

Evolutionary Economics and the Stra.Tech.Man Approach of the Firm into Globalization Dynamics

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Abstract

This article aims to examine whether the “Stra.Tech.Man” approach (Vlados, 2004), which explores the dialectical synthesis between strategy, technology, and management inside all socioeconomic organisms fulfills the requirements to be an analysis of evolutionary direction. It tries to answer this question, in particular, by examining the theoretical foundations of evolutionary economics and the subsequent evolutionary theorization of the firm that stems analytically from evolutionary economics. With this goal in mind, an overview of the relatively recent literature is attempted by presenting some of the significant contributions to evolutionary economics and the evolutionary theory of the firm. Next, it examines the specific way of building the Stra.Tech.Man approach on the production process of innovation and change management, by analyzing how this can lead to the structuration of an evolutionary direction of business planning for any socioeconomic organism.

Keywords: Evolutionary economics; Evolutionary firm theory; Evolutionary approach; Stra.Tech.Man approach; Evolutionary business plan.



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1. Introduction

According to Vlados (2004) and the argument put forward in the present study, every socioeconomic organism articulates its action as a co-evolution and co-determination result of three structural spheres that co-exist in its interior: strategy, technology, and management. The author calls the evolutionary synthesis of these three spheres as “Stra.Tech.Man.”

With a definition as simple as possible, “*evolutionary economics focuses on the processes that transform the economy from within and investigates their implications for firms and industries, production, trade, employment and growth*” (Witt, 2008). Moreover, in particular, the work of neo-Schumpeterian origin of (Nelson and Winter, 1982) on an evolutionary explanation of the economic change, and the specific historical significance, and the transfer of biology to economic phenomena via the individual behavior of firms (in what is called “the evolutionary theory of the firm”), seems to have been used in the structuration of the Stra.Tech.Man approach.

In a similar methodological concern, Vlados (2004) argues that strategy, technology, and management of every species of socioeconomic organisms –drawing both from the “biological analogies” in economics and the strategic management theories (Ansoff, 2007)– constitute the three fundamental and co-evolving spheres that define the organism’s corresponding innovative potential. Specifically, he argues that every socioeconomic organism answers –explicitly or implicitly– three fundamental questions:

- Strategy: where is the organism now, where is its desired destination, how will it go there, and why does it choose the particular path each time?
- Technology: How does the organism draw, create, synthesize, diffuse, and reproduce its means of work and knowledge, and why does it choose this particular way?
- Management: How does the organism use its available resources, and why does it make in each case a specific managerial choice within its evolutionary course?¹

What are though the foundations of this particular theory and to what extent does it make use of the contributions of evolutionary economics and the evolutionary theory of the firm? These are the questions that this study will attempt to answer.

¹ Based on this fundamental finding, Vlados (2004) goes on to study how the Greek firms incorporate themselves into globalization. After measuring in qualitative and quantitative terms the Stra.Tech.Man of sample of firms he finds out that the Stra.Tech.Man “physiology” that prevails in Greece, and in a similar level of development socioeconomic systems, is the so-called “monodocentric” physiology. That is, the majorities of firms act strategically by only using their market “instinct,” articulate technological choices only sporadically, and manage the everyday operations almost solely with their experience on the field.

2. Methodology

Therefore, what this study is trying to identify is to what extent the “Stra.Tech.Man approach” is of evolutionary origin and what effects this model of analyzing the firm might have towards the theoretical deepening of the evolutionary theorization of the economy. With this aim in mind, our article studies and presents the theoretical foundations of evolutionary economics, by attempting to identify at the same time what are the specific methodological orientations in the evolutionary theorization of the firm.

- i. Our study will attempt to identify in the next section the theoretical foundations of evolutionary economics, as these were formed from the beginning of its theoretical conception and how these are now expanded and studied in the respective approaches.
- ii. On a second step, it will proceed with an overview of the contemporary literature –mainly during the past ten years– and it will attempt to find out recent theoretical advancements on the evolutionary economic theory and the theory of the firm.
- iii. On this basis, it will critically examine next the way of analytical structuration of the Stra.Tech.Man approach on the issues of innovation and change management, by presenting the Stra.Tech.Man as the foundation of the construction of a complete and evolutionary business plan.
- iv. Finally, it will end up in conclusions by discussing the opportunities that the Stra.Tech.Man approach gives for the further deepening of evolutionary economics and the evolutionary theory of the firm, respectively.

3. Literature Review

The following sub-section tries to find out the foundations of evolutionary economics by presenting some of the necessary milestones in evolutionary economic thought. The next sub-section presents the issues that are studied in contemporary evolutionary economists. Finally, in the last sub-section of our literature review, we analyze older and recent contributions in the evolutionary theory of the firm.

3.1. Finding out the Foundations of Evolutionary Economics

For a first identification of the discipline of evolutionary economics, it is worth quoting a relatively new, concise, as well as a complete definition of the matters that fall under the evolutionary framework of today’s economic science:

“Evolutionary economics sees the economy as always in motion with change being driven largely by continuing innovation ... For evolutionary economists perhaps the most challenging and important economic questions that need to be addressed are: How did the economic progress we have achieved come about? What can be done to enable those societies that to date have not shared in economic progress to do better? And what kind of progress can we expect in the future, and how can we influence the paths taken?” (Nelson et al., 2018, p3)

Historically, the application of evolutionary thinking into economic analysis was first discussed during the end of the 19th/mid-20th century, initially by Thorstein Veblen and then by Joseph Schumpeter (Hart, 2013b). Evolutionary economics has its roots in evolutionary biology and the school of the classical political economy (Hamilton, 2017). According to Nelson (2018), the theories of human culture and institutions are evolving, in the discourse of evolutionary economics, long before Darwin’s and Wallace’s theories. Most classical economists and social scientists (Hume, Mandeville, Smith, Ferguson, Malthus, Babbage, and Jones) were, in fact, cultural evolutionary theorists. Moreover, during the years that followed after the theoretical stream that was established by Darwin, several economists (in particular, Veblen, Marshall, and Schumpeter are the most prominent among them) had underlined the adjacency of economic science mostly to the science of biology and not so much to physics (Foster, 1997). In this sense, today’s evolutionary economics takes shape over methodological orientations and arguments that have deep theoretical roots.

Of course, also the “Marshallian tradition” has had clear implications for the evolutionary approach (Roncaglia, 2017, p. 268): “[the Marshallian tradition is] not the tradition of U-shaped cost curves started by Pigou and Viner that ... dominates mainstream textbooks but the exoteric tradition aiming at translating the Darwinian evolutionary approach into the economics field, studying dynamical processes –mainly of a stochastic, non-deterministic kind– endowed with mechanisms able to induce systematic selection” (Pigou, 1912; Viner, 1937). According to Nelson and Winter (1982, p. 44) –who quote Marshall’s (1890) passage suggesting that the “The Mecca of economics lies in economic biology rather than economic mechanics”– Marshall’s thought, even though laid the ground for the subsequent “orthodoxy,” it is much closer to evolutionary economics that is generally discussed. In particular, they argue that:

“[Marshall] is now generally regarded as a precursor or source of today’s formal neoclassical economics. So he was, in the sense that he introduced to economics a portion of its present technical apparatus and stressed in particular that market analysis must consider both the supply and the demand side. But it is explicit in the Principles that his real interest was in economic dynamics ... Contemporary commentary on this tends to rebuke Marshall for his affront to the logic of purely static analysis; the fact that he quite correctly emphasized the role of (informational) increasing returns as an economic mechanism of irreversible change receives less attention. On this question and many others, our evolutionary theory is closer to the original Marshallian doctrine than is contemporary orthodoxy.”

