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Scientific foundation aspects of business models theory

Abstract. During the last two decades, the literature in management studies has shown a significant increase in interest in the theory of business models, and there has been wide-ranging discussion about the definitions of those models. These studies and discussions have provoked questions about the scientific nature of business models. The question is analysed here by using the methodology of the Scientific Research Tradition (ScRT) proposed by Larry Laudan. The result confirmed that the theory of business models that is created and defined based on management sciences falls under the scope of ScRT.

Keywords: business model, scientific foundation of economics and management theories, philosophy of economics

Podstawy naukowe teorii modeli biznesowych – wybrane aspekty

Abstrakt. W ostatnich dwóch dekadach odnotowano w literaturze dotyczącej zarządzania znaczący wzrost zainteresowania teorią modeli biznesowych, jak również szeroko zakrojonej dyskusji na temat definicji modelu biznesowego. Te badania i dyskusje budziły wątpliwości dotyczące naukowego charakteru modeli biznesowych. Kwestia naukowych podstaw modeli biznesowych została w tym artykule poddana analizie i ocenie, z wykorzystaniem Metodologii Tradycji Badań Naukowych (MTBN) zaproponowanej przez Larrego Laudana. Uzyskany tą drogą rezultat potwierdził, że teoria modeli biznesowych, która jest tworzona w oparciu o fundamenty naukowe zarządzania mieści się w zakresie MTBN.

Słowa kluczowe: model biznesowy, naukowe podstawy teorii ekonomii i zarządzania, filozofia ekonomii

1. Introduction

Is economics a science? Naturally, it is, but not in the same sense that a natural science or psychology are. Such a conclusion is supported by a view of science as the analogous concept of Agazzi (1979, 1988) and of Gorazda (2014). Scientific discourse in any field of research refers to a clearly defined set of objects, and does not cover the whole of reality. From the methodological point of view, scientific discourse is characterised by rigour and objectivity. It should be also added that the specific meaning of these terms changes when switching from one field of science to another. However, these are the terms that analogously define the scientific criteria within a given field of cognition. Agazzi (1988) concluded that sciences

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differ in the areas of their application, and in their criteria for objectivity and rigour (of verification).

These types of approaches do not necessarily mean abandoning the issue of demarcation as being non-applicable to the concept of science, or as a total abandonment of this issue. They are rather an expression of beliefs about the impossibility of constructing an analytical (purely logical) tool that allows for an accurate and clear distinction between what is science and what is not. As Laudan (1977, p. 5) wrote: "the rationality and progressiveness of a theory are most closely linked – not with its confirmation or its falsification – but rather with its problem-solving effectiveness". The problem-solving is an approach used in the modern design science, for example in engineering disciplines such as the information system and software engineering research and artificial world (Wieringa 2014, Simon 1996). In general, engineering disciplines including information systems and software production are empirical nature and being a part of the phenomena what the Herbert Simons pointed out as "artificial world" (Simon 1996, pp. 3–5). These phenomena are created not directly be the nature, but by human, along with many programming languages, tools, standards and empirical problems. On the other hand, human is the "product" of nature at the first place. Human is coming from the natural world and is a part of it. Thus, problem-solving approach is used by humans to find effective solution to a particular problem which belongs, as the Herbert Simos argue, to the artificial world. On economic filed, if solution is achieved, then it could be expected that in the same circumstances (covered by the *ceteris paribus* rule), the same problem will be effectively resolved by using this solution. It means that concept of "generic knowledge", as it is presented by Roel Wieringa, used on economic filed, is rather related to the boundary of empirical problems with all implications of *ceteris paribus* usage. The very same generic knowledge is not used at different and more general level of scientific theory falsification.

From this context, one can look more closely at economics. Basically, economics, as the home page of the American Economic Association states, "is the study of scarcity, the study of how people use resources, or the study of decision-making…Economic study ranges from the very small to the very large. The study of choices by individuals…is called microeconomics… The study of governments, industries, central banking, and the boom and bust of the business cycle is called macroeconomics" (AEC 2017). The situation found, for example, in physics or engineering disciplines cannot be the point of reference for economics, especially when it comes to issues such as the model of an experiment, or the verification or falsification of theses proposed under various economic theories. It is difficult to talk about recurrence in economics as is done in physics. There is also a limited controllability of experimental conditions. Indeed, there is no possibility of designing repeatable experiments, since two different theories can

