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Innovation, Ruptures and Economic Cycles in Technology Platforms: Proposition of an analytical framework

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Abstract

The world has been going through many technological transformations, which affect not only the productive systems, but also the prevailing social and institutional spheres, creating a fragmented and hard to understand scenario. Different theories aim at evaluating some specific dimensions of the complex process in course at the micro- meso- and macrolevels; however, none seems to encompass the multiple dimensions of the phenomenon concomitantly. To address such research gap, we resort to adaptive theory, which, on the one hand, turns to theoretical constructs on disruptive innovation, creative destruction and economic cycles; on the other, resorts to data and information on the emergence and proliferation of platforms for collaborative consumption. Our paper brings a unified theoretical conception, allowing a more comprehensive and integrated analysis of more than one dimension of the transformation process currently in course.

Keywords: disruptive innovation; creative destruction; economic cycles; technology platform; adaptive theory.

Introduction

The technological changes that occurred over the last decades have been affecting not only specific productive systems, but also broader social and institutional spheres. Such changes encompass the different kinds of technology platforms that emerged and proliferated all over the world (Wirtz, So, Mody, Liu & Chun, 2019; Xiao, Lee, Lim, & Tan, 2019; Min, So, & Jeong, 2018; Sutherland & Jarrahi, 2018; Belk, 2014) with impacts on different dimensions of the economic and social life, whose triggering and interconnections are not yet quite visible and understandable.

In the business field, for instance, innovations occurring over the last decade can modify the ways through which companies organize, establish their business models, offer products and services, and interact with customers (Cusumano, 2015). The technological changes also affect different links of productive chains, triggering modification in employment conditions, use of resources, structure of individual preferences, and in the dynamics and nature of the market. Regarding processes on institutions level, new values and interests arise – along with new legal regulations –, which differ from the former ones that helped maintain the last cycle of business and economic growth.

This suggests that we are on the edge of a radical process of long-term structural changes, along the lines of similar events in the past that were studied and analyzed by renowned authors (Freeman & Louçã, 2002; Kondratieff & Stolper, 1935; Mensch, 1975; Schumpeter, 1912, 1939).

Amid so many transformations at different levels – micro, meso and macro, which can lead to longer economic waves or cycles –, it is important to search for a unified and integrated theoretical support in order to conduct an analysis. However, some authors focus on approaching only certain levels of change. Amongst the most seminal authors that focus on these specific themes, we mention (a) Kondratieff (1935, 1984), who envisioned the development of capitalism as a sequence of waves or economic cycles with high and slow sectoral growth initiated and defined by technological basis; (b) Schumpeter (1912, 1991, 1939), who – interested in understanding the macro process of economic development – ended up creating the concept of creative destruction; and (c) Christensen (1997, 2001, 2006), who – influenced by Schumpeter – explained how the process of technological changes occurs at the micro level of entrepreneurial and marketing processes.

Our study places in such context; by appealing to the methodological approach of adaptive theory, we make use of the above-mentioned authors' theoretical constructs, in addition to data and information gathered from literature about the emergence and proliferation of technology platforms for collaborative consumption. Our objective is to outline a consistent and integrated analysis model, allowing for more comprehensive insights about the phenomenon related to changes caused by a determined technology, considering its multiple dimensions.

Considering the wide range and diversity of technology platforms, we chose to approach herein two kinds of peer-to-peer platforms, Uber (transportation) and AirBnB (lodging). It is important to emphasize that none of them can be considered a radical innovation; i.e. they did not give rise to a process of change of kingly proportions in the socioeconomic sphere, as idealized by Schumpeter's creative destruction theory (1912, 1991). At the same time, these two companies can be seem emblematic in the peer-to-peer collaborative consumption platforms for presenting – in a short period of time – an accelerated and continuous expansion process, in different countries and

places around the world. While the first grew 6,000% in five years, the second presented a growth of 750% since 2009 (Ferenstein, 2014). Both were already the target research of many previous studies.

Investigation carried out with some of the main databases (Spell and Capes Journals) and events (ENANPAD, EGEPE, SEMEAD), using as keywords “technology platform”, “collaborative consumption”, “sharing economy”, “Uber”, “AirBnB”, and “peer-to-peer” in titles or abstract, resulted in the identification of only a few articles that were not relevant to our study.

Considering the multilevel character of the phenomenon of interest, we chose as theoretical approach the adaptive theory (Layder, 1998; Leite, Moraes, & Salazar, 2016), which will be presented in further detail in the first part of the article. Heuristic approaches, with a more inductive character, are capable of being modelled and gradually formalized. It can be found in the Layder’s adaptive theory. In the second part of the article, we present some basic theoretical constructs, emphasizing similarities, differences, and possible complementarities among them, which enables the identification of the main interest and analytical categories that will guide the investigation.

In line with these the methodological procedures, the third part of this article relies on data, information and evidences extracted from the literature on the technology platforms Uber and AirBnB. The step-by-step comparison between, on the one hand, theoretical and analytical categories (defined as codes) and, on the other, the sets of data and information showed the need for small adjustments and complementations in the theoretical framework previously defined. In this way, it was possible to establish a more integrated conceptual model. The model enables the reader to notice how micro and meso processes of change affect one another, creating chains that interweave with socioeconomic macro processes and also with the possibility of emergence of a new business cycle, whose consequences remain unpredictable.

Due to the multilevel and dynamic nature of the researched issues, the adaptive theory approach (Layder, 1998; Leite et al., 2016) seems particularly adequate. As observed by Hewege (2010), a social reality “is produced by continuous, circular process whereby individual behaviour (agency) creates social structure that in turn shapes individual behaviour” (p.3) . If the act of innovating – performed by an entrepreneur or company, can produce ruptures and transformations in broader socioeconomic structures, these structures will also influence the behavior of individual actors.

The new analytical framework here presented may also be used and improved in further investigation, focusing on other types of companies or technological platforms.

Methodology

Layder (1993), considered one of the pioneers in adaptive theory, elaborated his proposition initially based on the association between two distinct approaches, yet capable of providing support for the construction of theories: middle-range theory (with a more positivist character) and grounded theory (more interpretivist). While the first is considered useful when testing propositions or hypotheses without necessarily turning to emerging data, the second supports field research, even though it does not need the support of a previous analytical or theoretical framework (Leite et al., 2016). Layder tried to find a compromise between both approaches, proposing the use of

deductive – with the definition of a previous analytical and preliminary framework – and inductive methods, simultaneously.