Concerning also Thorstein Veblen's (1898, p. 393) evolutionary thought, we can see that the institutional perspective prevails: "*evolutionary economics must be the theory of a process of cultural growth as determined by the economic interest, a theory of a cumulative sequence of economic institutions.*" At the same time, Thorstein Veblen's (1898) adopts to some extent analogies from biology to interpret the evolution of institutions: "*The economic life history of the individual is a cumulative process of adaptation of means to ends that cumulatively change as the process goes on, both the agent and his environment being at any point the outcome of the past process.*"

According to Hodgson (1998), Veblen adopted the Darwinian idea of natural selection, although he did not deny the role of "behavior" by arguing that the targeted action is always based on the institutional environment, which includes the sum of the structures that generate the culture and the ways of behaving. The "institutional school" that sprung up on the basis of Veblen's contribution (mostly by Clarence Ayres, John Commons, and Wesley Mitchell) abandoned to a significant extent Veblen's attempt to fit biology in social sciences by adopting, in contrast, the principles of a "cultural determinism" (Samuels, 1977). The disconnection between the "Institutionalists" and the evolutionary approaches during the period that followed is due to the fact that Veblen (as well as Marshall) could not systematize and propose a complete analytical framework capable of incorporating the evolutionary dimensions that economic change always brings forward (Hart, 2013b).

The theoretical rejuvenation of evolutionary economics before the second half of the 20th century and beyond is attributed to the significant contributions made by (Schumpeter, 1934;1939;1942), , and the subsequent neo-Schumpeterian theorists. Schumpeter developed a dynamic view that was based mostly on the dialectic of Karl Marx and the German Historical School, which was emphasizing historical specificity (Andersen, 2009). Schumpeter's work, on the other hand, was also influenced by the "neoclassical tradition" because he found the inspiration to apply the principles of methodological individualism (Fagerberg, 2003). In neoclassical economics, human behavior is explained in terms of rational choices, which are limited in capitalism by the prices and the available incomes: "*capitalism—and not merely economic activity in general—has after all been the propelling force of the rationalization of human behavior*" (Schumpeter, 1942, p. 125). This theoretical direction attracted Schumpeter to the ideas of the early theorists of general equilibrium and, more specifically, to Leon Walras' ideas (Schumpeter, 1939), although this "attraction" did not limit his microeconomic perception of evolutionary origin. In particular, Schumpeter (1939, p. 39) identified the term economic evolution as something that can describe "*the changes in the economic process brought about by innovation, together with all their effects, and the response to them by the economic system*". By suggesting that the capitalist process bears an inevitable evolutionary character, Schumpeter (1942) underlined, moreover, that "*the fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates*".

In this way, economic evolution is presented in Schumpeter's view as spontaneous and discontinuous and characterized by equilibrium disturbances that rearrange the previous order of things. Innovation, imitation, and competition based on technology drive towards the qualitative transformation and "creative destruction" where old means of production, as well as the social arrangements that have produced and "hosted" them, are heading towards destruction. In this context, a dialectic –of progressive cyclical nature– evolution in the economy is inevitable, because the very phase of prosperity cultivates in its interior the resources for its future destruction. He notes, in this regard, specifically:

"The opening up of new markets, foreign or domestic, and the organizational development from the craft shop and factory to such concerns as U.S. Steel illustrate the same process of industrial mutation—if I may use that biological term—that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in." (Schumpeter, 1942, p. 83).

In Schumpeter's thought, the usability of the "biological paradigm" to interpret economic phenomena is not, however, explicit. According to Hodgson (1993), the new stream of evolutionary theories should not invoke Schumpeter's name easily, since the similarities that his work has with the works of evolutionary economics is mostly superficial. Moreover, Schumpeter himself indeed contented to invoke Darwin and related biological mechanisms of variation, inheritance, or natural selection in the analysis of economic phenomena: "*There is, of course, no such thing as a biological sociology in the sense in which there is a historical sociology. Biological considerations may come in to furnish more or less important explanatory hypotheses—just as may economic considerations or any others—but the sociology they enter remains what it is by virtue of its own methods and materials*" (Schumpeter, 1954, p. 756).

Schumpeter was also against Veblen's perspective for the prospect of studying economics through a Darwinian approach, because his "*work was practically all in economic sociology*" (Schumpeter, 1954, p. 763). A similar belief concerning Veblen's role in the foundation of evolutionary economics seems to be shared by also the "founders" of modern evolutionary economics, Nelson and Winter (1982) through the "*Evolutionary theory of economic change,*" as there is no citation to Veblen's work. Subsequently, however, Veblen's contribution –mostly by authors of the stream of Hodgson (1998)– is acknowledged as essential in the foundation of evolutionary economics.

In fact, the emergence of modern evolutionary economics is due to the work by Nelson and Winter. As the authors argue (Nelson and Winter, 1982, p. 205): "*the neoclassical approach to growth theory has taken us down a smooth path to a dead end.*" The mainstream approach to growth and technical progress, according to Nelson and Winter, was not capable of studying the uncertain and complex character of the processes of economic reality:

“Formal orthodox theory purports to explain the determination of equilibrium prices, inputs, and outputs under various underlying product demand and factor supply conditions. ... More realistically, firms must be understood as making time-consuming responses to changed market conditions they had not anticipated on the basis of incomplete information as to how the market will settle down.” (Nelson and Winter, 1982, p. 24)

In this context, according to Nelson and Winter (1982, pp.4–14), also the explanatory power of the conventional model of profit maximization is now insufficient:

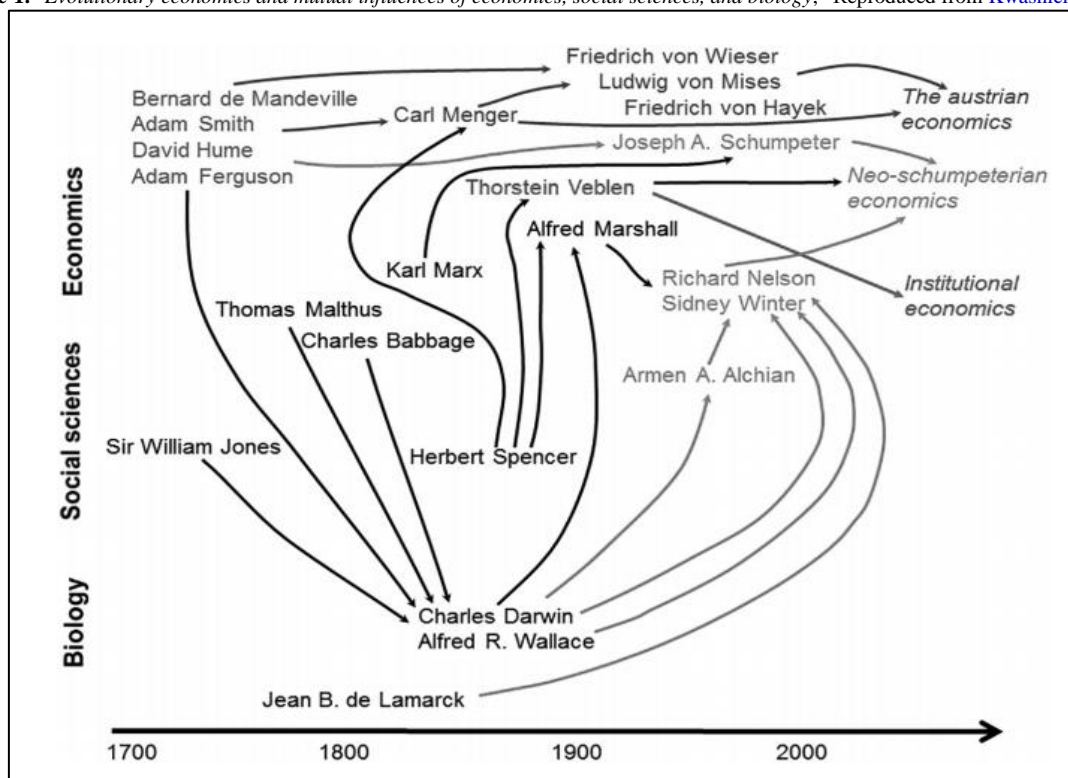
“... the modeling approach that we employ does not use the familiar maximization calculus to derive equations characterizing the behavior of firms. Rather, our firms are modeled as simply having, at any given time, certain capabilities and decision rules ... we reject the notion of maximizing behavior as an explanation of why decision rules are what they are ... Our general term for all regular and predictable behavioral patterns of firms is ‘routine’.”

