

Evolutionary Economics as a Trend in Modern Economics: An Overview

Introduction

Modern economic thought presents a variety of frequently opposing views on the operation of both economic agents and the national economy. Today's economics is constantly expanding and becoming more and more diverse internally, combining its own reflections with other social sciences, chiefly psychology, sociology and philosophy. As part of the interdisciplinary exchange, new methodologies and scientific approaches are emerging that are directed towards a more holistic view of economic processes and the functioning of entities in the market. The number of economic theories that may be considered relevant and may not be neglected when outlining the picture of modern economic thought is indeed considerable. The past five decades have seen an increased interest in the evolutionary approach to economic processes that are affected by the processes of selection, mutation and inheritance. Evolutionary processes are popular in economic sciences since they allow for an interesting interpretation of behaviours of economic agents by separating the behaviours from the rigid requirements of the neoclassical concept of rationality. This interest has resulted in the emergence of evolutionary economics, which, generally speaking, specifies various economic concepts that make it possible to explain economic processes by analogy with the evolution process occurring in the natural environment. As a trend in modern economics, evolutionary economics is a theoretical framework for the analysis of economic systems as open, complex and evolving systems.

This article aims at providing an insight into the evolutionary economics field of interest and presenting its historical roots, current views and prospects for development. The issues in this study do not describe its whole range, but only selected

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elements. The structure of this article is as follows. The first part concentrates on explaining the concept and key assumptions of evolutionism in various scientific areas, especially in social sciences. Further, the essence of evolutionary economics and its origins are discussed. Owing to the length requirements, the focus is exclusively on presenting the views of the most prominent representatives of this scientific discipline. The final part synthesises fundamental weaknesses of evolutionary economics and prospects for its development. Finally, major conclusions end this study.

Evolutionism and Various Scientific Areas

Evolutionism derives from the Latin word *evolutio* – developing, development, and from the Italian verb *evolvere* – evolve, develop. This term denotes a uniform set of conceptual frameworks, philosophical doctrines, and scientific theories and hypotheses referring to evolutionary processes (Grębecki, Kinastowski, Kuźnicki, 1962; Skowron, 1966). Evolutionism argues that the whole diversity of life was formed in a natural process known as evolution¹. The source literature suggests that the term “evolutionism” was first used in this sense in the 18th century by Albrecht von Haller, a Swiss physician, physiologist and botanist, in his eight-volume *Elementa physiologiae corporis humani*.

Evolutionism as a form of naturalism developed in the 19th century in the spirit of positivism and was a great system of that era, integrating scientific outputs (scientism). There is a wealth of literature on this topic, and it may be claimed that a certain tradition and evolutionary way of thinking exists in science, or even that there is an evolutionary paradigm of practising science. Evolutionism is understood as a metascience combining biological, chemical, geographical, physical, geological, cosmological and social sciences. For this reason, evolutionism is treated in different ways in the various scientific areas. In biological sciences, it is most commonly a study of changes of living species and mechanisms and regularities of such changes. From the philosophical perspective, evolutionism is a philosophical and scientific

¹ There are many interpretations of the word “evolution”. It is mostly construed as a change of gene frequencies in populations or common descent. The first meaning is empirical and is sufficiently confirmed by laboratory tests and observations. Insofar as it has robust empirical confirmation, it refers to what is called micro-evolution (intraspecific variability or variability at a slightly higher level). The second sense is theoretical, it unifies the way biologists view the living world, and also finds its strong empirical substantiation in various scientific disciplines, although not as conclusive as for the first meaning. It refers to macro-evolution, or changes occurring clearly above the level of species, that is to the formation of new anatomies (Jodkowski, 1998, pp. 23–24). The first one is called “the special theory of evolution”, while the other “the general theory of evolution” (Kerkut, 1960; Denton, 1985). According to T. Dobzhansky, evolution covers all development stages of the universe: cosmic, biological and human, i.e. cultural, development. The efforts to confine the concept of evolution solely to biology are unfounded. Life is a product of inorganic nature evolution, and the man is a product of evolution of life (Dobzhansky, 1967, p. 409).

ic view derived from H. Spencer according to which the current reality – its present state and structure – may be explained as a product of evolution which objects and phenomena undergo. In the case of cosmology, evolutionism refers to the idea by L. Smolin, who adopted the multiverse hypothesis that the nature of the different universes and of our world is determined by natural selection, which also conditions the character and evolution of the laws of nature. As claimed by L. Smolin, the reasons why such, and not other, laws of nature exist will not be possible to explain until the theory of evolution is applied to physics. He believes that the theory that will combine the relativity theory and cosmology with quantum mechanics must also be a theory of self-organisation (Smolin, 1996, p. 406). The multiverse hypothesis says that the mechanism of natural selection tends to create universes with such parameters that allow for maximising the number of black holes as universes are reproduced precisely via black holes (Smolin, 1996, p. 404). Also “hard” physics is trying to use evolutionism nowadays. According to W. Żurek, a Polish physicist, the connection between a quantum system and its environment leads to decoherence that is structurally similar to the so-called Darwinian processes. The latter are defined by three formal conditions met by objects developing in the model environment of replication, feature distribution and natural selection (Gardener, 2012, p. 377). In chemistry, on the other hand, evolutionism refers mainly to the so-called prebiotic evolution (I. Prigogine and M. Eigen), strengthening structural, conceptual and linguistic links between chemistry and biology that are considered as cognitively very important by some researchers (Sobczyńska, 2004, p. 351). In turn, in cultural sciences, it examines the development of cultural products from the primitive to the most advanced ones, following the idea of continuous progress of mankind, but taking into account both cyclical nature of changes and degeneration phenomena. In psychology, evolutionism looks into the development of psychophysiological life forms, comprising the stages of differentiation and integration. In ethics, it focuses on the evolution of moral standards content and the moral progress of man. As argued by P. Chmielewski, a Polish investigator of cultural evolutionism, evolutionism seeks to describe phenomena from the development perspective, thus striving to explain the origin of facts, identify developmental laws and assess events against the progress (development) criteria (Chmielewski, 1988, pp. 210–214). The elements of evolutionism so understood are found in many philosophical schools, scientific theories and methodological trends. It should also be pointed out that the introduction of the theory of evolution, especially in social sciences, reinforced the tendency to see the past as something primitive and immature, within a long and progressive chain of events leading to our modern world (Ryszkiewicz, 1994).