By making associations between a theoretical background and empirical datas, this approach aligns both positivist and interpretivist assumptions (Leite et al., 2016; Strauss & Corbin, 2008). The creation of the theory would result in the combination between – on the one hand – the use of an existing theoretical framework that could be expressed by a preliminary framework and – on the other – data and information collected or obtained through direct or indirect sources by the researcher. After developing this initial framework, it is up to the researcher to establish systematic comparisons between data and information stemming from the research and the previous conceptual structure; the researcher has to keep an eye to what can still arise from the data in order to establish a final theoretical model (Leite et al., 2016).

As emphasized by Layder (1998), the adaptive theory requires a flexible research approach, regarding either the order or sequence of the process, or the formulation of the theory itself. In our research, the deductive process occurs as soon as – based on specialized literature – a previous analytical framework is created about innovation, change, and rupture in the market and in economic cycles. The processes with inductive character arise from the introduction and emergence of data and information stemming from research in literature regarding Uber and AirBnB.

By adopting the procedures suggested by Layder (1998), our research evolved from concepts, theoretical constructs and existing theories (about innovation, ruptures and business cycles) to data and evidences (on the platforms Uber and AirBnB). From the comparison between both, we elaborated a draft analytic model. In our case, as observed by Layder, the adaptive theory allowed the conception of a new theoretical framework through a process that evolves by using existing theoretical theories that associate with theoretical conceptions that arise from sets of data obtained and from analyses made.

The search was performed in the databases Scopus, Web of Science, SPELL, Scielo, JSTOR, Google Scholar, Spell, Emerald Publishing, Wiley Online Library and Anpad. The search results associated with the technology platforms Uber and AirBnB were approximately fifty, displayed as articles pertaining to journals, congresses and other publications over the past ten years. The following indexers were used: “technology platform”, “collective consumption”, “sharing economy”, “Uber”, “AirBnB”, and “peer-to-peer”.

Regarding the bibliographic research that added to theoretical constructions (innovation, change/rupture, and cycles), the search results indicated approximately 70 works, including books, and national and international scientific journals. First, we searched for works elaborated by key-authors on this theme, namely “pioneers” or “groundbreaking”, including two classic authors considered essential to economic thinking: Schumpeter (with five works used herein) and Kondratieff (two works), in addition to a third contemporaneous author, Christensen (four works).

We identified the authors and works that mostly associate with either the exegesis, or advances, or critical aspects of pioneer studies, called herein “consolidators”, with high citation rates in literature over the last decades. Regarding neo-Schumpeterian economic theory, the indexers included – in addition to the word “Schumpeter” – the terms “creative destruction”, “technological change”, “technical change”, “technological paradigm”, “innovation”, and “economic development”. Dosi, Freeman, Nelson and Perez, herein cited, insert in the latter set. Regarding

Kondratieff, the indexers – in addition to "Kondratieff" – also included the terms "innovation", "economic cycle", "business cycle", and "economic waves".

In the case of Christensen, the search was carried out in different international journals' databases over the last five years; the terms used were "Christensen", and/or "disruptive innovation". In a third moment, after selecting the 'pioneers and consolidators' works, we looked for works and authors in literature considered "disseminators", i.e. authors that made use of the pioneers' and/or consolidators' proposition in different kinds of analysis. Hence, we selected the 70 works that were used herein.

The definition of the total studies allowed for, in addition to the consideration of seminal works, the criterion of theoretical saturation, which occurs when evidences are already sufficient and the speeches indicate no significant additional contribution to the data analysis and conclusion of the study (Paiva Júnior, Leão, & Mello, 2011, p. 193). Conforming to Fontanella et al. (2011), it occurs when the addition of a new element (a new article or study) does not seem to offer any additional contribution to the topic of interest; the sample can be, therefore, concluded – sample is to be understood as the set of elements that support the analysis and interpretation of the phenomenon. The decision to conclude the sample, according to Fontanella et. al., should be based on previous experiences and on the researcher's "good judgement taking into consideration the reasoning established through the theoretical knowledge of the relationship between the object of study and the corpus to be evaluated " (p. 289). In our study, the set investigated and analyzed (seventy articles in the theoretical field and fifty on the specific object of study) was considered adequate, which enabled the "closure" of the data collection.

After providing an explanation on the theoretical framework, we adopted a few basic steps (Fontanella et. al., 2011) to explore and analyze each of the studies selected herein. Such steps organize as follows: (a) immersion and deepening in each source in order to better explore each one of them; (b) compilation of the individual analyses of each source, clarifying the themes and the types of assertions found, and verifying the emergence of new analytical categories not beforehand explained in the previous framework (the concept of backward and forward linkages by Hirschman (1958) allowed the interaction between the different levels of analysis: micro, meso, and macro); (c) aggregation of the themes according to each category previously defined or to a new category found; (d) codification/numbering of the themes (which resulted in 22); and (e) verification and comparison between analytical elements and evidences found.

This is how the initial framework – stemming from the seventy articles –, compared to the data and information from the other fifty articles, allowed us to confirm or disprove some previously defined concepts. In this process, the data and information gathered on Uber and AirBnB were examined and analyzed according to previous theoretical framework, allowing the establishment of inferences that support the formulation of new interpretations and analyses. Such achievement was possible due to categorizations and codifications, whose accomplishment was based on the conceptual ordering by Layder (1993, 1998), in which codes/categories found can be confronted and compared with the initial framework allowing the emergence of new constructs stemming from identified evidences (e.g. the concept of forward and backward linkage, found in literature). As result, some theoretical propositions and concepts could be interconnected and strengthened. At the same time, the concept of the concept of forward and backward linkage – not previously considered in the analyzed literature – was introduced in the final framework.

Innovation and economic cycles

We make use of three constructs, or basic theoretical propositions, associated with innovation, rupture and economic changes. First, Kondratieff and Stolpers' (1935) and Kondratieff's (1984) long-term reflections on cycles or sociotechnical waves. Second, Schumpeter's (1939) creative destruction concept, which shows how innovation can be considered the engine of economic cycles. Third, Christensen's (1997) disruptive innovation concept, which shows how innovation – introduced in the market by a determined company – can become dominant in the segment. Each one of these authors provides original and essential elements to support the analysis of different moments and levels of processes of change and rupture caused by innovation – especially technological innovation.