And these findings of Nelson and Winter constitute to a great extent the theoretical background from which the evolutionary theory of the firm also emerges, as a byproduct of “biological-type objection” of the existing body of knowledge of classical and neoclassical economics. In particular, some of the critical features of Nelson and Winter’s approach can be summarized as follows:

1. Unlike Schumpeter, Nelson and Winter (1982, p. 9) explicitly recognize that their work is related to the evolutionary theorization in biology: “we have borrowed basic ideas from biology, thus exercising an option to which economists are entitled in perpetuity by virtue of the stimulus our predecessor Malthus provided to Darwin’s thinking.”
2. Nelson and Winter reject the traditional theories of profit maximization as a criterion for the behavior of firms, and they establish the significance of concepts such as “organizational capabilities” or “competence” theories of the firm: “We have argued in detail the view that organizational capabilities consist largely of the ability to perform and sustain a set of routines; such routines could be regarded as a highly structured set of ‘habitual reactions’ linking organization members to one another and to the environment. The tendency for such routines to be maintained over time plays in our theory the role that genetic inheritance plays in the theory of biological evolution” (Nelson and Winter, 1982, p. 142).
3. The method by Nelson and Winter does not follow a formalistic construction of models since the evolutionary theorization of the economy is that complex so that “geometrical precision” theorizations cannot be easily constructed. The dynamic nature of models is only studied using simulations, where a vast number of different scenarios and parameters are taken into account: “The advent of the computer has made available the computer program as a type of formal theoretical statement, and simulation as a technique of theoretical exploration. These developments now make possible what Marshall obviously wanted but could not reasonably attempt with the mathematical tools he had then—the development of a formal evolutionary theory” (Nelson and Winter, 1982, p. 47).

By summarizing and attempting to place the foundations of evolutionary economics into a manageable context, specifically for the needs of the present study, Kwasnicki (1999) contribution seems useful because it diagrammatically classifies the roots of evolutionary economics and its mutual influences (Figure 1).

Figure-1. “Evolutionary economics and mutual influences of economics, social sciences, and biology,” Reproduced from Kwasnicki (1999)



Kwasnicki (1999), argues that evolutionary economics is distinguished nowadays into three prominent theoretical “families,” each one with its own theoretical roots that co-evolve through time. In particular, the concurrent streams of thought of the science of evolutionary economics can be distinguished into the three following categories:

- In neo-Schumpeterian economists, who have in common that their theoretical point of reference is in Schumpeter’s work. With the term evolutionary, neo-Schumpeterians highlight the significance of long-term economic development, innovation, and the role that the “Schumpeterian entrepreneur” plays in “sustaining the discontinuity” of the system. A fundamental contribution of this school of thought is that the evolutionary economic process shows a lack of homogeneity in behaviors, with the selection and search for innovation constituting the principal mechanisms of development. Among the followers of his work, one of the first to establish a model in the biological sense of “natural selection” instead of neoclassical maximization, was Alchian (1950). Alchian’s work was one of the first steps in the construction of mathematical models of economic development based on evolutionary metaphors. These works have been, inter alia, the theoretical bases of the neo-Schumpeterians Nelson and Winter, and of other followers who attempt to apply “Darwinian” concepts at the level of the firm or at the level of the broader socioeconomic system (see, for example: (Dosi, 1982; Freeman & Soete, 1997).
- *The institutional school of thought that begins with the work of Veblen.* Veblen did not build any model to interpret by using biological analogies socioeconomic development. During the time that Veblen developed his scientific work, evolutionary biology was, after all, only an early branch of science without solid methodological foundations such as to allow the development of integrated models of studying socioeconomic development. According to Brett (1973 , p. 255), who studied the institutional thought of Clarence Ayres and how this incorporated the Veblenian dichotomy between institutions and technology, argued that: “Ayres showed that the symbolic process of which tool-using is one manifestation, also gives rise to fanciful behavior completely contradictory to the technological process.” This methodological orientation of dichotomizing the aspects of institutions and technology, which was initiated by Veblen William (1982), also prevailed in the subsequent institutional thought. Today, new institutional economic thought, starting with works like Williamson’s (1976) and Douglas North’s (1990), and also more recently with works like that of Acemoglu and Robinson (2012) reconnects gradually “institutionalism” with the context of evolutionary economics, mostly after the contributions of Hodgson (1998).
- Finally, there is the Austrian school of thought, with C. Menger as its primary founder, who developed the theory of the formation of money and institutions from a “subjective” point of view of value creation. According to Menger (1871), the origin of money is natural and not an invention made by the state, suggesting a “spontaneous creation” of institutions. According to F. Hayek (1988), the institutions are “*the result of human actions and not of human design.*”² Moreover, for L. Mises (1949 , p. 266), on an explicit evolutionary direction: “*The market economy is a man-made mode of acting under the division of labor. But this does not imply that it is something accidental or artificial and could be replaced by another mode. The market economy is the product of a long evolutionary process.*” However, Mises (1957) saw essential differences between biological and social evolution: “*the biological evolution that resulted in the emergence of the structure-function systems of plant and animal bodies was a purely physiological process in which no trace of a conscious activity on the part of the cells can be discovered. On the other hand, human society is an intellectual and spiritual phenomenon. In cooperating with their fellows, individuals do not divest themselves of their individuality.*” Next, also, Hayek (1967 , p. 68) uses terms such as “evolutionary approach” and suggests the action of individuals as a co-creator of institutions: “*The evolutionary selection of different rules of individual conduct operates through the viability of the order it will produce, and any given rules of individual conduct may prove beneficial as part of one set of such rules, or in one set of external circumstances, and harmful as part of another set of rules or in another set of external circumstances.*”

According to Kwasnicki (1999), all these three schools of thought are focusing their analysis on the dynamics of economic phenomena, by suggesting that an analysis focusing on the system’s static equilibrium is, ultimately, insufficient in descriptive terms. Accordingly, contemporary contributions to evolutionary economics can be characterized as an attempt to interpret economic growth in both the short and long term, exploring those mechanisms that lead to the emergence and prevalence of new sectors of economic activity and analyzing the behavioral motivations of economic actors.