never be used in exactly the same conditions. Rather, an economist develops one or another theory, and on this basis, proposes a solution to specific problems. She or he develops the theory using knowledge of the existing situation, the history of other economic theories and the results of their application. It is easy to find criticism of economics as a science – a critique proposed at different levels of scientificness. The subjects of criticism are the continuous failures of the economy, specifically at the macroeconomic level, the inability to predict phenomena, failure to repeat solutions in the same situation, and negligible opportunities to reasonably verify theories before putting them into effect (see, for example: Dupré 1993, Blaug 1992, Rosenberg 1992, Simon 1996, pp. 25–49, Wojtysiak-Kotlarski 2011, and bibliography cited therein). Bernard Maris (2015, p. 20), in his popular essay said, that mathematical methods are a small consolation here. Of course, one cannot forget too easily the important role of mathematics in economy, for instance in the methodology of simulation used to validate different models and its assumptions, but never the less sometimes it seems, that mathematical methods serve to mask the shortcomings of economics as a scientific theory.

Adopting the concept of science that was cited in the introduction, the above remarks on the difficulty and complexity of the methods of economics, macroeconomics to be precise, which are general of necessity, can apply *mutatis mutandis*, and can be extended to other areas falling within the scope of the scientific discipline of the economics. This study will focus on business models, and more specifically, on the question of whether the theory of business models formed on the basis of management studies is in line with economics as a science. Business models theory is a part of microeconomics, so our conclusions cannot be extended to the economy or to macroeconomy, as such. Our scope is rather limited in the following sense. The present essay is in fact an exercise in applied philosophy dedicated to the business model as a part of microeconomic, because the conceptual apparatus developed by Larry Laudan in other fields of science (physics, chemistry, and by Sierotowicz (1997) in cosmology and theology, which is much less empirical science), is here arranged to answer the question of systematising the concepts and indicating further research directions. Bernard Maris (2015, p. 20), in his popular essay said, that mathematical methods are a small consolation here. Of course, one cannot forget too easily the important role of mathematics in economy, for instance in the methodology of simulation used to validate different models and its assumptions, but never the less sometimes it seems, that mathematical methods serve to mask the shortcomings of economics as a scientific theory. It is that because of mathematical models deal well enough with what is happening now, and what could theoretically happen should the economic reality follow what is now. But it hardly ever happens. In fact, as a rule, mathematical models fail to predict what is going to happen, and that poses the question on how business models are created. In the last section of the present paper a possible answer would be given.

The notion of applied philosophy is not incidentally used in this article. It identifies the approach to the given problem and has much in common with the following synthetic formulation of a program of the applied philosophy of Coady (2016, p. 53): "the applied philosophy [is] a two-way process, in which theory is applied to an issue, and improved understanding of the issue can lead to theoretical modification". In this study, "theory" is Larry Laudan's methodology of scientific research traditions, and "issue" is that of Business Models.

Similar exercises have been undertaken in the field of economics (Pheby 1988, Blaug 1992, and Solarz 2015), but not with regard to research on business models, and as far as we know not in the base of the methodology of Laudan, but rather in the base of methodologies of Popper, Kuhn and Lakatos. Wojtysiak-Kotlarski (2011, p. 58) emphasised that "handbooks dedicated to management theories essentially very rarely take the methodological issues". This fact does not necessarily mean there is a pre-paradigmatic (pre-scientific) state of development of management theory. This situation can signify a blurring and ambiguity in the meaning of its basic concepts and particularly, it seems to be related to the business model concept.

Business models, belonging to the central terms in management theory, have been extensively studied by experts in the subject, and there is no shortage of studies creating pathways that need to be overcome by analysing these models. Examples include Osterwalder (2004), Lambert (2006), Zott and Amit (2007), Applegate et al. (2009), Lüdeke-Freund (2009), and Wojtysiak-Kotlarski (2011). The way the exercise is formulated, as well as how it is resolved, offers an alternative approach to the abovementioned concepts. This exercise is not only a simple application of Larry Laudan scientific research methodology to research on business models (sections 2–4 of this article) A positive result of the exercise also suggests that reflection on business models, and more broadly, on the microeconomic at least, should consider the fundamental question of the unpredictability of the emergence and development of scientific theories, as well as of the situations in which models and theories come into being.

2. Scientific research traditions

The development model of science proposed by Larry Laudan situates itself in the mainstream of the philosophy of science set forth by Thomas Kuhn and Imre Lakatos. Laudan's model, which as a basic unit of the description of the development of science accepts the so-called research traditions *(ScRT)*, interprets science as intellectual activity. It is practical, in that it essentially boils down to solving problems, which, in turn, is the core of management, because management theory, in fact, is used to solve all kinds of problems related to the activities of entities conducted in a social-business environment.