The phenomenon of cyclical economic processes and the role played by innovation in the capitalist world draws attention from researchers for a long time (Freeman & Louçã, 2002; Kondratieff & Stolper, 1935; Mensch, 1975; Schumpeter, 1939, 1942; Villaschi Filho, 2015). According to Kondratieff (1984) and Kondratieff and Stolper (1935), the evolution of modern economy presents itself according to a dynamic pattern based on cycles or waves that emerge with the introduction of a technological innovation. Different innovations characterized capitalism's development and were capable of provoking a process of radical changes identified by the emergence of new industries, distinctive productive models, and a new system of social practices and beliefs, which support the economic growth and development, characterizing a new cycle or new economic wave.

Each one of these productive models would be defined by a set of unique technologies and practices, and the interval between them would ease the entry of new kinds of innovation in the market, which creates the sociotechnical basis that forms the foundation for the inception of the next wave (Kondratieff, 1984). The long waves, which last a few decades, are an essential factor in the economic development and its effect can be found in social and economic life (Kondratieff & Stolper, 1935, p. 154). Between the waves, one can find periods of turbulence and crises, provoked by the emergence of concurrent technologies that coexist with the ones already consolidated. Many researchers consider that we are already going through such a period. Conforming to Moody and Nogrady (2010), the current period of turbulences can indicate the downswing of the fifth growth wave and the world could be going through a transition period, which would lead to the sixth wave.

The technological revolutions, underpinned by the processes of birth, growth, maturity and decline of long-term economic cycles, are caused by the introduction of innovations capable of broadening the frontiers of production possibilities, indicating the emergence of a new "technological system" and creating a new technical and economic paradigm; i.e. a new way to face a problem and new ways to solve it (Dosi, Freeman, Nelson, Silverberg, & Soete, 1988). A new technical and economic paradigm can affect several sectors of the economy, bringing about the advent of new sectors and the emergence of new organizational and managerial innovations (Freeman & Perez, 1988) – such statement refers to Schumpeter's constellations (or clusters) of innovations. These models shall constitute the new natural general trajectory (Nelson, 1988), which will remain for several decades restraining the socioeconomic and institutional life.

The notion of technical and economic paradigm is similar to Kondratieff's (1984) propositions on sociotechnical waves or cycles of development – denominated by Schumpeter as "Kondratieff

waves" – and to Schumpeter's (1939, 1979, 1997) propositions on business cycles and the role played by creative destruction, which can provoke crises, ruptures, and, finally, adjustment and growth. As observed by Schumpeter (1979), great technological transformations led to growth and development, which can be seen in railroads construction, electricity, steam, steel, and automobile production, which are responsible for the recurring prosperity that revolutionized the economic system and – not less important – for the recession periods due to imbalances provoked by the introduction of new production methods (Schumpeter, 1979, p.18).

Conforming to Kondratieff's line of thought, Schumpeter (1939, 1979, 1991, 1997) elaborated the concept of creative destruction as an incessant process of cyclical nature that starts with a revolution followed by accommodation or assimilation, which occurs within the economic system and is part of the essence of capitalism, responsible for the economic development. The engine of creative destruction is hidden behind economic cycles. According to Walton and Oestreicher (2012), "radical technological innovations create new market opportunities whilst simultaneously destroying or transforming demand in many existing marketplaces" (p. 1483). The fundamental boost that maintains the movements of capitalism is triggered by new consumption objects, new production and transportation methods, new markets, and new kinds of industrial organization (Schumpeter, 1979, p. 116).

Schumpeterian innovations are inventions or unprecedent technical possibilities introduced in the market by an entrepreneur; they can be characterized as the production of a new merchandise, a new production method of an already existing merchandise, the exploration of a new source of resources or a new market, the reorganization of a productive segment, etc. (Schumpeter, 1979, p. 186). They arise from the combination of unrelated – or without clear antecedents – ideas and resources that can reformulate the production routine and allow the emergence of whole new opportunities, broadening the frontiers of production possibilities. Radical innovations can revolutionize the economic structure, eroding traditional companies and triggering the creation of new business models and strategies in a "gale of creative destruction" (Walton & Oestreicher, 2012, p. 1478).

Once an innovation gets accepted, a period full of new opportunities and propagation of several incremental innovations emerge; i.e. innovations created through the combination of insights and resources found within the frontiers of production possibilities. In this context, radical innovations bring a new technological paradigm. When technological opportunities become abundant, growth rates increase. This way, the development tends to carry on in long-term waves or cycles with variable intensity.

For a new development cycle to take off, it is not enough to wait for the technologies to be available. As mentioned by Villaschi Filho (2015), it is also important that innovations are economically viable; i.e. the technological availability and the economic availability must be institutionally feasible. From the economic perspective, this kind of change brings about not only a great variety of new products, but also new processes bring new ways to do things, which requires new institutional structure (Villaschi Filho, 2015, p. 68); in other words, the new rules (formal or informal) of the game (North, 1990a, 1990b). The existence of rules is, however, not enough; they must be believable, they must generate a sense of security, while embedding throughout the social, economic, political, and organizational spheres. From such merge, an institutional infrastructure would arise and no economic agent alone – consumers, companies, governments – could create it.

Such institutional infrastructure can promote economic growth and define the trajectory of nations. Each new wave involves a set of elements and tendencies and a new key-factor that requires a new facilitating infrastructure. However, every time a new process starts, two technological paradigms and two technical and productive systems might coexist at the same time for a while (Torezani & Kretzer, 2012).

Even though the emergence of an invention or scientific discovery can occur regardless of business cycle, its transformation into an innovation – i.e., the possibility of being introduced in the market – depends on the general conditions provided by the environment. According to Freeman and Perez (1988), temporary over-capacity or the saturation of some markets, crisis and instabilities in the international economy, protectionism and lack of business trust "may trigger or accelerate a vicious circle of declining investment and national income" (1988, p. 40). On the other hand, when conditions become favorable, innovation rises along with business trust, creating a virtuous cycle that may lead to a booming period. Such conditions always require a strong interconnection and complementarity between innovations, and the establishment of an appropriate infrastructure to support them.