In the background, it seems that a central element that differentiates evolutionary economics from mainstream economic science lies in the fact that evolutionary economic science studies centrally the continuous change, which derives from innovation, and which is a core element of modern capitalist economies. In this way, according to Nelson *et al.* (2018 , p. 3): “*Economies are always changing, new elements are always being introduced and old ones disappearing.*”

² One of the followers of this stream of thought of Menger was also Friedrich von Wieser, (1889 , pp. 61–62) , who suggests, inter alia, the concept of “natural value,” as against the exchange value which is “*disturbed by human imperfection, by error, fraud, force, chance; and on the other, by the present order of society, by the existence of private property, and by the differences between rich and poor.*”

In conclusion, we think that to define any analysis as one that falls under the discipline of evolutionary economics, it seems that the following methodological criteria and directions should be present and applied, either individually, or in combination:

1. As [Schumpeter \(1942, pp. 82–83\)](#) suggested, an explicit analytical connection between the phenomenon of innovation and the innovative entrepreneur with the overall process of socioeconomic development should be present.
2. A methodological approach that rejects the mechanistic approaches of the firm as “black box” and, supposedly, “profit maximizer” should be present. In contrast, the firm should be better approached based on the “biological” model of study of a socioeconomic organism, which is characterized in practice by evolving through time “routines” and “organizational capabilities.”
3. The issue of socioeconomic development should not be cut off from the institutional perspective and the specific space-time framework that hosts the actions of socioeconomic actors. In this sense, the institution must also be perceived as an evolving entity that can also be described with biological analogies.

3.2. Recent Approaches to Evolutionary Economics

But where are we now, and how does the international literature seem to approach the socioeconomic issues under the perspective of evolutionary economics? We analyze below a brief –but we also think a concise one– sample of evolutionary contributions in socioeconomic sciences, by presenting a variety of perspectives that are being developed during the past twenty years. In particular, we distinguish the following contributions based on their specific analytical focus:

- i. [Boschma and Lambooy \(1999\)](#), suggest applying evolutionary thinking in economic geography. They argue that we have to perceive regions as spatial entities that define, select, or influence the innovative ability of firms. In this context, it is perceived that not only firms are influencing their spatial surroundings but also the “space” itself can be seen as a reproducible and evolving entity. In a similar methodological direction, [Martin and Sunley \(2007\)](#) support the idea that new knowledge (innovation) emerges on a small scale in local contexts. They also argue the evolutionary economic geographers have to be taking into account the role of geographic space in the creation and diffusion of economic novelty.
- ii. According to [Dopfer and Potts \(2008\)](#), there is a “general theory” of economic development that is not limited to the study of “micro” processes, which also cannot be confined analytically to the aggregative “macro” level as the modern theory of economic growth suggests. The authors suggest, in particular, that an integrated “micro-meso-macro” framework is necessary, whereas the “micro-level” explores how economic actors produce, adopt and sustain new “rules,” the “meso-level” how these rules are getting transformed, while the “macro-level” how “meso-units” are coordinated within a historically developing trajectory.
- iii. [Heinrich \(2016\)](#), argues that there are no substantial differences between evolutionary biology and the evolution of institutions, firms, and strategies in economic science and that is because there is no genetic variation, that is, DNA and RNA or sexual reproduction in economic evolution. The involved economic actors are capable of deliberate intervention. However, there appearing phenomena of transformation in socioeconomic organisms that can frequently lead to the exclusion of the fittest. Therefore, the protection of small firms by sustaining their knowledge could contribute to the stability of the system and delimit these “random variations.” Moreover, [Heinrich \(2017\)](#) supports the idea that some models in evolutionary economics are based on metaphors from genetic evolution by assuming that a population of firms exists that has specific routines, technologies, and strategies where the dynamics of “variety generation” and selection are in force. This narrow-sighted conceptualization, as the author argues, could be enriched with the broader findings of evolutionary biology that allow one or more entities to adapt. In this context, an institution or a society as a whole can be perceived as an evolutionary entity.
- iv. On the issue of innovation in evolutionary economics, the approach of [Araujo and Teixeira \(2011\)](#) is useful. In particular, they explore how some mechanisms obstruct the diffusion of technological progress from developed to underdeveloped countries. They suggest that an approach of “structural economic dynamics” gives the possibility for studying the problem via an industrial perspective while an evolutionary approach focuses on the dynamic capabilities of firms to highlight the complexity of innovative processes. They conclude that the diffusion of technological progress is based on the particular characteristics of the industrial or business environment, such as the per capita income level and the institutions in general. On a similar methodological concern, [Potts \(2017\)](#) notices that Keynes did not develop an endogenous explanation of innovation or economic transformation such as, for example, Schumpeter did. If he had indeed developed such a theory, then he would have been more focused on the role of institutions to reinvent the economic system continuously by creating new opportunities for entrepreneurship and production in general.
- v. Alongside innovation in evolutionary economics, an emphasis is also placed on its difference from other systems of thought, notably the mainstream neoclassical approach. [Safarzyńska and van den Bergh \(2010\)](#), who explore the classification of evolutionary models in economic science, argue that an understanding of the economy as an evolving system requires the construction of models in which consumers and producers have equal significance, in a co-evolving relation of supply and demand. [Sica \(2016\)](#), compares neoclassical economics to the evolutionary approach of eco-innovation by arguing that neoclassical theories are focused on incremental eco-innovations where characteristics such as effectiveness, prevention, or environmental regulations are explored. On the contrary, the analysis of eco-innovation in its dynamic and

multidimensional nature through the lenses of evolutionary economics perceives the phenomenon as related to the interdependencies among technical, social, and economic elements. Finally, [Monasterolo et al. \(2019\)](#) are supporting the idea that approaches which are based on evolutionary economics could enhance the existing traditional economic and financial models of managing the risk of climate change. This can be done through the analysis of the “micro” and “macro” behavioral levels of the systems that are characterized by non-linearity and time dependency.

In conclusion, in trying to discern where evolutionary economic analysis is going through these indicative contributions from the recent past, it seems that the criteria of evolutionary economics that we distinguished in the previous section are validated. At the same time, there seem to be some advancements in modern evolutionary economic analysis:

- We can see, for example, a call for an evolutionary perspective to economic geography ([Boschma and Lambooy, 1999](#); [Martin and Sunley, 2007](#)), where both space and firms are reproduced evolutionarily.
- Evolutionary economics seems to attempt to understand socioeconomic development as a combination ([Dopfer and Potts, 2008](#)) of the firm-level (“micro”), the institution-level (“meso”), and the aggregative level of coordinating the previous (“macro”).
- At the same time, the transfer of analogies from evolutionary biology in the economy ([Heinrich, 2016;2017](#)) seems to constitute now a shared point of reference for evolutionary economics. Firms and other socioeconomic actors, even though they do not exhibit biological genetic variations, they are biological organisms capable of deliberate intervention. In this sense, the evolutionary theory of the firm rejects largely the neoclassical tradition ([Monasterolo et al., 2019](#); [Sica, 2016](#)) by focusing on the complexity of the phenomena that cause innovation in the firm ([Araujo and Teixeira, 2011](#); [Potts, 2017](#); [Safarzyńska and van den Bergh, 2010](#)).

These last observations, concerning the rejection of neoclassical maximization, towards a strategic behavior of firms constitute, to a great extent, also the theoretical roots of the evolutionary theory of the firm, whose background and recent developments are going to be discussed briefly in the next section.