According to this philosopher of science, rational behaviour consists of picking those theories that contribute to greater scientific progress. Scientific progress can be defined as the increasing effectiveness of the theory in solving problems in a particular field of scientific research. The "measure" of this development is as Laudan (1977, p. 68) stated: "[The] global effectiveness of a particular theory in solving problems is determined in relation to the number and weight of the empirical problems which this theory solves. It is important to also take into account the number and weight of anomalies and conceptual issues that are caused by the theory".

The strategy used within science, especially in management sciences, therefore, comes down to solving problems. It is a strategy Laudan (1977, p. 66) called a *mini-max* strategy. It is based on two assumptions: "(1). A resolved problem, both empirical as well as conceptual, is the basic 'unit' of scientific development. (2). The purpose of science is to maximise the significance of resolved empirical problems and simultaneously minimise the significance of anomalies and unresolved conceptual issues".

As it can be seen from the above definition, Laudan (1977, p. 15) distinguished between two main types of problems, empirical and conceptual. Empirical problems are "problems of vital importance, and they are the basic questions concerning the objects that constitute the field of application of a particular science". Empirical problems are divided into three categories:

(1) problems unresolved by any theory in the particular field,
(2) problems solved, and
(3) anomalies, i.e. the problems unresolved by a particular theory but solved by other theories in the same field of research.

A conceptual problem is the problem that relates to the theory itself, and as such does not exist independently from it. Therefore, if the empirical problems are the problems of vital importance relating to a specific field of research, then the conceptual problems arise within the conceptual schemes or research traditions that are the suggestions for how to solve these empirical problems. Conceptual problems can be internal (e.g. when related to logical inconsistencies in a given theory) or external (when they are the result of a conflict of a given theory with another theory, or well established research tradition, or with some methodology theory, or with the overall vision of the world of a given era).

Having made all these distinctions, one can pre-determine the scientific research tradition. That tradition is, as Laudan stated (1977, p. 81), a "group of general assumptions concerning the objects and processes in the field of research and the assumptions concerning the methods that should be applied in order to solve problems and to construct new theories in this field". This statement recalls the observations of Kuhn (1970, p. 109) on the impact and role of a paradigm in scientific life. "It functions by telling the scientist about the entities that nature

does and does not contain and about the ways in which those entities behave. That information provides a map whose details are elucidated by mature scientific research". In other words, research traditions define in an abstract way what the world is built of, what are the relationships among the objects that exist within this world, what processes take place there, and how the world should be explored. Yet at the same time, they do not give any concrete answers to questions or specific problems. Thus, research traditions do not have an explanatory or normative function, but provide only the means for solving the empirical and conceptual problems. A given research tradition "consists of" various theories (which are sometimes in conflict with each other) that constitute the more concrete "ontology" of a research tradition, and carry methodological indications of that research tradition, trying to give solutions to specific problems. Among various research traditions in the same field of research, the more successful ones are those that leads to solving more empirical and conceptual problems, and which imply fewer anomalies and unresolved problems.

In order to facilitate further consideration, and specifically for more detailed description of components of a business model, one might introduce the following schematic description of scientific research traditions *ScRT*:

$$ScRT \rightarrow (O; R; M; \{p\}; \{T\}) \qquad \text{[def. 1]}$$

in which the individual symbols stand for, respectively:
(O) – basic objects,
(R) – relationships,
(M) – methodology accepted in the particular research tradition,
$\{T\}$ – the set of theories proposed in the framework of the research tradition to solve the set of problems of the vital importance, and
$\{p\}$ – other conceptual problems occurring in the given field of reflection.

Of course, almost all the components that define the *ScRT* may evolve over time, leading to increasingly different implementations of the same research tradition. In these circumstances, scientists can talk about the internal changes of the *ScRT*, in which the methods, theories and cognitive objectives (i.e. the problems to solve) are subjected to constant change. It should be emphasised that the O, M, and M components of the research tradition, that is the assumptions about what the world is built of, what are the relationships among the objects within this world, and how the world should be explored, are the factors which unifies the different implementations of the same *ScRT* in terms of diachronicity (the *ScRT's* identity in time, despite the ongoing internal changes), as well as in terms of synchronicity. Speaking of unity in terms of synchronicity, the components O, R, M and $\{T\}$ of the *ScRT* are in fact a proper realization of the research tradition, a realization used for

solving specific empirical or conceptual problems based on the above mentioned components of the particular research tradition. This allows one to consider *ScRT* as a kind of conceptual structure constructed for a specific purpose, and as a random collection of ideas, theories or methods.

Changes in the particular *ScRT* that aim to tackle a given basic problem (or concept) can be interpreted, from a somewhat different perspective, as changes leading to ever greater coherence within the research tradition. The point is that the process of scientific explanation is a continuous effort that leads to ever greater coherence that aims to characterise the theoretical system of science, as does the concept of coherence in science critical remarks of Feyerabend (2010, chapter 3).