In line with Perez (2009), long-term pendular swings – interspersing prosperous with recession periods or crises – "are as much in the nature of the market economy as the fact that economic growth, as Schumpeter held, is driven by technical change" (p. 780). In this context, the ending of a cycle may be characterized by the economy's entrance into a downswing phase, characterized by decreasing investment returns and a growing demand for innovative technologies capable of overcoming the crisis. The crisis, as the trigger of an environment prone to risk and innovation, is supported by propositions belonging to the depression-trigger theory of development elaborated by Mensch (1975). According to the author, waves formed by great innovations tend to emerge in depression periods, when the inertia of investments and the absence of technological opportunities eliminate profiles and cause market stagnation, which encourages the exploitation of opportunities related to high´-risk investments and high- potential returns. Each new cycle feeds partially on the previous one. For Ayres (1990a/b), new companies and innovative productions may use technologies developed in the previous cycle.

A technological revolution associated with "a great surge of economic development" could take a few decades "to yield its full potential in terms of growth, productivity increases, product rage, geographic spread and social benefits" (Perez, 2009, p. 709). This way, the creative destruction process would be completed as the impacts of the introduction of a new combination of existing resources in the market (innovation) are finally absorbed, and the new productive system takes off in a manner consistent with the new institutional structure that supports them. However,according to Schumpeter (1991), as the economy evolves, the rhythm of changes amplifies and the act of innovating turns into a routine, being developed not only by actors gifted with especial peculiarities (entrepreneurs), but by specialized teams that plan, enable, and control the incessant flow of new consumption goods' entry in the market (p. 181).

The concept of "creative destruction" is used in conjunction with the concept of "disruptive innovation" (Christensen, 1997, 2012). Even though they both diverge in terms of nature, they refer to great transformations, especially in the technological field, that destroy what is old and turn to what is new. However, despite eventual similarities, they are not to be understood as synonyms (Liversidge, 2015; Schneider, 2017); but as complements (Schneider, 2017). Such complementarity

is, however, not easily perceived considering that there are considerable differences between the two terms. Christensen (1997) distinguishes between two types of innovations: sustainable innovation and disruptive innovation. Sustainable innovations are the ones focused on the improvement of existing products and services, providing benefits to existing companies and markets – they can unfold into evolutive and revolutionary innovations. Disruptive innovations, on the other hand, provoke disruptions in the productive system, which affects business models, markets and institutions.

Confirming to Christensen, Raynor and McDonald. (2015, p. 2), a typical disruptive innovation stems from "a process whereby a smaller company with fewer resources is able to successfully challenge established incumbent businesses", provoking the liquidation and bankruptcy of traditional companies or entire segments (Christensen, 1997; Christensen, McDonald, Altman & Palmer, 2016; Christensen et al., 2015). Many scholars disagree with Christensen (1997) due to the lack of examples that can be in fact considered a disruptive innovation (see Schneider, 2017).

In this context, we recommend the analysis of each case based on the four basic categories that, according to Christensen et al. (2015), characterize a disruptive innovation: (a) disruption is a process that develops over time; (b) "disrupters" always build business models that are very different from existing ones; (c) some disruptive innovations succeed, others don't; (d) during the transition, established companies can keep their traditional business model while investing in a new (disruptive) model in order to maintain themselves in the market. Such categories will be emphasized in our article.

Christensen et al. (2015) highlight that consolidated companies tend to ignore markets that are susceptible to disruptive innovations because they present inferior and tighter profit margins and seem uncapable of ensuring satisfactory growth rates for an established company. Moreover, as companies consolidated in the market seem always focused on constant improvements of products and services for demanding customers, they end up exceeding the needs of some market segments, ignoring others. Then, peripheral companies start to meet the needs of the neglected segments, offering services with customized functionalities – with smaller costs – and start to, slowly, gain market share. When mainstream customers start to demand for services of new entrants, disruption occurs.

While Christensen focuses on understanding successful entrepreneurial ventures that may provoke changes and ruptures in specific productive segments, Schumpeter analyzes how creative destruction may disrupt the balance of the economic system, deflagrating a new economic cycle. As pointed out by Schneider (2017), while Schumpeter tries to understand creative destruction (descriptive/analytical approach), Christensen shows how the logics inherent in disruptive innovation can help companies (prescriptive/normative analysis). Interested in showing companies how to trigger or manage specific processes of change, Christensen (1997) considers that supply and demand will be influenced by innovation and by marketing. Disruptive innovations may alter the existing preference structure in the market by introducing new benefits and dimensions that – after becoming dominant – are considered essential in social life. In this context, disruptive innovation is to be understood as the probabilistic causal mechanism that lies behind creative destruction. While creative destruction describes the potential impact of a set of innovations, disruptive innovations shows its interior development (Schneider, 2017).

Table 1 summarizes the main analytical categories (propositions/theoretical conceptions of the authors approached herein) and their respective codes/numbers (22 in total) and organizes them according to two criteria. The first criterion regards the coverage of the environment where the event/process takes place, including: (a) micro (events/phenomena occurring at the entrepreneurial/company level); (b) meso (within sectors/productive segments); (c) macro (within the economy); and (d) structural (long-term events). The second criterion regards the theoretical conception, including: (a) disruptive innovation (Christensen, 1997, 2012; Christensen et al., 2015; Liversidge, 2015; Schneider, 2017); (b) creative destruction (Dosi et al., 1988; Freeman & Perez, 1988; Schumpeter, 1939, 1979, 1991, 1997; Torezani & Kretzer, 2012; Villaschi Filho, 2015); and (c) economic cycles (Ayres, 1990a/b; Kondratieff, 1984; Kondratieff & Stolper (1935); Mensch, 1975; Perez, 2009; Schumpeter, 1939, 1979, 1997;).

The shaded area in the Table delineate the most relevant categories at each one of the levels according to the logic of their respective authors. The propositions of Christensen (and similar researchers) allocate between the micro and meso levels of analysis. In the case of Schumpeter (and neoschumpeterians), even though the author approaches the importance of the entrepreneur and the company (micro) and the impact of innovation on productive sectors (meso), he does it so in order to understand the macroprocess of economic growth and its consequences in the long-term (macro and structural). Regarding Kondratieff and contemporary researchers interested in economic cycles, the macro and structural aspects are approached (Dosi et al., 1988; Freeman & Perez, 1988; Torezani & Kretzer, 2012; Villaschi Filho, 2015;).