In social sciences, evolutionism is interpreted narrowly and broadly. The former approach treats evolutionism as Darwinism and maintains that it involves a transfer of Ch. Darwin’s key evolutionary assumptions to social sciences or an application of the notion of evolution similar to Ch. Darwin’s idea. In a broader sense, evolutionism refers to all those thinkers who wrote about evolution in any meaning and

made social development laws the centre of attention. Generally speaking, evolutionism in social sciences is a collection of theories that describe the social development process involving continuous, gradual and unidirectional progress. The world may, therefore, be said to be changing gradually in a continuous and unidirectional manner, in line with the same pattern. As a consequence of gradual qualitative and quantitative changes, lower forms evolve naturally to become higher, more perfect ones.

The link between evolutionism and social sciences, particularly economics, which makes an analogy between the nature and the economic system, may be dated to 1838, when Ch. Darwin was inspired by the economic thesis about a constant number of people in the poorest social classes despite a relatively large number of children being born therein, as forged by T.R. Malthus in his *An Essay on the Principle of Population* published in 1798. He noted the existence of natural determinants limiting this population growth, the most important one being food shortage. This thesis, having provided the foundation for the idea of natural selection, reappeared in the economic theory and practice as the originally termed economic biology theory (A. Marshall) and later as evolutionary economics (J.R. Commons, W. Mitchell) treating the economy as an evolutionary system dependent on both social relations and political impacts.

The key assumptions of evolutionism as a kind of theoretical trend in social sciences include:

- believing in the unity of the world and knowledge about it, which means that the human reality is part of nature and should be studied by employing the methods developed by natural sciences;
- proving that the human world is regulated by the laws of nature rather than by chance or sudden impulses;
- assuming that the human nature does not change within certain limits, which means that despite constant alterations in the human reality in the course of evolution, it has some permanent features;
- believing that changes in the human reality are pervasive, targeted and synonymous with progress;
- assuming that social change normally is not sudden and higher levels of evolution are usually separated from lower levels by multiple intermediate ones;
- proving that the change is immanent and its causes should be sought within a studied population, which means that external influences start working only when a population is mature enough to accept them and, in fact, would be able to satisfy a new need if no new solution had come from outside.

Today's evolutionists reject some ideas of their predecessors. It is believed that only when the existing reality has been thoroughly examined may inquiries be made into what arose out of what and how. The thesis about unidirectional and uniform development of all peoples, that is the identity of chronological consequences on the way from lower to higher forms of culture, has been questioned. What has also been abandoned are the views that the culture of primitive peoples may be deemed representative of the early development stages of all mankind.

The Concept and Essence of Evolutionary Economics

Evolutionary economics is a trend in modern economics that initially appeared as an alternative proposal in relation to neoclassical economics. The problems in defining evolutionary economics that may be found in the relevant literature are exacerbated by the rapid development of institutional economics, with “evolutionary economics” and “institutional economics” being sometimes considered as meaning the same and at times treated as parallel trends dealing with similar issues that would benefit from closer cooperation (Tomczyk, 2011, p. 40). According to W. Stankiewicz, the term “evolutionary economics” involves an attempt to integrate old and new institutionalism and is used to define multiple, often conflicting approaches to describing economic phenomena (Stankiewicz, 2012, p. 265). Evolutionary economics may thus be said to be a heterodox school of economics and to include several different research trends such as neo-Schumpeterian, institutional, Austrian, trying to resist the way of thinking that dominates mainstream economics (Hodgson, 2007). This diversity may, in a way, explain why evolutionary economics is neither theoretically nor methodologically uniform.

The evolutionary approach in economics is not new, yet has been increasingly popular in recent years. It should be clearly stated that the relevant literature provides no consensus as to the origin and development of evolutionary economics. The source literature says that some elements of the evolutionary economics idea were already developed by the physiocrats, who treated the economy as part of nature. Most often, it is assumed that this idea refers to the concepts by Ch. Darwin, J. Lamarck, H. Spencer, and stands in opposition to the method and paradigm of neoclassical economics. In contrast with the neoclassical paradigm, evolutionary economics considers that the economic theory seeks to understand the motivation behind human activity in economic processes, the laws governing economic development, the essence of economic agents’ (households, businesses) activity and the mechanisms behind this activity, using tools of natural sciences rather than those of mechanics. In addition, evolutionary economics does not separate the economic activity of economic agents from the influence of other, e.g. cultural, psychological, sociological, political, technological and climate, determinants. It analyses economic processes in their motion, that is as seeking an equilibrium constantly disturbed by various factors. Furthermore, it stresses the limitations of human knowledge which, in turn, result in economic agents making decisions that cannot be optimal. Evolutionary economics may thus be said to focus on investigating development processes in various areas of economic life, presuming that both the rules of operation of organisations and societies and the principles governing the economic agents’ behaviour evolve. As claimed by W. Kwaśnicki (1996, p. 3), nowadays the term “evolutionary economics” is used to define multiple, often different approaches to analysing economic processes. What these approaches have in common is the stress put on the importance of economic changes and development and the opposition to neoclassical economics focusing on optimisation and equilibrium.

According to S.G. Winter, an American economist, evolutionary economics examines dynamic phenomena and concentrates on observations far from equilibrium (...). Another important issue also concerns quantitative and qualitative changes and historical perception of the economic process, where macroeconomic characteristics are significant aggregates of behaviours of economic agents at the microeconomic level. In turn, the diversity and heterogeneity of their behaviours form the special core of research into economic processes (Winter, 1982, pp. 24–28).