3.3. The Evolutionary Theory of the Firm: Older and Recent Contributions

One of the significant contributions towards the structuration of the evolutionary theory of the firm was, on the one hand, [Penrose \(1952\)](#) approach, whose work, according to [Nelson and Winter \(1982, p. 36\)](#), linked the development, structure, and nature of business management. To this end, subsequently, [Williamson’s \(1976\)](#), by following the “transaction cost” approach of [Coase \(1937\)](#), contributed to the business goal approach, the organizational structure, as well as to other issues related to politics. This stream of thought that sprung up mostly from Harvard Business School ([Kanter, 1983](#)), explored the concept of business strategy and its relation to the business organization ([Chandler, 1962](#)).

In this context, [Nelson and Winter \(1982, pp. 14–15\)](#), by also drawing from these contributions in business strategy, rejected the profit maximization hypothesis by substituting it with the “routines” that constitute predictable decision rules. These routines, which reflect the “memory” of the organism of its specific capabilities, they come from the learning and selection processes and are expressed through production techniques. In contrast to the simplified behavioral hypotheses that laid the ground for the maximization criterion in neoclassical economics, by building models of decision-making in conditions of perfect equilibrium, [Nelson and Winter \(1982, p. viii\)](#) argue that firms can be explained better in terms of “*general habits and strategic orientations coming from the firm’s past*”.

Based on the above introductory clarifications, we will attempt to find out below some of the recent trends in the evolutionary theory of the firm, via a general overview of the literature on the subject during the past ten years, approximately:

- According to [Nooteboom \(2008, p. 26\)](#), the evolutionary theory forces us to recognize the role of the different actors based on their individual preferences, in the process of variety generation, as well as the structure of markets and institutions in the process of selection. According to the author, the theory of the evolution of firms should be an approach that helps to recognize “*dynamics and emergence, rather than rational design and choice, as a result of selection (by markets and institutions) upon a variety of competencies/capabilities (of firms)*.” The author concludes by wondering whether this analysis is enough by answering that “*We need to add content to how these processes work ... in terms of cognition, learning and communication.*”
- [Coad \(2010, p. 215\)](#), argues against the neoclassic view of the firm as a rational maximizer of profits. Such a hypothesis is not useful to initiate empirical research in the growth of firms. The author suggests that even though the neoclassical theory has the advantage of advanced mathematical modeling, evolutionary economics has “preferred” not to sacrifice realism for “mathematical tractability.” It is argued that a starting point for empirical research lies in the evolutionary thesis that firms are heterogeneous internally and, therefore, while the existence “*of any sensitivity of investment to cash-flow is interpreted as a problem worthy of a policy intervention for neoclassical economists, for their evolutionary counterparts who do not have such restrictive theoretical lenses it is merely the sign of a well-functioning economy.*” In this direction, [Coad \(2010, p. 215\)](#) proposes that “*the problem of imperfect capital markets and asymmetric information leading to financial constraints has been exaggerated by much of the mainstream literature.*”

- According to [Rahmeyer \(2010\)](#), a neo-Darwinian explanation of evolution specifies a variation and selection process, which means the creation and exploitation of knowledge from heterogeneous individuals and organisms. In this context, bounded rationality, research, and exploitation of knowledge of firms are essential to study the aspect of economic change. This alternative theoretical pattern contradicts the dominant neoclassical paradigm, which is oriented towards optimization and equilibrium.
- [Stoelhorst \(2010\)](#), argues that Darwinian logic leads to a view of the firm where individual behavior is the only source of variation in different organizational capabilities. In this perspective, as social systems, firms coordinate the behavior of their people while, as economic systems, firms compete with each other based on their specific capabilities. It is argued that this thinking can be useful for evolutionary economics, which can bridge analytically the separation between the micro and macro level, which is a constant issue in social sciences.
- According to [Sirghi \(2013\)](#), the theories of the firm contribute to our understanding of the phenomena of the real economy. Nowadays, microeconomics does not study the function of markets, but how firms can coordinate their decisions based on dynamic interactions in a competitive environment that is characterized by riskiness and uncertainty. At the same time, [Sirghi \(2014\)](#) argues that structural changes are the rule in any economic system, while economic actors display different behaviors in the markets that result in different outcomes based on the number, relative size, and strategies that approached by other economic actors.
- [Jaeckel \(2015\)](#), who reviews [Dunn \(2013\)](#) book “*Inside the capitalist firm: An evolutionary theory of the principal-agent relation*,” suggests that this book can be distinguished in two main areas. First, it explores the goals of the firms, contrary to the traditional profit maximization hypothesis, by introducing the idea that a chaotic and competitive environment is the main principle that governs all firms, and not profit. Second, the book presents a critique of the neoclassical conception of the firm since, according to Dunn, the firm does not execute any technically determined automatic procedure that just transforms inputs into outputs but, on the contrary, the firm is a complex system that is characterized by the simultaneous interaction between technological and social relationships.
- According to [Etemad \(2017\)](#), a theory that explains the evolutionary trajectory or lifecycle of an internationalized firm can be useful. This theory can offer, in advance, information for the time or “age” stage of the lifecycle of the firm, leading to information about how firms succeed in creating and acquiring new knowledge.
- In a similar methodological concern, [Coad \(2018\)](#) argues that it is of scientific interest to explore the “aging” stages of the firm. However, the firm’s “aging” does not present the same formalities observed in the human process of aging and, therefore, the “anthropomorphic” analogies are not fully operational to the lifecycle of firms. This happens because there are probably two or three stages in the firm’s aging. The first period corresponds in a booming activity where firms “*struggle against the initial ‘liability of newness’.*” During the second stage, firms become “*routinized and change is gradual,*” while the third stage could correspond to the level where “*routines are so rigid as to lead to organizational ossification.*”

In conclusion to the previous approaches, we find that the behavioral interpretation of the firm that Nelson and Winter laid the foundation for, remains the prevailing trend (such as, for example, in these analyses: [Nooteboom, 2008](#); [Stoelhorst, 2010](#));. We also observe a moderate tendency to analyze the firm from a biological perspective ([Coad, 2018](#)), drawing primarily on a “neo-Darwinian” evolutionary interpretation ([Rahmeyer, 2010](#)) where differentiation does not necessarily mean mutation, but rather a process of creating and exploiting knowledge from heterogeneous individuals and, more generally, business organizations ([Etemad, 2017](#)). Of course, one common point of reference is the assumption that the conventional neoclassical interpretation of the firm as a static transformer of inputs into outputs is insufficient ([Dunn, 2013](#); [Jaeckel, 2015](#)). Evolutionary economics, although not particularly advanced at the level of mathematical modeling, has chosen realism over “mathematical formalization” ([Coad, 2010](#)). Moreover, an evolutionary interpretation of the firm appears to be the analysis of the heterogeneity of economic actors, which show different results depending on their relative sizes and individual strategies ([Sirghi, 2013;2014](#)).

Undoubtedly, the above analyses help us to understand that the emergence of the evolutionary theory of the firm is based on the perception that firm behavior is a historical process that does nothing in an “automatic way.” They also help us understand how evolutionary economics places firms and their business planning at the center. However, this stream of thought appears to us as being still in its infancy, something that is evident from the minimal attempt to provide specific operational models.

However, by drawing on [Nelson et al. \(2018, p. 31\)](#) analysis, a relatively operational model, at least in our attempt to interpret the Stra.Tech.Man approach, could work:

“Some routines involve the technologies used by a firm and the division of labor and modes of coordination that are operative in production ... The role of management is seen as monitoring what is going on in the firm, and holding it to a standard, and assessing when firm routines need to be changed and if so in what direction. A considerable body of research has been concerned with the “dynamic” capabilities of firms, which includes prominently capabilities for effective innovation. Firm innovation itself involves considerable use of established routine, along with conscious analysis and deliberation, and explicit managerial decision making.”