Table 1
Identification and Classification of Codes Derived from Theoretical Constructs

Levels of analysis and authors	**Disruptive Innovation (DI):** Christensen, 1997, 2012; Christensen et al., 2015; Liversidge, 2015; Schneider, 2017.	**Creative Destruction (CD):** Schumpeter, 1939, 1979, 1991, 1997; Villaschi Filho, 2015; Torezani & Kretzer, 2012; Dosi et al., 1988; Freeman & Perez, 1988.	**Economic Waves/Cycles:** Kondratieff, 1935, 1984; Schumpeter, 1939; Perez, 2009; Mensch, 1975; Ayres 1990a/b.
Micro	DI noticed in products/specific markets (1). Disruptive or incremental innovation (2). DI identified by four factors/characteristics (3). DI creates business models (4). Disruption as a noticeable process (5).	Innovation as a unique technical possibility (6). Innovations introduced by entrepreneurs (7). Innovations trigger organizational and managerial innovations (8).	
Meso	DI affects the nature of the market (9), alters the structure of preferences (10), introduces new usage benefits and dimensions (11). DI after establishment is considered essential in social life (12).	Radical innovations destroy traditional industries and create business models (13). Innovation triggers the emergence of new segments (14).	

(Continue)

Levels of analysis and authors	Disruptive Innovation (DI): Christensen, 1997, 2012; Christensen, Raynor e Mcdonald, 2015; Liversidge, 2015; Schneider, 2017.	Creative Destruction (CD): Schumpeter, 1939, 1979, 1991, 1997; Villaschi Filho, 2015; Torezani & Kretzer, 2012; Dosi, Freeman, Nelson, Silverberg, & Soete, 1988; Freeman & Perez, 1988.	Economic Waves/Cycles: Kondratieff, 1935, 1984; Schumpeter, 1939; Perez, 2009; Mensch, 1975; Ayres 1990.
Macro		Innovation is the basis of economic growth (15). CD is noticeable at the macro process levels of rupture and growth (16). Emergence of new institutional structures/technological systems/technical and economic paradigms (17).	Technical changes trigger new economic cycles (18).
Structural		CD lies behind economic cycles (19). Each new cycle feeds partially on the previous one (20). The new trajectory remains for several decades, impairing socioeconomic and institutional life (21).	Technological and institutional ruptures trigger new economic/business cycles (22).

Source: Elaborated by the authors.

Economic cycles, innovation, rupture and technology platforms

In line with the methodological approach of adaptive theory (Baikie & Priest, 2019), some initial insights, which were transformed into codes and inserted in Table 1, guided the search for data and further information. As observed by Layder (1998), the data encompass results of previous investigations and the outcomes stemming from different sources of information – direct or indirect. The data presented herein through information, analyses and reflections were collected mainly from international scientific articles published in journals, congresses, and organizational publications, in which we identified the presence of the 22 codes or analytical categories that cover the main issues of the papers, especially regarding digital age and technology platforms of collaborative peer-to-peer consumption – mainly Uber and, to a lesser extent, AirBnB.

As we already mentioned beforehand, each new cycle feeds partially on the previous one. According to Ayres (1990a/b), the sixth wave, which is currently in course, is taking advantage from ICTs (information and communications technology) solutions, especially regarding integrated circuits, quantum computers, global telecommunications, and internet. Conforming to Perez (2009), "such changes are particularly amenable to the innovation trajectories facilitated by ICT; […] investments […] will open abundant profit opportunities while bringing employment and increasing incomes to greater and greater portions of the population of all continents" (p. 803). At the same time, innovations capable of meeting compelling socioeconomic demands, e.g. the ones related to environmental concern and universalization of services, would be seen as "many challenges to guide technological and organisational innovation contributing to a change in

consumption and production patterns" (p. 803). Such tendencies can be observed in the contemporary world.

For Moody and Nogrady (2010), the innovations in course show the emergency of a resource- and opportunity-limited world. It indicates a focus on the minimization of resources, such as fuel and water, while maximizing desired results (e.g. in products and services) and minimizing or eliminating unintended results by avoiding waste. The same way, novelties already introduced allow us to verify a change in companies' focus (from product to services); a tendency that shall spread in the future.

Pressure to universalize services and increase consumption are also to be perceived. According to Stahlman (2010), one of the priorities of elite technologies is to reach out to immense consumer groups. Not by chance, the most recent innovations in different areas are turning this into a reality. The digitalization (a kind of radical innovation), for instance, gave rise to several electronic downloadable alternatives (Walton & Oestreicher, 2011). According to Halal (2009), "the information technologies driving globalization are gaining momentum as publishing, entertainment, virtual education, and other forms of e-commerce" (p. 107) and are responsible for the beginning of a new series of innovations. New companies are taking off by expanding or creating new markets for the dense populations of China, India, Brazil and other countries, who frequently use PCs, internet, smartphones and global media, creating great opportunities for the digital world with faster, more intelligent and more interactive systems.

As reported by Wilenius and Kurki (2012), the basis of digitalization (of the previous wave) provided a more consolidated experience in people's lives, which makes room for new business models, ventures, partnerships, and ecosystems that are still focused on providing a drastic reduction in transaction costs – i.e. all costs related to the transfer of goods or services among economic agents – and productivity gains. In line with Williamson (2012), the range of organizational innovations that defined the development of economic capitalist institutions over the past 150 years give way to considerations in terms of transactional costs. New actors, capable of innovating based on intelligent collaborative systems through social media and partnerships, start to play an essential role in the initial phases of the process, especially in the field of urban mobility, communications, health, energy efficiency and environment, by reducing costs, facilitating access, and improving people's quality of life.

In this new world, technology platforms of different kinds play a crucial role because – in addition to enabling the minimization of resources and reduction of waste – they present customization capabilities, production flexibility, and maximization of results. Technology platforms encompass a large set of different technological solutions and organizational forms, meeting multiple needs. They are to be found, for instance, within companies (Black and Decker, Sony's Walkman, etc.), supply chains (Renault, Nissan, etc.), innovation ecosystems (social media/Facebook, and search engines/Google), among others (Gawer, 2014).

