Some Milestones for an Evolutionary-Institutional Approach to the Circular Economy Transition

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Abstract: In the recent decades, circular economy (CE) has attracted increasing interest from public authorities, non-profit organizations, businesses and, more recently, scholars who have proposed a variety of approaches to the concept. This article aims to lay the foundations for an original framework for analyzing CE from the perspective of the evolutionary institutionalism pioneered by Thorstein Veblen. Evolutionary institutionalism is rooted in a systemic and multi-layered ontology. It employs the Darwinian triplet of variation, selection, and retention/replication (VSR) as a fruitful framework for analyzing evolving population systems. Building on this generalized Darwinism framework, the article argues that the transition from a linear economy to a (more) circular economy should be conceived primarily as a co-evolution between business firms and industry architectures. From this perspective, it suggests centering the analysis of the VSR processes of the CE transition on the notion of business model, defined as a system of organizational routines that structures interactions between the members of the firm and the social entities of its industrial environment.

Keywords: circular economy, business model, evolutionary institutionalism, generalized Darwinism

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The idea of a circular economy (CE) has ancient roots. Evolutionary economist Kenneth E. Boulding's (1966) paper on the closed "spaceman economy," which recognizes the limits of resources availability—contrary to the open "cowboy economy"–is commonly regarded as a precursor to the CE perspective (Whalen and Whalen 2018 and 2020). Since the 1970s, there has been a growing recognition that the linear "take-make-dispose" model is unsustainable and needs to be replaced by production and consumption systems that limit resource waste. This objective has been promoted, in different and more or less intensive ways, by public authorities (especially in Europe), non-profit organizations (e.g., the Ellen MacArthur Foundation) and businesses (Lin 2020 and 2024). Furthermore, the number of academic publications devoted to the CE has increased sharply over the last decade (Geissdoerfer et al. 2017; Kirchherr, Yang, et al. 2023).

This article aims to lay the foundations for an encompassing evolutionary and institutional framework for analyzing (and supporting) the transition towards CE. The first section stresses the need for such a framework. The second section argues that (Thorstein) Veblen-inspired generalized Darwinism provides a relevant perspective for addressing the issue of CE. The third section shows that a conceptualization of the business model (BM) anchored in this framework provides a fruitful and rigorous basis for analyzing the variation, selection, and retention/replication (VSR) processes of the CE transition and, thereby, the co-evolution between business firms and industrial architectures that is central to this transition.

The Need for an Evolutionary-Institutional Framework for the Circular Economy

Circular Economy has been the subject of a variety of definitions and approaches among scholars and practitioners (Kirchherr et al. 2017; Merli et al. 2018). However, a certain consensus has emerged in the academic literature regarding the "core principles," "aims," and "enablers" of CE, which is summarized in the following "meta-definition" by Julian Kirchherr, Nan-Hua Nadja Yang, et al. (2023, 7, italics added):

> The circular economy is a regenerative economic system which necessitates a paradigm shift to replace the 'end of life' concept with reducing, alternatively reusing, recycling, and recovering materials throughout the supply chain ['*core principles*'], with the *aim* to promote value maintenance and sustainable development, creating environmental quality, economic development, and social equity, to the benefit of current and future generations. It is *enabled* by an alliance of

stakeholders (industry, consumers, policymakers, academia) and their technological innovations and capabilities.

This convergence of views now justifies considering CE as "a distinct field of scholarship" (Kirchherr, Urbinati, and Hartley 2023).[2] A set of ontological assumptions that are widely shared but rarely explicitly stated, has underpinned the development of this field.

First, it is generally accepted that the transition from a linear economy to a CE is path-dependent (Korhonen et al. 2018), that is, it involves "dynamical systems that are neither completely deterministic nor purely random in their workings, and in which the specific details of history govern the unfolding course of development" (David 2007, 92). Second, a widespread support for the assumption that the transition to CE is systemic can be seen in the frequent assertion that this process involves interactions between a diversity of factors, namely technological, economic, cultural, regulatory, etc. (de Jesus and Mendonça 2018). Third, it is widely accepted that the CE transition is not only a systemic but multi-layered process in the sense that it involves interactions between entities at different ontological levels: individual (e.g., consumers or employees), organizational (e.g., companies or public organizations), industrial (e.g., networks of firms), and institutional (i.e., "social rule systems)" (Hodgson and Knudsen 2010, 239). This assumption is often revealed by the assertion that the CE transition involves micro, meso, and macro processes, although the characterization of each of these levels may differ between authors (Kirchherr et al. 2017; Merli et al. 2018; de Jesus et al. 2018).