In other words, we could argue that routines (strategy), includes “*the technologies used by a firm*” (technology), and “*modes of coordination that are operative in production*” (management). In this sense, the “Stra.Tech.Man”

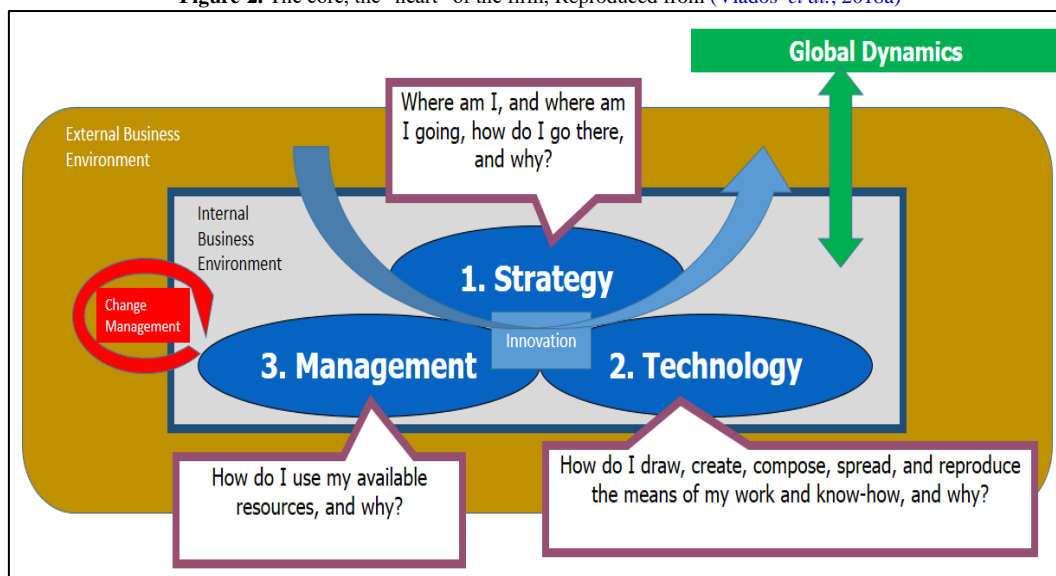
approach that we will discuss in the next section seems to have analytical significance on the dialogue of evolutionary economics and the evolutionary theory of the firm.

4. Counter-Proposal: The Stra.Tech.Man Approach in the Evolutionary Perception of the Firm and its Socioeconomic Environment

One of the main conditions of evolutionary economics and the respective theory of the firm seems to be based on the perception that the description of economic processes and behavior of economic actors at the firm level approaches the reality in a way that the orthodox neoclassical tradition of rational profit maximization is incapable of perceiving. Both from the introduction of Schumpeterian dialectic of “creative destruction” and the entrepreneur’s innovation that occupies a central position, as well as from the neo-Schumpeterian enrichment with biological analogies by Nelson and Winter, evolutionary economics and the subsequent evolutionary theory of the firm seem to attach principle importance to the micro-level of the firm. On the other side, even though the contributions of institutional economics and the Austrian school are evolutionary in their unfolding, their way of theorization is mostly expressed in a non-explicit micro-level as the center of the socioeconomic system they study.

As we presented in the introduction, a model of evolutionary nature, which focuses on the historical shaping of the action of socioeconomic actors by using biological analogies, is the Stra.Tech.Man approach (Vlados, 2004). The “Stra.Tech.Man approach” composes, in interpretive terms, the spheres of strategy, technology, and management and emerged as a model that tried to operationalize the evolutionary approach of the firm, suggesting that the neoclassical claim of rational profit maximization has reached its interpretative limits (Vlados, 2006, p. 203). The Stra.Tech.Man approach constructs its explanation based on the following questions (Figure 2):

Figure-2. The core, the “heart” of the firm, Reproduced from (Vlados *et al.*, 2018a)



- “Strategy: Where am I, and where am I going, how do I go there, and why?”
- “Technology: How do I draw, create, compose, spread, and reproduce the means of my work and know-how, and why?”
- “Management: How do I use my available resources, and why?”

Every one of these questions, in its own synthesis for every co-evolving sphere, attempts to identify, at the beginning, which are the most profound dialectical questions that every socioeconomic organism is facing. By the term “dialectical,” it is presupposed that, in its most profound nature, in every intellectual endeavor, there is a “Thesis” that cultivates its “Antithesis” that leads necessarily on the highest level of “Synthesis” (Vlados *et al.*, 2019b). And by the term “socioeconomic organisms” it is presupposed that an evolutionary approach deals with the “economic” and “social” as a single system of which all organisms with their internal action shape both their internal and external environments.

With these introductory clarifications in mind, below we present some of the recent contributions of the Stra.Tech.Man approach. We have divided these into five categories, which we will briefly analyze.

I. Biological Perspective, Stra.Tech.Man Physiology, and the Firm as a “Living Organism”

One of the fundamental contributions of this approach is based on the fact that this socioeconomic organism (firm) has and expresses specific Stra.Tech.Man “physiology” that only allows specific “openings” towards a more advanced model –or “restrictions” to a less advanced model. The Stra.Tech.Man physiology refers specifically to the firm as a living socioeconomic organism (Vlados, 2019a). It supports, that is, that the firm must be dealt with as an entity that co-formulates the environment that lives via its actions.

In particular, by studying firms operating in Greece during the late 20th and early 21st century, Vlados (2004) found that the firms in the Greek productive system (but also in productive systems of similar range) exhibited three different physiologies: the flexible, the massive, and the “monadocentric.” The finding of the trend that the majority

of the Greek firms are “monadocentric” was proved by taking into account quantitative and qualitative empirical data on the field over time, and by using “Stra.Tech.Man physiology questionnaires” in samples of firms, in chosen industries and Greek regions. This method of Stra.Tech.Man physiology is still in usage on the field (Vlados and Chatzinikolaou, 2019a), as a business consulting approach, validating the “biological” concept of physiology since it seems practically impossible for a socioeconomic organism to display, for example, “monadocentric” physiology in the sphere of strategy and flexible physiology on management (Vlados, 2016).

II. Continuous interaction and co-determination between the internal and external organizational environment inside the dynamics of globalization: the Stra.Tech.Man business ecosystem

The Stra.Tech.Man synthesis, quite normally, also can extend conceptually onto a micro-meso-macro level (Vlados and Katimertzopoulos, 2018), while the dynamics of globalization nowadays act as a unifying link of the different levels of the socioeconomic system (Vlados *et al.*, 2018). More specifically, with a co-evolutionary perspective of the firm’s environments in Stra.Tech.Man terms (Vlados and Chatzinikolaou, 2019c), the firm is studied as the co-creator of its internal and external environment, and not just a mere passive receiver of external forces. The firm contributes actively to its business ecosystem.