The variety of platforms hinders the possibility of a unique definition that can be used for all cases, which, according to Cheng (2016), fragments the research in this field. Gawer (2014) characterizes technology platforms as evolving organizations that: (a) aggregate and coordinate constitutive agents who can innovate and compete; (b) create value by generating and taking advantage from economies of scope in supply and/or demand; (c) imply a modular technological

architecture composed of a core (leader or key-company) and a periphery, composed of individualized actors linked to one another and to the core through an interactive network capable of combining innovation and competition. These communities are based on shared activities to certain resources (products, services, information, knowledge, etc.) organized in an online platform, constantly used and coordinated by the users themselves.

Within this set, the technology platforms of sharing economy are to be found. For Mattsson and Barnes (2016), sharing activities are in significant growth; they are no longer focused exclusively on information, but on different types of resources, such as goods, credit, among others. The peer-to-peer platforms, e.g. Uber (an information platform that links – globally – local providers and users for urban mobility purposes), Blablacar (carpooling), Turo (connecting private car owners to individuals interested in renting a car), and AirBnB (connecting travelers and apartment owners), are rapidly changing the production and consumption systems and the transaction processes. In sharing economy, new platforms emerge in different markets; in2010, sharing economy made up a market estimated at over US$ 100 billion per year (Lamberton & Rose, 2012). The speed of such proliferation is seen as a threat to traditional companies according to some authors (Matzler, Veider, & Kathan, 2015); to others, it indicates an opportunity for businesses (Tussyadiah & Personen, 2018), especially in the areas of transportation, lodging, and travelling.

In the Uber case, the platform, launched in San Francisco in 2009, quickly expanded its services and reached approximately 70 countries (Dudley, 2017), revolutionizing urban mobility services around the world while bringing up some controversies and a few disputes; the platform also became the target object of several researches (Dudley, 2017; Laurell & Sandstrom, 2016; Hill, 2015; Schneider, 2017) (1) (2). The articles and authors mentioned herein bring evidences that are in accordance with the following analytical categories/interest codes situated at the micro and meso levels: specific disruptive innovation in products/markets (1); disruption as a process (5); innovation creating new business models (4); disruptive innovation affecting markets (9); alteration of preference structure (10); insertion of new benefits and uses (11); the disruptive innovation, after becoming dominant, is considered essential in social life (12).

Christensen et al. (2015) considered Uber a kind of incremental innovation, because some elements of Uber's strategies are more in line with the concept of incremental innovation. Before the emergence of Uber, the city of San Francisco already had a demanding clientele, whose needs were met by a good quality taxi service. As consequence, Uber did not focus – initially – on marginalized consumers. Therefore, Uber improved the quality of an already existing service. Other authors disagree with the hypothesis developed by Christensen et al. (2015) and consider Uber a successful example of disruptive innovation. For a more detailed analysis of the process of creation and growth of Uber, see Slavulj, Kanizaj, & Durdevic (2016). According to Schneider (2017), for example, the platform ended up destroying the market of traditional transportation suppliers (especially taxi drivers) and not, exactly, improving the performance of already established actors (1) (9) (10) (11); therefore, the case could not be considered an incremental innovation. Besides, conforming to Schneider (2017), the essence of Uber's disruptive innovation indicates the use of a technology that can offer a cheaper and more comfortable substitute for taxis. At the same time, Uber opened an entrepreneurial perspective for the individuals logged in the platform as part time suppliers/service providers.

Considering this perspective, we can see Uber as a case of disruptive innovation. In addition, the platform adjusts to the four factors or characteristics proposed by Christensen et al. (2015) to define disruptive innovation (3): (a) disruption as an evolutionary process, (b) creation of new business models; (c) possibility to become successful; (d) possibility to live and compete with traditional existing models.

The Uber platform, as well as other similar ones like AirBnB, enables that many more individuals overlap traditional production, commercialization, and consumption systems eliminating mediators and using – in a more efficient way – "underused" resources, commuting or sharing resources among themselves, at a lower transactional cost, lower environmental impact and higher quality of life, revealing the need to revise radically long-established organizational models (6) (7) (8) (13). These new systems are based on a flexible structure of business networks, created around a central coordination capable of including thousands of independent producers and consumers (Gawer, 2014), facilitating the transactions between them (Parker, Van Alstyne & Choudary, 2016).

The experience gathered in the peer-to-peer system (which substituted the traditional business-to-person model) allows the emergence of incremental innovations (2) that can come up in any point of the system, including the ones provoked or created by the users themselves, taking the exclusivity of innovation away from entrepreneurs. As sharing platforms require a reputation based on transparency, trust and legitimacy (Perren & Kozinets, 2018), many of them invest on the creation of systems – closed or open – for evaluation and classification, which are supplied by the users (providers and/or customers). These features are useful not only for improving the own system/services, but also to support decisive processes for effective and potential users. This is how every Uber or AirBnB user is systematically evaluated, either as a user (customer evaluated by the driver or automobile owner), or as a provider of the service (driver evaluated by the customer or automobile evaluated by the traveler).

As previously emphasized, successful disruptive innovations also tend to alter the competition, the structure of the market, and preferences, introducing new benefits and usage dimensions (Yu & Hang, 2010). In the case of Uber (or AirBnB, according to Guttentag, 2015), such benefits involve cost, access, agility, and flexibility gains (9) (10) (11) (12) (13) (14).

In the urban transportation sector, the demand for taxis or private individual transportation migrates to Uber and other related platforms (in the case of lodging, such demand migrates to rooms or residences provided by AirBnB), which impacts the entire productive chain. Uber, for instance, affects taxi drivers, car rental companies, parking lots and automobile manufacturers: it eliminates hierarchies by turning employees (or unemployed individuals) into providers or independent entrepreneurs (9) (11) (12) (13) (14).

The impacts of the changes provoked by Uber are already to be seen at the micro level andat the macro dimension associated with, for instance, social and institutional aspects (17), which are not addressed by Christensen. These changes are affecting not only the way through which people make a living or move within urban areas (or organize their rides), but also the cognitive background of individuals, their beliefs and values (15) (17). As pointed out by Laurell and Sandstrom (2016), the changes are deep. In the case of Uber, such changes entail alterations in the

frequency or willingness to purchase a new vehicle; the relative willingness to use other types of transportation; the nature of social connections, etc. (16) (17).