The *ScRT* concept is formulated so that it can be used (after appropriate changes) in different fields of human knowledge. However, this possibility is not a consequence of the generality of terms in which the *ScRT* is formulated, but is instead the consequence of the idea according to which the research tradition is the activity that aims to solve problems (for important illustration of this statement see recent work on design science, such as Wieringa (2014) or Simon (1996), who believe that many sciences – including the engineering disciplines – are about problem solving, and not so much about explanation).

3. Definition of Business Model

As has already been written, the exercise that is the subject of this article applies to business models (BM). The concept of business models, belonging as they do to management theory, have taken on great significance since the end of the nineties, together with the virtualization of social and economic life. On the one hand, the use of the internet by enterprises has moved to the forefront the importance of BM. On the other hand, it has facilitated the statistical analyses of market activities undertaken, their organization, and the results of such activities. At the theoretical level, this situation has provided new incentives for more and deeper reflection on BM.

The results of the reflections of Sierotowicz (2013) argue that many authors have led to differently formulated, but in fact converging definitions of BM. They are formulated in the technical language of management theory and do not avoid mathematical apparatus. However, it might be good to look at the BM from the point of view of the philosophy of science, and try to express the essential aspects of BM in philosophical language. Such an approach may contribute on the one hand to clarifying the concepts used in BM theories, while on the other hand, would indicate the aspects of the theory that should be interpreted in greater detail, and on the basis of concepts that have not yet been used in the theory (see sections 4 below).

But first, the following question must be answered: what are the business models? The answer, in fact, means choosing from a variety of existing definitions.

It should be noted, however, that the majority of about 30 authors of scientific publications on BM have used several original definitions that are used in this article. The choice falls upon a definition that seems to be a kind of the most effective synthesis of the elements of the existing definitions.

Magretta (2002, p. 87) and Magretta and Stone (2002, p. 44) proposed the following BM definition: "business models are stories (narratives) that explain how companies operate. A good business model answers the old question of Peter Drucker: Who is the customer? What is the value for the customer? It also answers the fundamental questions that every manager needs to ask: How do we make money in this business? What is the basic economic logic (economic justification), which explains how we can deliver value to customers at the right price?"

Magretta (2002, p. 90) examined the BM example that was the basis of the success of the traveller's check. Analysing this particular BM, the author formulated a thesis that became the impetus to undertake this exercise. "The business model is the managerial equivalent of the scientific method – it starts from the hypothesis, which later subjects to tests in action, and if necessary improves the hypothesis". What does the BM have in common with the scientific method? Actually, a lot. In fact, since physics theories can be told using the concepts of the methodology of scientific research programs of Laudan, the same is possible in the case of BM. If we recall what has already been said earlier about the analogical nature of the notion of science, then there is nothing else to do but to agree with Magretta's conclusion.

Joan Magretta, as well as other researchers, emphasised the complexity of the BM concept resulting from the fact that the socio-economic entities never operate in a market vacuum. There are complex relationships among them, and situations and market expectations, including the social and psychological aspects of these relations. This must be accompanied by the availability of resources and materials, relations with banks, and other business operators. Perhaps the following definition that was proposed by Osterwalder (2004, p. 15) reflected this complexity in the most synthetic way. It becomes the starting point for further consideration: "A business model is a conceptual tool that contains a set of elements and their relationships, and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital in order to generate profitable and sustainable revenue streams".

A successful BM for a given economic operator modifies the market situation in the sense that it is a winning alternative to other BMs that are owned by other companies that do not reach the same degree of economic success. Comparing the performance of the entities conducting business activities in the same market, and therefore exposed to the same factors, is on the basis of management science, issues

related to competitiveness, and in particular competitive strategies of these entities. The differences in this regard, as the Porter stated (1980), result from differences in the strategic nature of the operators conducting business activities. In this context, the important issue is the relationship between the BM of a given company and its strategy. The following analyses, based on Magretta (2002, p. 91), will adopt the notion that BM answers the question of how "various components of the company relate to each other", and the strategy answers the question of how to "behave towards the competition". Understanding Magretta's strategy is therefore consistent with the definition of competitive strategy that was proposed by Porter (1980).

4. Business Research Traditions

With the abovementioned BM definitions and Laudan's synthetic description of the concept of scientific research programs, it is possible to propose the concept of Business Model Research Traditions (BMRT). Indeed, Laudan's idea is based on the interpretation of science as an activity aimed at solving specific problems. Laudan believed that his approach could be applied, after making appropriate changes, to other fields of knowledge. Let us see what the result is when we apply the concept of *ScRT* to the theory of business models.