J.S. Metcalfe, an English economist, holds a view similar to that of S.G. Winter, claiming that evolutionary economics strives to understand the role of heterogeneity of economic agents in economic events. This diversity of their behaviours is, however, limited by personal knowledge, norms, conventions and other institutions that evolve in the long term. For this reason, economic evolution is largely reliant on institutionalised coordination and the system where market institutions are firmly established (Metcalfe, 2005, p. 392; Metcalfe, Foster, 2006, pp. 834–836).

V.L. Makarov and V. Mayevskiy argue that evolutionary economics is a scientific discipline that studies the development of the economy, assuming that a set of factors operating therein changes in accordance with the law of natural selection. Economic evolution is an irreversible process associated largely with the phenomena of imbalance, instability, relaxation and uncertainty. Simultaneously, there are also tendencies to balance inputs and outputs, demand and supply, financial stability and the fight against crises. There is a need to combine the evolutionary and traditional theories of economic development (Mayevskiy, 2005). According to K. Dopfer and J. Potts, evolutionary economics is a theoretical framework for analysing economic systems as open, complex and evolving systems. It is a theoretical hybrid of the evolution theory, the theory of complex systems, the self-organisation theory, and Austrian, behavioural, institutional, post-Keynesian and Schumpeterian economics. It is the hybridisation of theories and methods that leads to the lack of a platform for assessing the development or integration of concepts that make up evolutionary economics (Dopfer, Potts, 2004, p. 195).

Analysing the essence of evolutionary economics, it may be concluded that in a broader sense it includes, among others (Dosi, 1991, pp. 5–6; Dosi, 2012, p. 8):

- 1) the lack of complete information on the part of people and organisations, excluding optimisation on a global scale;
- 2) the decision-making process of people and organisations is associated with principles, norms and institutions;
- 3) people and organisations may imitate each other to some extent;
- 4) the manner in which people and organisations cooperate is usually defined in a situation of imbalance and the result is a success or failure of a combination of factors or goods and of the economic life participants themselves;
- 5) economic evolution is non-deterministic, non-teleological and irreversible.

In a narrower sense, on the other hand, evolutionary economics refers to the ideas of biological evolution developed by Ch. Darwin and J. Baptiste de Lamarck. These references may be (Witt, 2003, p. 9):

- 1) direct – the evolution of economic systems reflects the actions of people who have undergone biological evolution;
- 2) indirect – through an analogy between the principles of biological and economic evolution;
- 3) indirect – through biological metaphors in economics (such references may resemble the links between classical mechanics and neoclassical economics).

Evolutionary economics looks for its identity by concentrating its economic evolution research fields on the present and future organisational and functional dynamics of the economy. Therefore, economic events are explained in evolutionary economics by (Glapiński, 2013, p. 5):

- 1) referring to previous events and finding causal relationships in preservation and transformation of behaviours and institutions;
- 2) a mechanism of creation of differences and a mechanism of selection thereof that contains a mechanism of segregation and exclusion.

Summarising the reflections on the concept and essence of evolutionary economics, it should be concluded that it is a multidisciplinary science analysing and explaining endogenous transformations of knowledge applied in economic systems that covers decision-making, production methods, economic life organisational forms, consumer behaviours and the psychology of economic agents, building on the achievements of other scientific disciplines such as sociology, social psychology, behavioural biology, evolutionary biology, social anthropology, institutional economics and economic history. Preservation, protection and transformation of patterns and institutions are investigated by social anthropology, sociology, institutional economics and economic history, whereas the mechanism of creating innovations, mutations and deviations from routine behaviours is studied by behavioural biology, social psychology, behavioural economics and complexity economics (Beinhocker 2006, pp. 43–45), and the segregation and exclusion mechanism is examined by evolutionary biology, sociology and industrial economics (Glapiński, 2013, p. 7). It is apparent that evolutionary economics, and modern economics in general, is an imperial force which urges or successfully encourages the use of its concepts, models and research methods, on the one hand, and borrows ideas, concepts and research methods, opens to other disciplines, cooperates with them and seems to integrate with some of them, on the other hand (Brzezinski, Gorynia and Hockuba, 2007, p. 4; Walasek, Zalega, 2014, p. 3).

The Old and New Evolutionary Economics

The extremely dynamic development of evolutionary economics in the past five decades has prompted economists to distinguish between the so-called “old” and “new” evolutionary economics. The old evolutionary economics refers to strictly macroeconomic issues, based on historical and empirical works by precursors of evo-

lutionary economics such as Ch. Darwin, H. Spencer, J.B. de Lamarck, T.B. Veblen, K.E. Boulding, W.C. Mitchell and J.A. Schumpeter. In turn, the new (modern) evolutionary economics is focused primarily on microeconomic issues. It is based on more formalised modelling by means of the game theory, concentrating on detailed studies that analyse evolutionary processes in the various areas of industry, services, outlet emergence, consumption or consumer behaviour. It covers issues such as (Kwaśnicki, 1996, pp. 12–13):

- the impact of innovation on changes in business activity and attempts to understand economic and innovative processes in the framework of natural sciences;
- behaviours of industrial branches and entrepreneurs in a competitive environment;
- examining the emergence of diverse behaviours of economic agents making up the changing environment for economic processes;
- market operation from the evolutionary perspective;
- technological changes and their impact on the development of societies and human civilisation in the long term;
- attributing individual determinants pushing economic agents to change, improve their situation and seek innovation.

The leading representatives of the new evolutionary economics are R.R. Nelson, S.G. Winter, E.S. Andersen, G.M. Hodgson, Y. Shiozawa, U. Witt, E. Penrose and C.H. Pillath.