These new business systems also face existing regulatory marks, such as labor legislation and competition defense not only in Uber, but in many other cases. In the institutional field, some groups – e.g. taxi drivers in the case of Uber and similar apps – claim for restrictions and regulation of the new services. This last evidence is more compatible with analytical categories/codes related to the macro dimension, such as the "emergence of new institutional structure" (16) and (17).

In the case of Uber, many users are stopping to use private automobiles, which affects drastically social and economic lives. One can notice the rising of a new type of economy in which the interests of the user/consumer starts to be the usufruct of a given good, not its ownership (16) (17). The consumption of a good based on access – unlike consumption based on ownership – does not attach the individual to any economic, social or emotional obligations that are inherent in the ownership of goods (Botsman & Rogers, 2010), affecting consumption attitudes and behaviors, and challenging strongly established assumptions and social standards (Zervas, Proserpio, & Byes, 2017) (16) (17). When offering to users usage benefits at lower costs, it starts to be an alternative to traditional ownership (Botsman & Rogers, 2010), indicating a rupture with the valorization of private propriety – one of the pillars of capitalism – and suggesting the emergence of elements that may eventually promote a new type of "technical and economic paradigm" (16) (17).

This new paradigm is more compatible with contemporary needs, in which the urgency of reducing environmental impacts (20) is included. The possibility to replace the private ownership with collective usufruct minimizes the utilization of resources demanded by production systems in the automobile industry. In addition, the nature of the process of supply/demand also minimizes resources (and waste) because they do without large investments in fixed organizational structures; they rely on online and auto-coordinated structures. Productivity gains add to the expansion of accessibility for large populations (in the case of Uber), which is also considered an urgent need in the current world (20).

Changes of such a magnitude, triggered off by innovations like Uber, AirBnB and others, indicate the emergence of a wider process, typical of the phenomenon of creative destruction, in line with propositions on the sixth wave of development that could be emerging – after the crisis at the end of the last decade – supported by technologies remaining from the previous cycle and focused on saving resources and expanding and democratizing the access to new products or service. (20).

According to previous analyses, we conclude that the set of data and information found in literature on technology platforms (Uber and AirBnB) show impacts on different dimensions, including: micro, with categories (1), (2), (3), (4), (5); meso, with categories (9), (10), (11), (12), (13), (14); macro with at least categories (16) and (17); structural with category (20) and possible evidences of (22). We did not find in the literature on Uber or AirBnB evidences that could fully support the categories/theoretical propositions (15), (18), (19), (21), (22). The most plausible explanation for such gap could be related to the fact that a new economic cycle can only be fully mapped after its complete occurrence; in other words, trying to map a cycle during its early stages of expansion would present a few limitations, which indicates only a few evidences of the extensive, comprehensive and diversified process in course.

After concluding the comparison, we state that there are two problems – somehow interconnected – that need to be overcome in order to achieve the final theoretical model. The first is that none of the theoretical propositions – when considered separately – would be capable of encompassing the phenomenon of interest in its entirely. While the propositions of Christensen are more adequate to the analysis of micro dimensions (and, eventually, meso dimensions as well), Schumpeter's main analytical categories are better for macro-level analysis (eventually, meso and structural), and Kondratieff's are better at the structural level. Consequently, the sets need to be associated adequatelywith the theoretical model.

The second problem can be expressed in a question: how is it possible to explain that a certain innovation, introduced in the micro-organizational level, can expand influencing different economic levels and dimensions (micro, meso, macro and so on)? None of the constructs or theoretical conceptions known so far approaches such theme, indicating a gap that needs to be overcome through a process of identification and appropriation of a theoretical conception compatible with the phenomenon and other categories of analysis.

In order to understand how the expansion and incursion process of an innovation may affect different productive sectors and dimensions of socioeconomic life in a determined environment, we resort to the propositions by Hirschman (1958) on the "forward and backward linkages". In the 1958 masterpiece, the author shows that, considering the interdependence nature between different productive systems, a novelty (innovation) introduced in one of them can alter not only the nature of this particular market, but it can also spread – through a backward and forward linkage – reaching other segments, even when apparently unlinked. This way, disruptions provoked by the introduction and expansion of Uber, AirBnB and other platforms can engender changes through backward and forward linkages. Such chained changes can go forth, affecting variables of institutional nature, including norms and social values, preferences, and individual perceptions.

Figure 1 presents the basic analytical model with the main propositions/interest categories; each one of them alludes to the respective authors/creators. The micro level is covered by the meso level, which is covered by the macro, which is covered by the structural, interconnecting all of them. The model presented herein adjusts not only to the analysis of the phenomenon of interest (Uber and AirBnB), but it can also be used and improved in further research, focusing on different technology platforms.