BMRT defines in the abstract way the concept of the business model, given the complexity of the constituent elements, the relationships that exist between them, and the appropriate management strategy. In a symbolic way, and using [def. 1], *BMRT* can be depicted as follows:

$$BMRT \rightarrow (O; R; M; \{T\}; \{p\}) \qquad \text{[def. 2]}$$

All elements listed in the [def. 2] regulate the economic and methodological (strategic) choices of a company, which, when taken as a whole, define a particular tradition and distinguish it from others (for different, less philosophical and mathematically more sophisticated problem-solving description see: Gordijn and Akkermans 2001, 2003). In fact, it is a question of narration, of the basic idea defining the concept to come into the market, and of the business idea (e.g. as in the case of Dell, PC sales without intermediaries). Perhaps the best definition of this component are the terms "narrative" and "plot" used by Magretta (2002, p. 89) and by Magretta and Stone (2002, p. 46). This element may also contain references to a particular economic theory, e.g. regarding the market structure, the circulation of money, price policy, etc., which constitute peculiar characteristics of the business environment in which the entrepreneur has discovered the chances to achieve economic success by realizing a business idea.

In turn, the symbol (O) indicates the basic components of the company (see [def. 2]). Naturally, the component (O) include other basic objects with whom the

company comes into contact. Aaccording to the definition of BM by Osterwalder, 2004, a network of "partners that participate in the creation of value, marketing, and provide value and capital". It includes other institutions present in the market, such as banks, stock exchanges, etc., which is what some authors call the ontology of BM. The symbol (*R*) includes the relationship with the above mentioned entities that constitute the BM ontology (for more detailed exposition of different aspects of BM ontology (*O*) and the relationships (*R*) in question, see: Sales et al. 2017, Elikan and Pigneur 2017, Kruijf and Weigand 2017). Methodology (*M*) is to be identified with what Magretta (2002) called a company's strategy, or what Osterwalder (2004) defines as the "company's logic of making money". (*M*), {*T*} defines a set of specific solutions that are proposed in the particular business tradition, and aim at solving the first-class problem {*p*}, which is a part of Osterwalder's (2004) definition: "to generate [a] profitable and balanced revenue stream" (a clear expression of a *mini-max* strategy of *BMRT*), and other conceptual problems resulting, for example, from the unique resources and capabilities of the company, market conditions, and its competitive position. In the latter case (competitiveness), one has to deal with the solutions that are the company's strategy, which, as was stated, belong to the tradition element (*M*). An important tool that constitutes the basis for forming the solutions included in the {*T*} element is, after Magretta (2004, p. 89), computer simulations of possible profits in different situations. Of course, other important, and quite new tools should be taken here into consideration, as for example, brand modelling or analysis of value propositions (see: Sales et al. 2017, Elikan and Pigneur 2017).

When it comes to comparing business models generated by different *BMRT* that operate in the same market area, it must be noted that the most triumphant BM is the one that is more successful in the market (profit maximization). Thus, in the final analysis, as Magretta and Stone (2002, p. 44) stated, the equivalent of the experimental *BMRT* verification is its success in the market. But it is important to notice that success of business model depends on many dynamic nature factors such as: good leadership, resources and environmental situations, not only on underlying (static) theory.

5. Conclusions – towards better description of *BMRT*: how BM-s are created

The result of this article is that, in light of the Laudan's approach is considered, it can be concluded that business models theories are scientific.

The considerations, presented in this article as the exercise in the notion of applied philosophy, depicted solution to the exercise on the scientificness of the theories dealing with BM based on the methodology of scientific research programs invites one to pose a question about the way in which BM are created. In this

context, it should be noted that the optimism of Lambert (2006, p. 5), who, after Kerlinger (1999), expected to create a BM theory that not only would explain the structure of the BM, but also have the ability to predict phenomena in this area, is groundless, as it can hardly, if ever, be find in the literature a presentation of such a model or procedure.

It would be a truism to repeat here the arguments stated by Polak (2008) and Heller (2009) that are in favour of the variability and unpredictability of both market situations and the development of scientific theories. However, such a situation cannot fail to raise following question: what is the reasoning when a BM is created? Or, in different words: how a BM is created? The existing, vast literature faces that problem with great attention and offers impressive variety of approaches (see for example: Foss and Saebi 2016 and Christensen, Bartman, van Bever 2016). Such variety, notwithstanding, seem to require a more philosophically orientated research, specifically on the philosophy of science area. That is the avenue for our future research.

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