The Views of Leading Representatives of Evolutionary Economics

Undoubtedly, A. Smith may be considered as a supporter of the evolutionary perspective on economic development. In *The Theory of Moral Sentiments* published in 1759 as a free-form essay, he pointed to the spontaneity of development and perceived the emergence of the social order as a result of freely established individual contacts (Smith, 1989, pp. 53–57). He also used the term *oeconomy of nature*² in order to praise the positive effects that themselves are unintentional, but seem to be produced by an intelligent “agent” which may be identified with the will of God (Kwaśnicki, 1996, p. 5). The observations concerning the nature of a seeking man were later developed by A. Smith in *An Inquiry into the Nature and Causes of the Wealth of Nations* published in 1776, where he argued that the economic agent is led by an “invisible hand” of the market, and unconsciously, acting solely in order to achieve personal gain, also helps improve the situation of the whole society (Smith, 1954, p. 46).

² This term was first used by Carl Linnaeus, a Swedish naturalist, in *The Oeconomy of Nature* published in 1751, where he described the foundations of his living organisms classification system and popularised the principle of binomial biological nomenclature. Adam Smith and Ch. Darwin were C. Linnaeus’s students.

Many economists think that Charles Darwin is a pioneer of evolutionary economics and that his fundamental work *The Origin of Species by Means of Natural Selection* published in 1859 marked the beginning of an evolutionary view on social development and a discussion about whether cultural evolution might be based on natural selection relying on variety and diversity. In that work, Ch. Darwin not only spelt out the theory of evolution, but also convincingly explained how natural selection and other mechanisms of evolution work within populations of living organisms. It should be mentioned here that his theory of natural selection was inspired by the picture of “struggle for existence” presented by T.R. Malthus in *An Essay on the Principle of Population* published in 1798. Such a struggle among organisms, as Ch. Darwin wrote, takes place because they are too numerous in nature and there is not enough space and food for them. In consequence, it triggers the selection process changing the structure of a set of individuals of a given population, habits, routines, institutional links and various systems. It should also be mentioned that in his later works Ch. Darwin hoped that the theory of evolution would serve to explain social emotions and behaviours (Van der Dennen, Smilla, Wilson, 1999, pp. 291–292). Ch. Darwin’s work caused a revolution in biology. Although he supported his arguments with a large amount of data, the Darwinian theory of evolution did not convince all biologists. Until the 1930s, it had been one of many concepts explaining the living world.

Independently of Ch. Darwin, the theory of evolution was also presented by Alfred Russel Wallace, a British traveller, biologist, anthropologist and geographer, in 1858. In *On the Tendency of Varieties to Depart Indefinitely From the Original Type*, he explained the mechanism of species emergence as a process involving survival of the fittest whereby weaker individuals and their genes are eliminated from the population through natural selection³.

The essential difference between Ch. Darwin and A.R. Wallace as regards the theory of natural selection is that Ch. Darwin emphasised competition among individuals of the same species serving its survival and reproduction, while A.R. Wallace pointed out that the environmental pressure on varieties and species forces them to adapt to further conditions, resulting in distinctness of populations living in separate habitats (Larson, 2006, p. 73; Bowler, Morus, 2005, p. 149). As rightly indicated by W. Kwaśnicki, in the context of social sciences, both Ch. Darwin and A.R. Wallace used the outcomes of observations of socio-cultural processes and relied on the idea of order and regularity stemming from a multitude of chaotic actions of individual economic agents. A key limitation of such inspirations was that the proposed metaphors were mechanistic – concepts such as the “invisible hand” of the market reflected the principles of Newtonian physics rather than biological evolution (Kwaśnicki, 1996, pp. 6–9; Witt, 1991, pp. 102–106).

³ A.R. Wallace described how he had arrived at the concept of natural selection in his book *This Wonderful Century. Its Successes and Failures* published in 1898.

Although it was Ch. Darwin and A.R. Wallace who independently spelt out the assumptions of the evolutionary theory in a very precise manner, the deliberations on evolution had been present in social sciences many years before their famous works were published. In social sciences, evolutionary ideas were popularised by Herbert Spencer. This English philosopher and sociologist, a representative organicism and evolutionism in social sciences, contributed to the development of an evolutionary approach in ethics and social sciences. In 1851, in *Social Statics*, he presented his theory of social evolution and socio-political thought for the first time. In that book, he expressed views on the state and freedom of the individual (“the right to equal freedom”), in the spirit of liberal individualism. On the other hand, H. Spencer, in the ten-volume *System of Synthetic Philosophy*, put forward his evolutionary idea based on assumptions slightly different from those adopted by Ch. Darwin and A.R. Wallace, both biological and physical ones. According to him, the world and its development are governed by the principle of evolution which is the result of movement of matter and motion. He understood evolution as a change from an indefinite and incoherent homogeneity to a specific, coherent heterogeneity, identifying it with progress, which he saw as part of nature. He perceived heterogeneity as something better, a higher form of organisation, sophistication, and adaptation that he contrasted with inferior and lesser homogeneity. Furthermore, H. Spencer interpreted variation and diversity in the context of the theory of evolution differently from Ch. Darwin. For Ch. Darwin, diversity was the driving force of evolution (leading to diversity favourable to evolution), while H. Spencer thought it to be an effect of evolution (balance and harmony) (Kennedy, 1978, pp. 45–49; Elwick, 2003, pp. 35–72). In addition, H. Spencer took over Darwin’s claim about differentiation of species and their adaptation ensuing from the “struggle for existence”, coining the famous concept of survival of the fittest. Only those organisms that are best adapted to the environment can survive and bequeath the effects of their adaptations to their offspring (Steward, 2011).