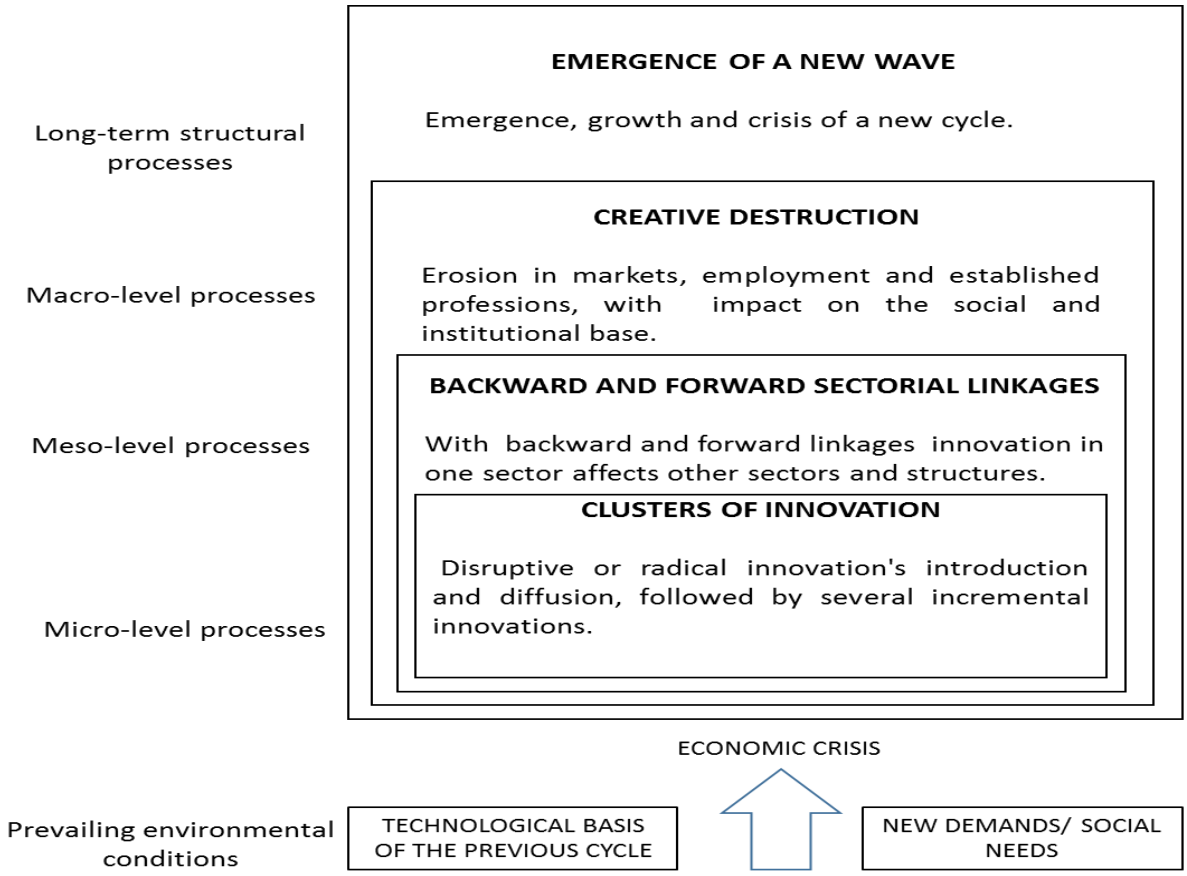

Figura 1. Integrated Analysis Model.

Sources: Elaborated by the authors.

Final Considerations

In the case of Uber and AirBnB, as innovation advances in the market (transportation/urban mobility; travelling/lodging), it triggers changes and disruptions at the organizational/micro level (Christensen, 1997, 2012; Christensen et al., 2015; Liversidge, 2015; Schneider, 2017; Freeman & Perez, 1988; Schumpeter, 1939, 1979, 1991, 1997). Through successive and simultaneous backward and forward linkages, such innovation goes beyond this dimension and affect other productive segments, placed at the meso dimension (transport production chain/automobile industry; leisure and entertainment). At the same time, as these last changes also occur, they affect different segments/sectors and go beyond the macro level, affecting several institutional variables (regulations, social preferences, etc.). Changes in the latter level suggest that platforms could be seen as triggers of a wider process of creative destruction that may lead to a new technological path (Dosi et al., 1988; Freeman & Perez, 1988; Schumpeter, 1939, 1979, 1991, 1997; Torezani & Kretzer, 2012; Villaschi Filho, 2015), resulting in a new economic cycle in the long term (Ayres 1990a/b; Kondratieff, 1935, 1984; Mensch, 1975; Perez, 2009; Schumpeter, 1939, 1979, 1997).

This new cycle would be backed by supportive factors (technological basis of the precedent cycle, ITC) and process boosters (demand/social pressure for new technologies/cleaner production processes, universalization of services, etc.) (Ayres, 1990a/b; Perez, 2009). As observed by Wilenius and Kurki (2012), the presence of these factors enables the innovative company to overcome adversities and crises. Considering the current time we are living in, the crisis provoked by the Covid-19 pandemic in the business world favors some sorts of ventures while harming or eliminating others (Leatherby & Gelles, 2020). The pandemic will most likely speed up the process of change that was already in course, strengthening different kinds of platforms that allow transactions in the virtual world.

Like every change, there will always be winners and losers. Amongst the losers, companies, jobs, abilities, markets, social prestige, and political power will extinguish, affecting entire productive chains and segments. Amongst the winners, new entrants equipped with diversified resources, who dominate the top of the technology chain. Considering losers and winners, one may expect potential crises and fierce competition. Such issues can be partially solved not exactly by the logic of the market, but by the existence of financial or legal regulations (restrictions or differentiated incentives), including patents, intellectual property, and market reserves, in order to suppress the pace of change and protect the status quo of the ones that could be more harmed.

Changes bring not only opportunities, but also threats. On the one hand, there is the hope that new technologies will be capable of mitigating waste, improving the efficiency of the scarce resources of the economy. A more efficient management of resources tend to, as consequence, improve the quality of life of large populations. According to Gico Júnior (2012), waste is unacceptable from the moral and ethical perspectives. The author claims that, if resources are scarce and human necessities are unlimited, nothing could be more unfair than waste. On the other hand, the risks and challenges are massive, especially taking into account the increasing unemployment, social polarization, and institutional weakening. Many consequences of the process in course are unpredictable. If socioeconomic gains exceed in terms of income increases and other benefits, society will be able to enter a virtuous cycle of growth and development, which may lead to the peak of Kondratieff's sixth wave sometime in the future. If, on the contrary, losses are higher, society may enter a dark period in which innovations will provoke higher concentrations of income and recurring crisis cycles, depression, or economic stagnation.

The elements that suggest a paradigm shift with a strong impact on the field of organizational studies constitute an important matter. As mentioned by Schumpeter (1991), insofar as society advances through cycles or waves, the pace of change increases and the act of innovating tends to turn into a routine; it no longer belongs exclusively to entrepreneurs, but to different actors. If, on the one hand, it seems that we no longer live in a time where Schumpeterian entrepreneurs are the only ones capable of introducing innovations that can provoke ruptures in the market; on the other, it seems that the ability to innovate is no longer exclusive to entrepreneurs or companies. In the digital network world, consumers/users mix up with producers/suppliers/providers, which go beyond the established limits between production and consumption systems, generating new innovations, changes, and transformations.

These themes are strongly relevant for scholars involved in organizational research. We hope our article can stimulate new investigations.

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