Evolutionary and institutional economics, as it was founded by Veblen (1919), is rooted in a systemic and layered "ontology of cumulative causation" (Lawson 2002; Hodgson and Knudsen 2010). It thus provides an epistemological and methodological framework that is relevant to the analysis of CE. Several evolutionary approaches have been developed that can be fruitfully applied to CE (Chizaryfard et al. 2021). These include the multi-level perspective (MLP) on "socio-technical transitions to sustainability" (Geels 2019). This approach provides a useful basis for analyzing the conditions for a shift from a linear to a circular socio-technical regime, such as the transition from a fossil-based plastics industry to a sustainable bioplastics industry (Pyka et al. 2022). The evolutionary literature on path dependence enriches the MLP perspective by deepening the analysis of self-reinforcing processes, particularly (inter)organizational, that hinder the transition to CE (Brette et al. 2024). Other approaches rooted in institutional economics provide relevant theoretical and conceptual resources for analyzing the transition to CE (Whalen and Whalen 2018). This literature emphasizes

2 Kirchherr, Yang, et al. (2023) and Kirchherr, Urbinati, and Hartley (2023) point out that this process of "conceptual consolidation" and "institutionalization" of the field has been accompanied by a "differentiation" of approaches and the persistence of certain debates. In particular, the possibility of reconciling economic development or growth with environmental sustainability remains a disputed issue.

that a successful and efficient transition to CE will require adjustments or changes to many of the institutions that govern production, consumption and investment, be they national laws, international standards or guidelines, cultural norms of behavior, etc. (Lin 2020 and 2024). A key issue is to understand how and to what extent public policies and the measures they implement can lead companies to adopt circular BMs that aim for genuine ecological sustainability (Whalen and Whalen 2020). This requires understanding the role of "institutional intermediaries"—such as non-profit organizations, social enterprises, or consultancies—in linking the different types of actors involved in the transition to CE, in defining the rules of CE and in implementing these rules in circular BMs (Fischer et al. 2021).

Each of these different approaches offers a valuable but necessarily partial view of CE. What is lacking is a common meta-theoretical framework that would allow the results of these different works to be integrated coherently and rigorously. This problem of fragmentation is a general feature of evolutionary and institutional economics, which limits cumulative advances in this area of research (Hodgson 2019). Veblen's writings provide the basis for an integrative framework for evolutionary and institutional economics (Brette 2006). Generalized Darwinism, which builds on the Veblenian idea of extending the application of Darwinian principles from biological phenomena to social phenomena (Hodgson and Knudsen 2010), seems to offer a relevant perspective for integrating the contributions of different evolutionary and institutional approaches to CE.

A Generalized Darwinism Approach to Circular Business Models

Generalized Darwinism rests on a layered and emergentist ontology. This means that reality has a multilevel structure in which each layer admits properties that are dependent on, but irreducible to the properties of lower layers and may even act upon those lower layers (Lawson 2012). Generalized Darwinism claims that Darwin's conceptual triplet of variation, selection, and retention/replication (VSR) applies to any complex population system in which similar but varied entities interact with each other and with their environment (Hodgson and Knudsen 2010).[3] The claim that this triplet provides a fruitful basis for analyzing any natural or social system of this kind does not imply that the VSR principles manifest themselves in strictly identical ways in nature and society, nor that their mobilisation is sufficient to explain social (or biological) phenomena.

Following David L. Hull (1980), entities that directly interact in evolving population systems are commonly referred to as interactors. Individuals, but also many groups and organizations, particularly business firms, are entities that are sufficiently cohesive to be considered as interactors.[4] Interactors host material structures called replicators that carry information (or programs) that is crucial for the preservation and, in

3 Our presentation of generalized Darwinism is based mainly on Hodgson and Knudsen (2010).

the case of generative replicators, the development of their associated interactors. Genes and habits qualify as generative replicators that guide the development of individuals and some groups of individuals, as do routines for organizations.

The evolving population of entities such as competing firms results in the selection of some of these entities, based on the differential fitness of the replicators they host relative to a common selection environment. The selection *of* an interactor (e.g., a business firm) involves selection *for* the replicators it carries (e.g., organizational routines). By causing the survival of some interactors and the demise of others, the selection processes lead to changes in the overall pool of replicators present in the population. However, interactors do not necessarily passively undergo selection processes. For example, firms can try to improve their adaptation to their environment by imitating other firms (i.e., trying to copy the replicators of firms they consider having a fitness advantage) and/or by innovating (i.e., trying to introduce novelty into their replicators to improve their fitness).

