technological Forecasting & Social Change

Reforming higher education in Portugal in times of uncertainty: The importance of illities, as non-functional requirements

Manuel Heitor [a], Hugo Horta [a,b,*]

[a] Center for Innovation, Technology and Policy Research, IN+, Instituto Superior Técnico, University of Lisbon, Avenida Rovisco Pais, 1049-001 Lisbon, Portugal
[b] Division of Policy, Administration and Social Sciences Education, Faculty of Education, The University of Hong Kong, Hong Kong SAR, China

ABSTRACT

This article shows that higher education reforms can create opportunities for higher education institutions (HEIs) to thrive under a legal umbrella that may reinforce their legitimacy, mandate, and contribution for societal development. This requires a profound consideration of illities affecting HEIs, including but not limited to affordability, accessibility, quality, capacity, adaptability and autonomy. The analysis, based on the Portuguese reform of higher education in the period 2006–2010, allows the identification of different policy implications in distinct orthogonal dimensions. Accessibility and affordability are found to be required to broaden the social basis of the "knowledge pyramid", while capacity and quality require policies oriented to pull-up the top of that pyramid. The need to foster effective institutional autonomy and integrity of modern higher education institutions is reinforced in a context where innovation must be considered together with competence building and advanced training of people to work in increasingly globalized economies and labour markets.

© 2015 Elsevier Inc. All rights reserved.

1. Introduction

It is well known that emerging regions worldwide are striving to develop at an unprecedented accelerated rate their higher education systems and institutions, HEIs (Willis, 2005; Sanyal and Johnstone, 2011; Horta et al., 2015). A common feature to this process is the need to guarantee sustainable growth with adequate resources (Schwartzman, 1996). Yet, the strategic planning of this process is known to be influenced by straightforward and simple, but potentially dangerous university rankings and similar quantitative indicators (Salmi and Saroyan, 2007). Specific contexts and local conditions for growth, as well as adequate determinants of institutional capacity are often minimized, even forgotten, in the design of public policies and institutional strategies (Marginson and Considine, 2000). Rather, Institutional strategies are influenced — frequently emulated — by policies and perceived practices from mature higher education systems, placing in jeopardy higher education systems and institutions themselves in emerging regions of the world (Yang, 2003).

It is in this fast changing and uncertain context that this article argues that *Illities* should be taken into greater account as relevant factors in modernizing and reforming higher education. Illities are non-functional requirements, including but not limited to accessibility,

quality, sustainability, efficiency, flexibility, and capability. They are associated with modern technical solutions and depend on the way people, institutions, and the social environment interact with knowledge (De Weck et al., 2011). The understanding of illities is associated with holistic perspectives on the increasing complexity of our daily life and related technical, cultural, social and economic relations.

From the emerging technical literature about illities, lessons for higher education policies can be learned. Neufville and Scholtes (2011) have shown that projects can be improved by flexible designs that can facilitate adaptation to uncertainty. They argue that designers of complex, long-lasting projects — such as communication networks, power plants, or hospitals — but that could well be higher education institutions and systems, must learn to abandon fixed specifications and narrow forecasts. The authors stress the need to avoid the "flaw of averages," a conceptual pitfall that traps so many designs in underperformance. This is relevant to higher education because it stresses flexibility in the design of complex higher education policies, reforms, and in creating organizational models for HEIs. It applies to planning of higher education and its links with learning societies that are expected to increasingly rely on "distributed knowledge bases" maintained across an economically and/or socially integrated set of agents and institutions (Conceição et al. 2003).

Illities also matter for higher education because of the current context of perceived and real change. De Weck et al., (2011) argue that technical change, for much of the 20th century, was mainly about artefacts and inventions. Now, it is increasingly about complex systems and their perception. For example, the charging of a plug-in hybrid vehicle

* Corresponding author at: Division of Policy, Administration and Social Sciences Education, Faculty of Education, The University of Hong Kong, Hong Kong SAR, China.
E-mail addresses: mheitor@ist.utl.pt (M. Heitor), hugo.horta@ist.utl.pt, horta@hku.hk (H. Horta).

links transportation, the electricity grid, and social behaviours. Based on many other examples, the authors argue that today's large-scale, highly complex sociotechnical systems converge, interact, and depend on each other in ways that one could have barely have imagined before. As scale, scope, and complexity increase, technical and social issues are considered together in a highly integrated approach. Concurrently, flexible, adaptable, robust systems are designed to be easily modified and reconfigured to satisfy changing social, cultural, political, technical requirements and accommodate new technological opportunities. This is relevant for higher education because flexibility, adaptability, integration, and robustness of systems refer to improving the capacity to learn and adapt.

The potential revolution for learning that the "networked world" provides is the ability to create scalable environments for learning that engages the tacit and the explicit dimensions of knowledge. The term that Brown and Douglas (2010) have used for this, borrowed from Polanyi, is "indwelling". Understanding this notion requires to connect experience, embodiment, and learning. First, the world of the 21st century is characterized by a sense of constant change, which demands rethinking the notions of interaction with new knowledge towards a deeper understanding of participation (*knowing*). Second, the notion of experience (and participation) within new media contexts has shifted from a traditional sense of experiencing content to using content as context to construct a social world with others (*making*). Third, understanding the means by which networked media supports a kind of play that allows people to navigate the complexities of a constantly shifting world (*playing*).