It is also worth noting that H. Spencer built on the views of Jean Baptiste de Lamarck, who defined the first ever full theory of evolution, the so-called Lamarckism, in *Philosophie Zoologique (Zoological Philosophy)* published in 1809. This theory asserts that the development of organisms involves their evolution towards greater and greater perfection and better and better adaptation to the environment. This happens under the influence of environmental determinants the change of which triggers adaptations of the anatomy and functions of animal organs. The features so developed are then inherited. This law is common in the biological world. It should also be mentioned that H. Spencer was considerably influenced by the “developmental law” articulated in 1828 by Karl Ernst von Baer, a German naturalist and founder of embryology, in his famous work *The Developmental History of Animals*⁴. According to that law, embryonic development essentially consists in a transition from

⁴ This book was published in two parts in Germany. The first part was published in 1828, and the second one in 1837. Its original title is *Über Entwicklungsgeschichte der Thiere*.

a homogeneous to heterogeneous anatomy, from simple to complex forms (Richards, 1992, p. 34). This thesis was taken over by H. Spencer, acknowledging that the quintessence of all, not only biological, development is a shift from homogeneity to heterogeneity. Today, socio-economic evolution is gaining recognition. It assumes that deliberately designed behaviours can be inherited (Powell, 1995, p. 173).

Parallel to H. Spencer (several years later), Alfred Marshall worked on similar theories and wrote about economic biology as the principal research direction for every economist in his five-volume work *Principles of Economics* published in 1891. He claimed that “the Mecca of the economist” lies not in comparative statics or dynamic analysis but in economic biology which he understood as the study of economic regimes as organisms evolving over historical time (Blaug, 2000, p. 430). In an appendix to *Principles of Economics*, he wrote that economics, like biology, deals with a matter, of which the inner nature and constitution, as well as the outer form, are constantly changing; therefore, economics should be regarded as part of broader biology (Marshall, 1948, p. 637). In his works, A. Marshall employed metaphors taken from biology to overcome the limitations of the “mechanistic” language (derived from physics, in particular classical mechanics) of orthodox economics (Hodgson, 1999; Witt, 2008; Dopfer, 2005).

Among the economists living at the turn of the 20th century, Friedrich August von Hayek, an Austrian economist and philosopher, should also be mentioned. Despite being regarded as one of the most influential economists of the Austrian school, he often referred to the phenomenon of evolution in economics, especially the “evolutionary approach”, in his works. F.A. von Hayek treated the behaviours of economic agents in the market, patterns driving them, as an element of adaptation to the environment that is subject to laws similar to natural selection in biology. He claimed that the principles and rules governing the market and investment decisions are transferred between economic agents, and at the time of transfer, a set of all principles is subject to the law of free natural selection, so that higher system productivity and efficiency is achieved. Societies with orders better adapted to (both natural and social) environment have a chance to survive and attain an adequate procreative success, which in turn leads to more adaptive patterns being replicated. It should be noted, however, that F.A. von Hayek did not examine individual investment strategies of economic agents in evolutionary terms. In his book *The Road to Serfdom*, being a specific anti-communist manifesto published in 1944, he argued that any state intervention is pointless since only the free market allows for selecting the best technologies, innovations and management mode. Only natural selection of companies and business models makes further development possible (Hayek, 1944). The works by F.A. von Hayek clearly demonstrate that he opposed uncritical employment of natural science methods in social sciences, particularly in order to quantify economic phenomena and aggregate individual behaviours too hastily.

Thorstein Bunde Veblen was another economist who took up the evolutionary approach at the turn of the 20th century. In his breakthrough article *Why is economics*

not an evolutionary science? published in 1898, T.B. Veblen considered economics to be a theory of cultural growth determined by economic benefits, a theory of cumulative changes of economic institutions, expressed in terms of the process as such (Veblen, 1898, pp. 374–397). He attempted to build an evolutionary theory of socio-economic development presuming that human behaviour is controlled by certain thinking habits the causes of which he sought in human instincts. In *The Theory of the Leisure Class* published in 1899, T.B. Veblen stated that thinking habits are formed due to evolutionary adaptation of the individual to changing conditions in which the individual lives every day, chiefly to cultural and technological changes. The life of the man in a society, as the lives of other species, is a struggle for existence, and thus a process of selective adaptation. The development of social structure means natural selection of institutions. The achieved and continued progress of social institutions and development of the human personality may, roughly speaking, be reduced to natural selection of the most appropriate ways of thinking and forced adaptation to the environment changing with a quantitative growth of societies and gradual modifications of institutions. Apart from being a result of the selection and adaptation process that frames attitudes and inclinations, social institutions define both a way of life and relationships among people, hence themselves are important selection factors (Veblen, 1971). For those reasons, T.B. Veblen believes that economics should be an evolutionary science, which means investigating the origins and development of social and economic institutions construed as a combination of habitual and conventional behaviours that form the basis for actions of decision-makers (managers). It should be noted, however, that T.B. Veblen did not develop methodological fundamentals that allow for devising a coherent economic theory of evolution which would constitute the basics of evolutionary economics.

Another economist who moved towards evolutionism was Joseph Alois Schumpeter, an Austrian economist. In works such as *Theorie der wirtschaftlichen Entwicklung* (*The Theory of Economic Development*) published in 1912 or *Business Cycles. A Theoretical, Historical and Statistical Analysis of the Capitalist Process* published in 1939, J.A. Schumpeter focused on the causes and progression of dynamic development processes in the market economy. He held that the development is frequently endogenous, the impact of exogenous factors is not taken into account, and processes at the enterprise level are the key driver of changes. The dynamic theory was used by J.A. Schumpeter to formulate the theory of business cycles and demonstrate that the cyclical nature of economic changes is evolutionary, in accordance with the idea of evolution, as each full cycle brings the system up to a higher economic level. Furthermore, he claimed that development processes are primarily driven by endogenous determinants, in particular by innovative activities undertaken by entrepreneurs. The concept concerning innovation is one of the most meaningful achievements by J.A. Schumpeter. Although it was built solely to clarify the processes of economic change, its unaltered version is broadly used in the present analyses on the theory of industry organisation (Maslak, 2002, pp. 226–227). It should be emphasised that