It has been suggested elsewhere that BM can be conceptualized as a system of organizational routines hosted by a business firm which structures the interactions between the members of the firm and the social entities of its industrial environment (i.e., a system of *intraindustry organizational routines*) (Brette and Chassagnon 2021). Defined in this way, BM qualifies as a generative replicator that is positioned one layer above routines and is related to a specific type of organization (as interactor), namely the business firm (see table 1). This means that the selection *of* firms at the industrial level involves selection *for* BMs, plus selection *for* routines, habits, and genes.

Table 1. Interactors of Four Levels and Corresponding Replicators

Levels	Interactors	Replicators
Industrial	Firms of an industry	Business models, routines, habits, genes
Organizational	Organizations	Routines, habits, genes
Group	Groups	Habits, genes
Individual	Individuals	Habits, genes

Source: Brette and Chassagnon (2021, 755); adapted from Hodgson and Knudsen (2010, 173)

This rationale is based on several arguments. First, it derives from the view that the specificity of a BM lies in the way it governs the interactions between the firm that hosts it and the various actors in its industrial environment (i.e., consumers, competitors, suppliers, partners, public authorities, and other stakeholders). Second, it rests on the

4 This view relates to the crucial idea of group selection (Hodgson and Knudsen 2010, 151–179; Figge et al. 2021).

view that BM is a materially grounded structure rather than an idea. The BM may embody a vision or a project, but it should not be confused with it. We, therefore, argue that every firm has a de facto BM, whether or not it has been clearly conceived or formally described by its managers. Third, our rationale is based on the idea that the intraindustry organizational routines that make up the BM form a coherent set that is essential to the coherence and perpetuation of the firm and that guides its development. Fourth, it is based on the idea that the differential fitness (or profitability) of competing firms within an industry is primarily due to differences between their BMs.

We argue that such an evolutionary and institutional conceptualization of BM provides a relevant integrative basis for analyzing CE transition. The design and implementation of circular BMs have been identified as central to the CE transition (Whalen and Whalen 2020). Thus, "research on circular business models has emerged as one of the most vibrant sub-fields of current CE research" (Kirchherr, Yang, et al. 2023, 7). In addition, it seems to be widely acknowledged that what we call intraindustry organizational routines play a key role in the performance of firms seeking to implement circular practices. Indeed, "[t]o work in practice, [circular economies] involve inter-firm cooperation and the development of resource sharing and usage groups" (Figge et al. 2021, 1). Our approach to the BM is therefore a priori well-suited to analyzing the shift from a linear economy to a CE.

The VSR Processes of the Circular Economy Transition

The transition from a linear economy to a (more) circular economy should be conceived as a co-evolution between firms and "industry architectures" (Jacobides 2016) that involves three main kinds of processes: the retention/replication of linear BMs, the introduction of variations towards more circularity in the pool of BMs, and the selection (or non-selection) for (more) circular BMs. In the remainder of this section, we briefly outline each of these three key processes in turn, based on our approach to BM. Some examples from the plastics industry are also given.

The Retention of Linear Business Models

The analysis of the transition from a linear "sociotechnical regime" to a (more) circular one must start from a study of the mechanisms of reproduction or "lock-in" of the current linear regime (Geels 2019). The core of any sociotechnical regime lies in its "industry architecture" (Jacobides 2016), which can be defined as "the set of BMs of firms that operate within an industry," according to our definition of BM (Brette and Chassagnon 2021). The industry architecture that underpins a sociotechnical regime is an emergent system from the organizational routines that govern the interactions between the various firms in the industry and between these firms and other actors (e.g.,

consumers or public actors). For the most part, the organization of economic systems that has been implemented in the post-1945 period has been based on the "take-make-dispose" principles of a linear economy (Lin 2020; Whalen and Whalen 2018). Once established, linear BMs tend to persist over time, thereby ensuring the relative stability of linear industry architectures and linear socio-technical regimes.