What may be most important to understand is that each of these dimensions of learning is in the process of evolving in response to the demands of the 21st century (Thomas and Brown, 2011). In our societies, *knowing, making,* and *playing* emerge as critical components of "becoming". In relation to this, the development of modern capacity in higher education to foster learning by students requires training of a competent and flexible teaching body that can be easily adapted to satisfy changing contextual and learning requirements while making use of new technological opportunities (Bellanca and Brandt, 2010). Recent literature on the concept of illities suggests that learning how to manage uncertainty is necessary; this has also become of the main challenges facing higher education reform and future development. In this sense, illities represent a movement of "rupture", emphasizing forms of thinking and action that go beyond the immediate temporal frame, apparent functionality or success, and the constraint to fundament decisions solely on what is measurable (Rouse and Serban, 2014). Sticking to what is measurable in higher education may limit choice and the potential for sustainable growth (as criticisms to university rankings and other quantitative indicators suggest; see Hazelkorn, 2011).

Inspired and conditioned by a myriad of global, national and local challenges that implicitly or explicitly rely on science and higher education for potential solutions, HEIs are required to be both increasingly adaptable and resilient (two important illities). Thus, higher education systems and institutions have to consider accommodating new configurations of knowledge production by establishing alliances with an increasingly large range of "knowledgeable" institutions (Nowotny et al., 2001). Moreover, they require to secure a sufficiently stable environment to train and supply talented people, including researchers, for that growing range of "knowledgeable" institutions (Peters et al., 2009). This leads to the need, more relevant than ever, for public policies promoting effective institutional autonomy and integrity of modern HEIs (Shapiro, 2005), that integrate higher education and science polices (Heitor and Horta, 2012). This is particularly relevant as partnerships among HEIs and scientific institutions worldwide, as well as between them and industry, gain significant prominence (Sidhu et al., 2011).

Additionally, HEIs are increasingly pressed to fulfil several societal roles. They continue to be repositories of knowledge, identity, and culture (King, 2004) and still represent beacons of creativity, where talent

is assembled, and the discussion of ideas nurtured to foster the creation of new knowledge (MacLaren, 2012). In on-going processes of institutional change threatened by corporate-like reforms and neoliberal thinking, HEIs contribute decisively to democratic processes, support policy decision-making, and garner societal trust (Kwiek, 2005; Giroux, 2002). They have an unmistakably civic role strongly rooted in the public sphere and in providing public goods (Culum, 2014). A clear example of this is that HEIs continue to strive towards the socialization and education of students of diverse social, ethnic, cultural and socio-economic backgrounds to become citizens of both their nations and of the world (Denson and Bowman, 2013; Banks, 2008). As increasingly global actors, they promote knowledge flows and train national and international students (Horta, 2009), while embedded in local and community development (Lebeau and Bennion, 2014). Concurrently, they drive economic change through several initiatives, including the promotion of technological development in firms through employment of graduates, the creation of new firms and university-industry relationships (Baptista et al., 2011).

The societal roles of HEIs continue to rest — or to a large extent associated with — two basic social functions that depend on their relative institutional stability (Altbach et al., 2009), which per se is a major illity to be considered in higher education policies. Among the most essential roles of HEIs, is the supply and training of talented people. Increasingly, this is one of the most essential contributions that HEIs are expected to make (Harkavy, 2006), while remaining the most important incubator of the next generation of researchers. This requires effective "University–Science" relationships, because research-intensive environments are critical to train researchers. Another essential role of HEIs is the generation and promotion of "cultural norms" in both substantive and procedural terms (Nowotny et al., 2001; see also Walker, 2012), as it is associated to claims for the maintenance of a "culture of liberal rationality" (Nussbaum, 1997). In the 21st century, HEIs should promote the necessary institutional integrity to allow students to experience novel learning environments, evolving towards "living laboratories" to better educate youngsters towards a sustainable society (Shriberg and Harris, 2012; Conceição and Heitor, 1999). No other institutions are as well prepared as HEIs to undertake these tasks in modern societies (Barnett, 2012).

In the following sections these arguments are emphasized in terms of higher education policies in Portugal for the period 2006–2010, in a way that attempts to substantiate the reasons why the OECD considered them a success (MCTES, 2011). These sections are preceded by a section focusing on the research framework. The article concludes with a brief outline of lessons learned from Portugal with relevance to emerging regions worldwide.

2. Research framework

This article contributes to reflect on the role that higher education and science policies, if adequately integrated, may play in further democratizing and promoting social-economic development through three complementary goals in association with increasing relevant illities shaping our society (the illities are identified in the parenthesis), as follows: i) opening access to the knowledge base through higher education (Affordability; Accessibility; Quality); ii) promoting advanced qualification of skilled people and strengthening research institutions through adequate consideration of human resources in technical change (Capacity; Resilience; Systems linkages); and iii) strengthening institutions and provide adequate relevance to institutional issues in the social construction of our knowledge base (Autonomy; Adaptability; Integrity).

Overall, this framework calls for a better understanding of diversity in higher education and the effective role played by science–higher education relationships, beyond the currently dominating policies of thinking science through short-term, demand-driven economic development issues (Heitor, 2008). The rational for our approach is related