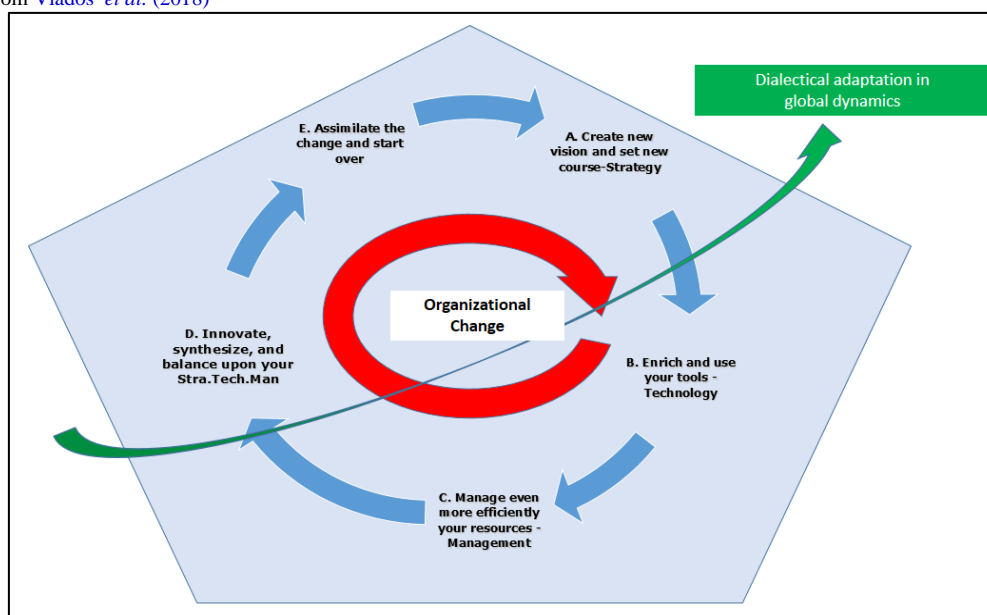
By placing the firm at the center of its business ecosystem, we understand that business ecosystems act as both receivers and senders of “micro-meso-macro” dynamics in Stra.Tech.Man terms. Today, in the current phase of crisis and restructuring of globalization (Vlados *et al.*, 2019b), different business ecosystems, with different level of development each, which depends on the specific Stra.Tech.Man physiology mostly at the micro level, co-formulate with their action the dynamics of globalization. This evolutionary process unifies progressively different socioeconomic systems at micro-meso-macro level (locally, nationally, and transnationally).

III. Innovation and change management in Stra.Tech.Man terms

In this sense, this “dialectic triangle” of Stra.Tech.Man gives birth to organizational innovation –or at worst, a less developed Stra.Tech.Man triangle leads to a continuous innovative decline and thus to reduced competitiveness for the socioeconomic system as a whole. In the Stra.Tech.Man approach, emerging innovations are always organically linked, whether they come from a sphere or a combination of strategy-technology-management dimensions, leading to higher benefits for the organism as a whole and pushing the Stra.Tech.Man model of the firm at more advanced levels (Vlados *et al.*, 2019). Therefore, innovation, born through the constant change of dialectical character, is nurtured and emerges through successful evolutionary Stra.Tech.Man syntheses.

This creation of innovation (new knowledge and its profitable application) is undoubtedly one of the most critical dimensions today, in the new age of knowledge and dynamics of globalized capitalism (Vlados, 2017; Vlados *et al.*, 2018). Innovation, however, which inevitably transfers the forces of change into each expression, is systematically put into practice when the management of change allows it. The Stra.Tech.Man approach, in which the three spheres of strategy, technology, and management co-evolve and are co-defined, can be seen in the context of an endless development cycle, in which five successive dialectical steps emerge (Figure 3): a) strategic evolution, b) technological evolution, c) managerial evolution, d) innovative synthesis, and e) the successful assimilation of change. In the last step, the socioeconomic organism returns to the first step of the cyclic dialectical process and restarts, on the basis of a higher dialectical and developmental level (Vlados and Chatzinikolaou, 2019b).

Figure-3. The five steps of change management in Stra.Tech.Man terms and the dialectical adjustment of the firm in global dynamics. Reproduced from Vlados *et al.* (2018)



IV. Stra.Tech.Man and the competitiveness web

It is argued that the firm in Stra.Tech.Man terms operates at the center of a “competitiveness web” (Vlados, 2019c), which takes into account, to the fullest extent possible, all the systemic influences that a socioeconomic

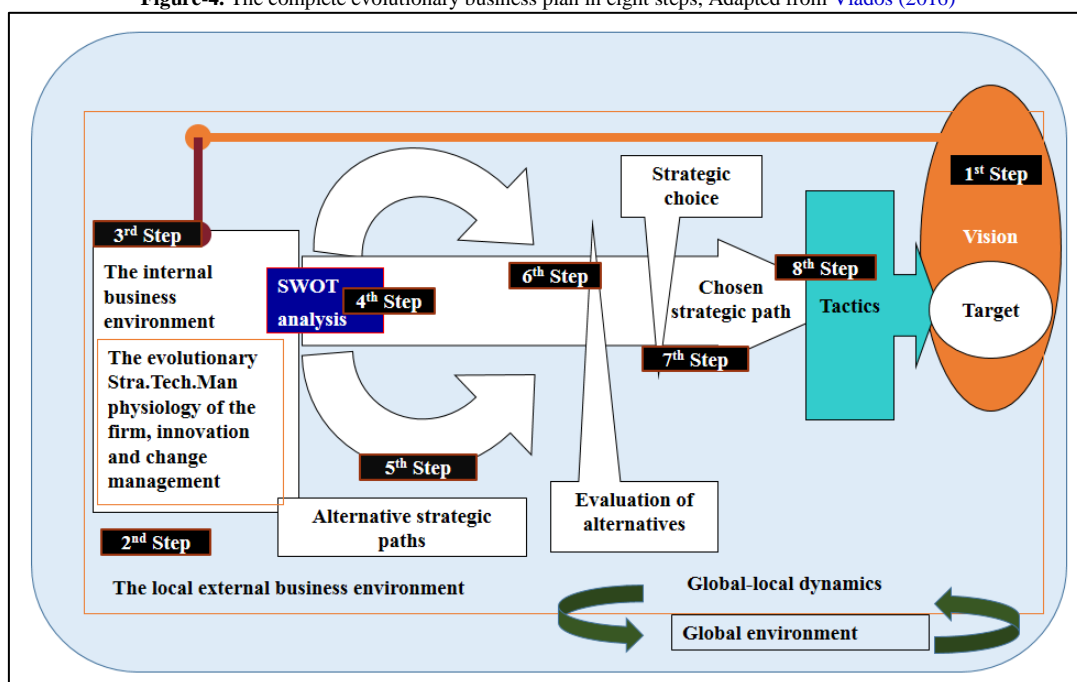
system absorbs or transmits to its components. Depending on the level of competitiveness of the firms living at the center of the system, the overall competitiveness of the different socioeconomic formations that host and co-shape the activity of the firms evolves in terms of competitiveness.

Through the competitiveness web methodology, the “extra-economic” dynamics that are involved in the structuration of the Stra.Tech.Man competitiveness at all levels of the socio-economic space are also incorporated. In this way, the institutional, sectoral, and political environment actively participate in this dialectical process. A process, that is, of hierarchically-placed institutions, with different potentials each, that have at the center the evolutionary dynamics of the firm in Stra.Tech.Man analytical terms.