J.A. Schumpeter is considered to be the father of modern evolutionary economics. He was the first to spell out the key concepts underlying the theory of development, thereby providing inspiration for the founders of the so-called post-Schumpeterian trend, which is one of the main trends in evolutionary economics, represented by researchers such as R.R. Nelson, S.G. Winter, G. Silverberg, G. Dosi, C. Freeman and N. Rosenberg. In *Business Cycles*, J.A. Schumpeter defined evolution as changes in the economic process brought about by innovations, together with their effects and the response to them by the economic system (Schumpeter, 1939, p. 86). The nature of innovations makes evolution a permanent and cyclical process the pace of which is, however, variable as it comprises periods of stagnation, recovery, growth and decline in the system. Later, J.A. Schumpeter made a distinction between evolution in a narrow and broader sense. In its narrower meaning, evolution encompasses all these phenomena excluding those that may be described in terms of continuous differentiation of the pace of changes in the context of unaltered institutional environment, preferences and technological barriers, and will be included in the concept of economic growth. In a broader sense, it embraces all phenomena that make an economic process non-stationary (Schumpeter, 1954, p. 964). Thus, the evolutionary process in its narrower meaning corresponds to the concept of economic growth and more generally it means any change in the system. It is also worth noting that one of the key slogans of J.A. Schumpeter's theory is the concept of "creative destruction" emphasised in *Capitalism, Socialism and Democracy* published in 1942. The concept of creative destruction refers to processes inside companies where, through innovations, changes occur in their current operation, their structures are destroyed from within, with old forms and structures being replaced by new ones that are better adapted to the environment (Schumpeter 1942, pp. 82–83).

Another economist who claimed that the evolutionary approach to economics should be adopted was Kenneth Ewart Boulding, a British economist and philosopher, who combined neoclassical doctrines with Keynesianism. In *Evolutionary Economics* published in 1981, he attempted to integrate economics with biological concepts of biological equilibrium and dynamics of transgenic production. In his deliberations, he treated evolution as a continuous ecological interaction among populations of all (biological, physical and social) species in constantly changing circumstances (Boulding, 1981, p. 23). According to E.K. Boulding, economic evolution is a natural part of universal evolution occurring in time and space. The economy is the result of social evolution and a significant element of the social and political institutional environment. The simplest model of the economy may resemble biological ecosystem models and use the equilibrium as defined by L. Walras (Boulding, 1991, pp. 10–12). It should also be noted that in his theory, K.E. Boulding emphasised an important role of niche formation in socio-economic development as niches are a factor behind progress similar to biological evolution. Predicting the directions of evolution is hampered by the general indeterminism of evolution of the universe and the disasters that disrupt continued development and radically separate the var-

ious eras. In this case, the concept of equilibrium at a certain point of the evolution process may be helpful (Stankiewicz, 2012, p. 266).

Leading representatives and pioneers of modern evolutionary economics are R.R. Nelson and S.G. Winter, who interpret the economic process in terms of natural selection as defined by Ch. Darwin, expressing their views in the monograph *An Evolutionary Theory of Economic Change* published in 1982. They used elements of the theory of evolution to explain the technological and economic changes taking place in the global economy (Dosi, Nelson, 2010, pp. 52–53). They draw attention to the need for an economic analysis of long-term processes of change. In other words, today's regularities should not be construed as a solution to static problems or as a result of comprehensible dynamic processes being a consequence of known past processes or factors that may bring effects which will be different from the present ones in other future circumstances (Nelson, Winter 1982, p. 10). The works by R.R. Nelson and S.G. Winter refer directly to H. Simon's concept of bounded rationality, R.M. Cyert and J.G. March's behavioural theory of the firm and A.A. Alchian's model based on the concept of evolutionary natural selection, with a chief focus on dynamic evolution of the firm/industry (Zalega, 2014, p. 146). Nelson-Winter's evolutionary model of competition describes the evolution of manufacturing techniques, i.e. process innovations, in the context of the dynamics and evolution of a homogeneous market. This model depicts stochastically a dynamic system where productivity increases over time, causing a fall in average production costs owing to the implementation of new technologies. As a result of these dynamic forces, the market price is reduced and the branch supply rises. In effect, companies that achieve profits grow, while the unprofitable ones are eliminated from the market, and enterprises that pursue research activities involving the implementation of new solutions or imitations of technologies used by other companies can expand or limit their activities depending on the outputs of their innovative/imitative efforts (Nelson, Winter 1982, pp. 284–285).

Evolutionary concepts may also be found in the works by Geoffrey Martin Hodgson, a contemporary British economist, who asserts that the evolutionary approach in economics should take into consideration the irreversibility and continuity of processes over time, given that evolution brings about an irreversible transformation of the knowledge structure and acquisition. He underlines that full attention should be given to long-term changes rather than to short-term marginal adaptations since evolutionism observes the entire direction of development change instead of an infinite number of minor changes. Moreover, according to G.M. Hodgson, the evolutionary approach in economics imposes on economists the need to study quantitative and qualitative, structural and parametric changes, variants and diversity, situations of equilibrium and a lack thereof, possibilities of erroneous behaviours and learning processes (Hodgson, 1993, pp. 218–224; Hodgson, 1999, pp. 178–185). He also argues that economics should be a multidisciplinary science as individuals living in the society are biologically conditioned, whereas economic phenomena are conditioned by culture (Hodgson, 1994, pp. 218–219).