The retention of linear BMs results from the replication of organizational routines and individual habits that are hosted by incumbent firms. It also derives from the imitation (or replication) of the incumbents' BMs by new entrants to the industry seeking to exploit network externalities. These retention/reproduction mechanisms are particularly important in industries such as the plastics industry which involve a diversity of firms—plastics resin producers, plastic-consuming companies, recyclers, etc.—whose BMs are closely interdependent along a complex value chain. Since the 1960s, this industry has been organized around the use of virgin fossil-based polymers (Pyka et al. 2022). The plastics industry's path dependence involves inter-organizational self-reinforcing social mechanisms, such as "coordination effects" and "complementarity effects," which fuel a "linear lock-in" (Sydow et al. 2009; Brette et al. 2024).[5]

Circular Eco-Innovations and the Variation of Business Models

The main source of variations towards more circularity in the pool of BMs within an industry lies in the development of eco-innovations, that is, innovations of various types (goods, services, processes, business models, etc.) "whose environmental impact on a life cycle basis is lower than those of relevant alternatives" (Kemp and Oltra 2011, 249; de Jesus et al. 2018). Several drivers of CE-related eco-innovations—including circular BM innovations—in various sectors have been identified: environmental regulations and public policies, increasing demand for sustainable products and services (de Jesus and Mendonça 2018), and inter-firm (and more generally inter-organization) collaborations (Pyka et al. 2022), including those based on contractual agreements (Fischer et al. 2022).

Our approach to BM is well suited to analyzing the effects of interactions between firms and the various players in their industrial environment (public authorities, consumers, partners, etc.) on the development of circular BM innovations. In particular, it makes it possible to analyze the effects induced by a firm's positioning within an industry architecture on the type of the circular (BM) eco-innovations it is likely to develop. In the plastics industry, firms that are positioned on the fringes of the industry architecture are more inclined than firms whose BM is at the core of the industry architecture to develop

5 Coordination effects refer to the idea that the larger the number of firms hosting similar organizational routines—concerning for instance the sourcing of resources, the production of goods, the management of their end-of-life, etc.—the more efficient their interactions and the greater the incentive for a new firm to adopt that routine. Complementarity effects emphasize that the interdependencies between the different organizational routines, each of which governing a specific activity, expose a firm which changes one routine at the risk of disrupting the efficiency of related routines, or even of the entire system of routines.

innovative bio-based polymers whose chemical structure differs from that of fossil-based polymers—and which may have interesting environmental properties (e.g., biodegradability). The latter firms tend to favor circular BM innovations based on the development of recycling and of "drop-in" bioplastics (i.e., bio-based polymers that have the same chemical structure and the same properties as conventional fossil-based polymers), which allow the essential characteristics of the complex plastics value chain to be preserved (Brette et al. 2024).

The Selection for Circular Business Models

As Korhonen et al. (2018, 44) argue:

> There will be competition between existing and new CE models. [. . .] [It is possible that] CE-type innovations will have many difficulties to break through in the market. This is even if they were economically, ecologically and socially superior than the prevailing technologies.

The fundamental reason for this phenomenon was identified by Veblen (1919, 299) when he pointed out that "[t]he ground of survival in the selective process [of business competition] is fitness for pecuniary gain, not fitness for serviceability at large." Public authorities and "institutional intermediaries" have a central role to play in defining and implementing legal and regulatory principles that can steer the selection process towards firms hosting BMs that contribute to genuine ecological sustainability or "higher efficiency" (Fischer et al. 2021; Whalen and Whalen 2020). A key point to bear in mind when defining these principles and the public policies that derive from them is the fact that "in circular systems, eco-efficiency overall is more than the sum of the eco-efficiencies of individual firms" (Figge et al. 2021, 1). It is therefore necessary to move from an approach of the selection of individual firms to one of the selection of groups of firms.

Our conceptualization of BM is consistent with this multi-level selection perspective. It notably implies that the selection process that takes place in an industry often leads to selecting groups of firms with complementary BMs (Brette and Chassagnon 2021). For example, the selection of firms whose BMs are based on the development of innovative biobased polymers depends on the concomitant selection of firms whose BMs make them likely to be consumers of these plastics on a sufficiently large scale for recycling firms to have an economic interest in taking these new materials into account in their collection, sorting, and recycling BMs (Brette et al. 2024). Upstream of the chain, it also implies the selection of firms capable of providing sufficient biomass resources under appropriate environmental and social conditions (Pyka et al. 2022). "Thus, the challenge for policymakers tasked with business sustainability issues, is to develop ways to incentivize *all* firms to take part in group-based circular economies,

without intervening in the functioning of the system itself" (Figge et al. 2021, 7). Moreover, this challenge should be pursued on a global scale, as the environmental footprint of plastics knows no borders. The difficulties encountered in concluding an international treaty to substantially limit plastic pollution show that there is still a long way to go before we achieve a CE worthy of the name in this area.

Let us ensure that evolutionary and institutional economics contributes as much as possible to this vital challenge.

Disclosure Statement

No potential conflicts of interest were reported by the authors.

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