A Review of Self-Different Fractals and Innovation

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Abstract

This review discusses Campbell and Carayannis' *Self-Different Fractals and Innovation* as an effort to reframe higher education governance through dialectical knowledge production processes. It highlights their emphasis on governing complex, multi-level systems by engaging underlying knowledge dynamics. While providing an overview of their work, the book ultimately reads as a programmatic call to rethink governance in higher education.

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In their volume on *"Self-Different Fractals and Innovation"*, David F.J. Campbell and Elias Carayannis frame the discourse on innovation and higher education governance and also take readers on a tour of their own oeuvre, which has significantly shaped this discourse over the last 20 years. The concepts brought forth by the authors include the "Quadruple" and "Quintuple Helix", extending Etzkowitz's Triple Helix; the concept of "cross-employment"; work on the third and fourth mission of universities; "Mode 3" – building on Nowotny et al. – and, most notably, their rendition of epistemic governance. Yet beyond a summary – and the volume serves as a valuable literature review as well – the authors take it a step further by proposing a theoretical and philosophical bridge across these concepts, culminating in the fascinating titular notion of "self-different fractals".

The title is at first puzzling; readers might be familiar with "self-similar fractals", mathematical and natural phenomena that exhibit similar structural patterns at each scale – by zooming in or out, the same patterns become visible. Building on this, the authors introduce the notion of "self-different fractals" to describe higher education and other knowledge-producing institutions and systems. These fractals exhibit different – dialectically opposing – structures (thesis and antithesis) at each scale or level of observation and, in this way, at each level synthetically spark creativity and drive innovation.

While such a concept to denote and grasp innovation and knowledge-producing processes is theoretically intriguing, a strength of the volume is that it consistently asks how to govern such structures adequately. Here, Campbell and Carayannis put forth the concept of epistemic governance in higher education – arguably one of the most compelling aspects of their work. They argue that sustainable governance in higher education institutions and systems depends on recognizing underlying epistemic foundations, including implicit or explicit assumptions, paradigms, and knowledge structures. Accordingly, policies and objectives can only be effectively formulated if these structures are taken into account (p. 29).

Epistemic governance thus requires engagement with the knowledge paradigms shaping higher education. The authors link this to diverse understandings of "quality" and the existence of multiple "quality cultures", which in turn necessitate differentiated governance approaches (p. 33).

Yet while the volume points to the necessity of governing such a "self-different fractal" system of innovation by addressing and incorporating epistemic bases, one is left wondering: how? The volume stops short

of offering concrete answers or examples. Yet posing the question from this new perspective – framing governance through the lens of epistemic complexity and dialectical dynamics – is as valuable as providing a practical how-to answer. As the authors posit, the future of governance is also the future of higher education.

The book adopts, at times, a distinctly prescriptive tone; this is intentional, however. Campbell and Carayannis term it "a manifesto of higher education governance" and, as such, it is a guidepost and a call for a new governance of higher education and innovation based on analysis. The authors further develop their concepts and – befitting the dialectical approach overall – synthesize them:

First, the Quadruple Helix, which extends Etzkowitz's "Triple Helix" model (the relationships between universities, industry, and government) to include civil society as a fourth dimension. This conceptual framing has been widely taken up, not least in EU policy frameworks. Recently, the authors extended it further into a "Quintuple Helix", which also includes the "natural environment into the overall architecture of innovation systems" (p. 40), while at the same time calling for an adequate governance structure or research framework that incorporates these various aspects.

The concept of the "academic firm" represents another important element of their framework. While the academic firm is presented in somewhat ideal-typical, if not idealistic, form – for example by incorporating "academic values" – the tensions inherent in this model, particularly between profit orientation and the public good, or between proprietary and open knowledge regimes, remain underexplored. Questions of how publication norms, open science, and commercialization interact within such hybrid structures would merit further discussion, even in this overarching volume.

The concept of Mode 3, which the authors have developed over the course of their publication career, extends Mode 1 and Mode 2 knowledge production processes – the first referring to academic basic research, the second, following Gibbons, Scott, Nowotny et al., to knowledge produced in the context of its application. With Mode 3, the authors call for an integration and co-development of these knowledge production processes, allowing them to co-exist and evolve together – not as exclusive, but as essential "co-learning between different knowledge and innovation modes" (p. 45). This is also reflected at the level of academic careers, where Campbell puts forward the concept of "cross-employment" and cross-careers. By engaging in parallel careers inside and outside of higher education, creativity in knowledge production processes is enhanced and enriched. He posits that cross-employment – although somewhat marginalised – "is equally important as the traditional tenure-track model for academic careers" (p. 49).

As with Campbell's work overall – and this volume presents a synthesis – the focus is on integrating diverse, even opposing, principles and perspectives at the individual, institutional, and systems levels to foster creativity and innovation in knowledge production processes, and to seek governance structures that reflect and promote this: "the competitiveness of a knowledge system is determined by its ability to combine and integrate various knowledge and innovation modes" (p. 44). This multimodality unfolds through co-development, co-existence, co-learning, and co-creation in an ultimately dialectical process. This process is also at the core of what Campbell calls a "Democracy of Knowledge" (p. 44), and it is this integration of manifold perspectives and approaches that Campbell and Carayannis call for in their present "Manifesto of Higher Education Governance".

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