A large contribution to the development of today's evolutionary economics may also be found in the works by Kurt Dopfer, a Swiss economist. In *The Evolutionary Foundations of Economics* published in 2005, he claims that the necessary interpretation of social systems and development of economics as an empirical science about long-term economic processes call for devising and implementing a new paradigm based on the principle of holism. In his article entitled *The Economic Agent as Rule Maker and Rule User: Homo Sapiens Oeconomicus* published in 2004, K. Dopfer, taking into account the achievements of neurological, cognitive and behavioural sciences, demonstrates that the concept of *homo oeconomicus* has long been outdated and must be replaced by that of *homo sapiens oeconomicus* (Dopfer, 2004, pp. 179–180). He recommends to pay more attention to the dualism of human evolution, namely biological and social changes, changes of behavioural patterns and interaction mechanisms. It is worth noting that John Stuart Mill's concept of *homo oeconomicus* where two components should be distinguished: a formal one that determines how the rational man behaves and a material element that describes his or her motivational structure, i.e. indicates what incentive is the primary factor in his or her behaviour, is strongly criticised by modern economics for its detachment from the real world (Zalega, 2015, pp. 21–22). In contrast, the concept of *homo sapiens oeconomicus*, that is the emotional human paradigm, presumes that people's economic decisions are driven by non-economic factors (customs, habits, imitation, fashion), hence their decisions are not optimal (rational). In K. Dopfer's opinion, due to the confusion that arose at the beginning of the 21st century (unbundling innovation and economic growth, threat of marginalisation, deterioration of competences, collapse of expectations, loss of cultural attractiveness), the "new" *oeconomicus* is becoming emancipated and is striving to throw off the shackles of biology and culture. Moreover, such a man can use the latest scientific achievements, including the precision of sciences, like for instance artificial intelligence and mathematical optimisation of data, when making decisions, on the one hand, and on the other hand – while remaining a human being – cannot suppress his or her emotional nature and the so-called human factor that are not so easily quantifiable in making economic decisions. For this reason, in order for evolutionary economics to perceive the world accurately, it must take into account the concept of emotional man.

A substantial contribution to the development of modern evolutionary economics has also been made by Ulrich Witt, a German economist, who in his monograph entitled *The Evolving Economy. Essays on the Evolutionary Approach to Economics* published in 2006 stresses considerable methodological diversity of modern evolutionary economics, noticing its four crucial evolutionary perspectives on economic phenomena (Witt, 2006, pp. 146–153). Combining the ontological criterion with the heuristic strategy criterion, he identifies the following perspectives: evolutionary (Ch. Darwin, A.R. Wallace), naturalistic (T.B. Veblen, D. North, F. von Hayek, N. Georgescu-Roegen), neo-Schumpeterian (R.R. Nelson, S.G. Winter) and Schumpeterian (J.A. Schumpeter). In his article "Production" in *Nature and Production in the Economy – Second Thoughts about Some*

Basic Economic Concepts published in 2003, U. Witt stresses the ontological foundation of evolutionary economics and underlines the importance of cognitive and social aptitudes acquired by humans through evolution that affect the behaviours of economic agents and influence the development of the economy. Furthermore, he is convinced that evolutionary processes of economic development rely on mechanisms different from those that underlie biological evolution. A form of evolution that is essential to economics is cultural evolution, which, according to U. Witt, is based on human cognitive apparatus as an effect of biological evolution, although determined by distinct and idiosyncratic mechanisms (Witt, 2003, pp. 168–169). For that reason, U. Witt is sceptical about using biological analogies to explain the evolution of the economy. He believes that the role of natural selection in cultural evolution is becoming negligible, given an enormous increase in the pace of evolutionary changes and a huge reproductive success of the human species supported by the evolution of culture.

A significant role in the development of modern evolutionary economics is also ascribed to Yoshinori Shiozawa, a Japanese economist, who in his article *Evolutionary Economics in the 21st Century: A Manifesto* published in 2004 states that evolutionary economics is a discipline that rightly and successfully concentrates its efforts on explaining the evolution of technology and institutions. In his opinion, evolutionary economics may develop in the 21st century owing to the use of computer simulations, that is simulations employing a mathematical model in the form of a computer programme. According to Y. Shiozawa, economic development, knowledge and institutions are focal points for evolutionary economics. In addition, he distinguishes three economic categories: goods, technologies and institutions which have common properties (Shiozawa, 2004, p. 11; Glapiński, 2013, p. 14):

1. They can be separated from the other ones as a whole.
2. They can be seen as something that preserves its identification.
3. They may be transformed into something else for various reasons.
4. They may be somehow reproduced.
5. They may be subject to selection.

The most important property is the fourth one, i.e. the ability to reproduce. Copies of economic categories are generated from the prototype. However, each of these categories has a different reproduction mechanism. Goods are reproduced from prototypes. On the other hand, technologies are transferred from one entity to another through imitation or licensing. In turn, institutions are transferred from one human community to another, but generally there are some differences between individual copies (Shiozawa, 2004, pp. 11–12; Glapiński, 2013, p. 14).

The picture of evolutionary economics development presented in this section clearly shows that the number of relevant publications is indeed very large, and it is impossible to mention all authors. Furthermore, stating that a particular thinker fits into the evolutionary economics trend may raise controversies that are difficult to resolve, especially if one wants to go into details of the distinction between evolution as a synonym of change and development.

Weaknesses of Evolutionary Economics and Prospects for Its Development

The conceptual framework of evolutionary economics that would allow for distinguishing its possible types within such a diverse whole should be primarily based on two criteria: ontological and methodological.

From a methodological point of view, evolutionary economics stands in sharp contrast with the reductionist understanding of economic systems as closed systems. The main methodological difficulty in defining the research field of evolutionary economics lies in distinguishing it from other scientific disciplines studying evolutionary processes, such as social psychology, sociology, social anthropology, economic history, behavioural biology, evolutionary biology, behavioural economics or institutional economics (Saviotti, Metcalfe, 1991, pp. 125–128). It should also be mentioned that evolutionary economics is still searching for its identity by arranging its own research fields focused around a model of the present and anticipated dynamics of the organisational and functional system of the economy. The consequence of this is continuous search for appropriate analysis tools to study the mechanism of economic evolution. As claimed by K.R. Popper, a crucial weakness of evolutionary economics is its empirical orientation that prevents deriving mathematical models and its low ability to formulate falsifiable hypotheses (Popper, 1992, pp. 47–48). Another weakness is that the research is essentially empiricist and historicist, resulting in evolutionary economics entering the territories of other scientific disciplines. The aforementioned methodological weaknesses and theoretical difficulties caused premature and often competing theoretical syntheses to occur, especially as regards the “old” evolutionary economics (Glapiński, 2013, p. 8). Economic theories that are not fully determined by data are impossible to falsify due to the Duhem-Quine problem. These difficulties mean that an expanded scope of phenomena being explained under a unified theory does not contribute to increased confidence in its epistemological veracity or correctness (Mäki 2001, Mäki, 2013). It may, therefore, be concluded that evolutionary economics based on evolutionary epistemology can be an intellectual interpretive proposal for modern economics.