V. Stra.Tech.Man, evolutionary SWOT analysis, and business planning

In the background, in any evolutionary analysis, the key strategic objective of the organism is to diagnose the particular historical content. In this sense, a SWOT analysis that takes into account strengths-weaknesses/opportunities-threats is essentially a dynamic-historical process. A “correlative SWOT analysis” (Vlados, 2019b; Vlados and Chatzinikolaou, 2019d) realizes that only “comparative” strengths exist, over time and compared with other organisms, which lead to specific potential opportunities, respectively. On the other hand, only “comparative” weaknesses exist, which lead to specific potential threats. This correlative interpretation of strategy articulation can be understood to the extent that the particular Stra.Tech.Man physiology of the organism has been adequately diagnosed. These two steps, diagnosing the physiology of the firm and building a correlative SWOT analysis, are two of the most critical steps in building a complete and evolutionary business plan (Figure 4).

Figure-4. The complete evolutionary business plan in eight steps, Adapted from Vlados (2016)



A business plan always begins with the vision (Step 1) set by every socioeconomic organism, to find out what its current state is and where it wants to reach within the environment that hosts its activity. Then it realizes the structure of its external environment within the specific space-time boundaries that concern the organism (Step 2). Next, the organism diagnoses the evolutionary Stra.Tech.Man physiology that allows it to innovate and manage the change (Step 3): in this step, the organism must understand the continuous interaction and co-evolution between its internal and external environment. Then, it finds out with an evolutionary and correlative SWOT analysis the potential opportunities and threats that give birth to specific strengths and weaknesses (Step 4). Next, the organism figures out alternative strategic paths (Step 5), evaluate them (Step 6) and chooses its strategy (Step 7). Finally, the partial tactics are only small “battles” that an organism gives on the “battlefield”: the target is to win the “war” that you have consciously chosen to participate (Step 8). The socioeconomic goal (vision) that the firm has set initially, it is continuously reshaped and transformed over time, as well as the overall evolutionary business plan.

In conclusion, it seems that the socioeconomic analysis of the “Stra.Tech.Man approach,” which is a theoretical model of the evolutionary theory of the firm, appears as a systematic attempt to deal with the internal and external environment of the firm from an evolutionary perspective. By focusing on the profound dialectical questions posed by each socioeconomic organism, the Stra.Tech.Man approach composes a model that can be a functional expression of the level of development through the diagnosis a) of the specific “physiology” of the firm and b) of the entire hosting socioeconomic system.

5. Conclusions and Discussion

We attempted in this article to study the theoretical foundations of evolutionary economics, the subsequent structuration of the evolutionary theory of the firm and, in the end, to present an analytical counter-proposal based on

the Stra.Tech.Man approach of the firm. As a conclusion, we will try to answer two questions on why we undertook this effort to classify evolutionary economics and the respective theory of the firm, and how this effort relates to the Stra.Tech.Man counter-proposal with the corresponding evolutionary contributions we presented so far.

First question: What points of evolutionary economics seems to be used by the Stra.Tech.Man approach? How does the Stra.Tech.Man enhance and deepen them?

The Stra.Tech.Man approach was born as a methodological counter-proposal of strategic management of firms, in the effort to combine the contributions of evolutionary economics at its core. Having as a feature the dialectics that underlie every socioeconomic actor, it poses a set of three questions corresponding to the three spheres of strategy, technology, and management.

As we have seen, there are at least three necessary conditions in order to have an evolutionary economic science:

- a) The explicit link between innovation and the entire socioeconomic development: in the sense that the Stra.Tech.Man dialectical questions lead to a “Schumpeterian innovation” where the new status replaces necessarily the old, then the Stra.Tech.Man is evolutionary. Moreover, the Stra.Tech.Man seems to enhance our perception of innovation, as it places it into an actual framework, through the specific and –always necessary– synthesis of strategy, technology, and management.
- b) To reject the neoclassical mechanistic interpretation of the firm, which is not a rational profit maximizer: on the contrary, the firm in Stra.Tech.Man terms is a socioeconomic “living” organism that has capabilities, knowledge, and routines (strategy) and constructs complete business plans.
- c) Institutions are also co-evolving entities, which shape their content according to the level of development of the socioeconomic actors that live in their interior: the Stra.Tech.Man approach places the firm at the center of the socioeconomic system, acknowledging that the level of development of the Stra.Tech.Man physiology also provides an analysis of the respective level of institutional development.

Except for these fundamental contributions of evolutionary economics, there are also recent advancements:

- a) Economic geography is, in fact, an evolutionary science where both space and firms are reproduced: the Stra.Tech.Man approach can provide in this direction the center of the spatial system under study, diagnosing its opportunities for socioeconomic development.
- b) Socioeconomic systems are the result of the co-evolving “micro-meso-macro” systems: the Stra.Tech.Man approach, being at the center of the business ecosystem that hosts it, creates the conditions for a co-evolutionary understanding of different business ecosystems at the micro-meso-macro level.
- c) Even though firms and other socioeconomic actors do not exhibit “strict” biological functions, such as genetic variation or inheritance, they are biological organisms capable of conscious intervention to their environment: the Stra.Tech.Man approach places this deliberate action into a relatively sufficient operational model, by attempting to find out the specific physiology that is being co-formed over time.

Second question: Is the Stra.Tech.Man approach capable of incorporating the basic directions of the evolutionary theory of the firm and enrich them into a direction of research?

As we have discussed in this article, specific features exist that suggest an evolutionary theory of the firm. Below, we list the main findings and their relation to the Stra.Tech.Man approach:

- Contrary to the oversimplified maximization criterion of neoclassical economics, Nelson and Winter have suggested that firms can be explained by their “*general habits and strategic orientations coming from the firm’s past*”: in this sense, the Stra.Tech.Man approach, which builds its hypothesis in the dialectical co-evolution of strategy, technology, and management potential of the firm seems to enrich this research orientation. This is because it provides a model that, based on the particular Stra.Tech.Man physiology, we can perceive the innovative potential of the firm.
- A “neo-Darwinian” interpretation of the firm does not mean necessarily “mutation,” but also the creation of knowledge (innovation) from heterogeneous business organizations: again, the Stra.Tech.Man physiology operates as a link between the biological interpretation of the firm and its actual effort to innovate and, thus, to survive in a competitive environment.
- Evolutionary economics has not advanced mathematical modeling analogous to neoclassical economics, choosing a more realistic explanation instead: the Stra.Tech.Man approach classifies quantitatively and qualitatively different firm physiologies into the “monadocentric-massive-flexible” typology. It provides, therefore, the necessary combination between quantitative and qualitative modeling in order to recognize the level of development of the firm and the socioeconomic system hosting the firm.
- Finally, the evolutionary theory of the firm deals with the firms as different socioeconomic organisms, which have different qualitative and quantitative sizes and strategies: with the evolutionary business plan that the Stra.Tech.Man approach introduces, it seems that it analyzes in a relatively sufficiently developed way the firms’ heterogeneity. It attempts, except for interpreting their way of action, to propose an actual plan of action that can be used probably by all socioeconomic organisms.

Concerning the limitations of our research, a more in-depth exploration could probably examine and other, as relevant, contributions to the Stra.Tech.Man approach, which would help in its operational enrichment. Of course, we do not argue that the Stra.Tech.Man approach has reached a level of operationalization capable of being used in all socioeconomic systems. The Stra.Tech.Man approach has only being used as a model related to the dynamics of globalization and the Greek socioeconomic system in its different aspects (Vlados, 2004). However, it seems that it creates an area of future investigation on the research field of socioeconomic development and business dynamics.

Acknowledgment

We want to show our gratitude to Dr. Andreas Andrikopoulos, Associate Professor at the Department of Business Administration of the University of the Aegean, who provided useful comments during the writing of this manuscript.

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