The prospect for development of today’s evolutionary economics is also worth considering. The economic and cultural globalisation, the development and spread of mobile phones and the internet, and urbanisation processes and rapid technological progress observed at the turn of the 21st century have had an enormous impact on economic development and operation of economic agents. In particular, the development of the internet is actually and completely open to evolution, creating perfect conditions for a better understanding of the evolution processes in economics and biology. Hence, evolutionary economics may be expected to concentrate on the knowledge and creativity (innovation) of economic agents, on the one hand, and on the development of economic institutions that are continuously transforming when trying to adapt to the changing world, on the other hand. According to

K. Dopfer, evolutionary economics will undoubtedly give priority to human innovation, which is an autonomous driving force of all economic processes (Dopfer, 2001, pp. 23–24). P. Danielson (2004) underlines that evolutionary economics analyses the expectations of economic agents by paying attention to the concepts related to rational behaviours of market participants.

Evolutionary economics may also be expected to explore more deeply the issues of competition and corporations, which are not limited solely to companies (equivalents of organisms) but also concern economic systems (equivalents of ecosystems). Moreover, the interactions between biological and economic evolution may fall within the scope of evolutionary economics (Włodarczyk, 2012, pp. 162–163).

The aforementioned processes of world economy globalisation and internationalisation contribute to the growing complexity of broadly understood socio-economic structures, institutions, increased bureaucracy, etc. That being said, evolutionary economics is very likely to develop analyses highlighting various aspects of the complexity of economic phenomena. In addition, with explicit inclusion of dynamic processes in evolutionary economics and with considering them important, its advocates will not only be encouraged but even forced to further modify the applied methods of formal analysis (in the case of econometrics) or to use a newer language (evolutionary game theory) in order to describe the behaviour of the economic system. It may be presumed that in the case of econometric modelling, the main application field of evolutionary economics will focus on the theory of economic growth, while in the evolutionary game theory – on business strategies of enterprises, describing the process of prediction strategy adjustment by financial market participants, forecasting the qualitative effects of structural changes in the economy and analysing the results of economic policy.

Conclusion

In the most general terms, evolutionary economics defines the economic concepts that aim at describing economic processes by analogy with evolutionary processes in the natural environment. The literature on that topic most often defines it by specifying three main characteristics that differentiate evolutionary economics from mainstream economics: the role of the concept of equilibrium, the importance of dynamic processes, and characteristics of economic agents (Young, 1998).

Evolutionary economics, despite its relatively long tradition, is still in an early stage of development. A distinctive feature of this trend is the treatment of economic phenomena and processes as never achieving equilibrium and being observed only in pursuit of this state. Furthermore, advocates of evolutionary economics emphasise that the vision of economic processes as “naturally” striving for equilibrium is not undeniable whatsoever. Evolutionary processes used in evolutionary economics allow for an interesting interpretation of the behaviours of economic agents by separating

behaviours from the rigid requirements of the neoclassical concept of rationality. According to the idea of evolution, competition rewards those economic agents that operate optimally, even if the optimisation of their activities is not ensured consciously.

Economists have expressed many opinions criticising evolutionary economics since the earliest stages of its development, concerning problems in identifying the evolutionary process components such as selection, mutation and inheritance. The economic interpretation of the evolutionary process requires a precise definition of these elements for an analysed economic phenomenon. In order to describe economic processes more accurately, evolutionary economics evolved into three trends for three levels of aggregation (Tomczyk, 2011, pp. 51–52):

- micro – describing how an economic agent specifies the rules of behaviour, what complex systems arise as a result of these actions and what processes underlie changes in these systems;
- mezzo – a bridge between individual decisions made by economic agents and the macro scale reflecting the population structure;
- macro – an analysis of complex structures and processes therein, with no room for rationality, conscious choice or other behavioural aspects.

It should be noted, however, that evolutionary economics has finally gained independence in modern economic thought. Undoubtedly, it is inferior to the neoclassical theory as regards the level of detail in theoretical description, the number of empirical publications and limited applications. Nevertheless, modern evolutionary economics describes behaviours of economic agents in microeconomic terms better than mainstream economics, and is a promising research direction in other trends in economics, including the macroeconomic theory.

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Abstract

Evolutionary Economics as a Trend in Modern Economics: An Overview

Evolutionary economics is considered to be part of heterodox economics, which focuses on developments in the economic system, their reasons and consequences. Accepting that the reality is dynamic, modern evolutionary economics examines the ways in which the economy evolves, seeking origins and mechanisms of its dynamics. These statements reflect the fundamental ontological and methodological characteristics of evolutionary economics.

This article aims at defining evolutionary economics and presenting its historical roots, current views and prospects for development. The issues put forward do not describe its entire range, but only selected elements. This paper is theoretical and consists of five parts. The first part concentrates on explaining the concept and key assumptions of evolutionism in social sciences. Further, the essence of evolutionary economics and its origins are discussed. Owing to the length requirements, the focus is exclusively on presenting the views of the most prominent representatives of this scientific discipline. The final part synthesises

fundamental weaknesses of evolutionary economics and prospects for its development.

Keywords: evolution, evolutionism, evolutionary economics, evolutionary processes, natural selection

JEL codes: B25, B 41, B 52.