

# Scientific Foundation of Models: Towards the Complexity of the Agile Business Model

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**Abstract:** Many concepts of business models (BMs) interfere with strategies. Therefore, it is important to find out how BMs are embedded in the philosophy of science and the theory of management. The goal of this research is to propose a concept of BMs that will be better embedded in the philosophy of science and the theory of management, therefore avoiding interference with strategy concepts and definitions. A literature review regarding BM concepts was conducted to achieve this goal and the results allowed the creation of a new agile business model (ABM) that does not interfere with any concept and definition of strategies. The result leads to theoretical and practical conclusions. The new ABM is open and flexible for use in businesses, specifically knowledge intensive ones like software development enterprises. The ABM is a useful tool that supports business activities without interfering with the other concepts of the theory of management.

## 1 INTRODUCTION


Is there a model for strategies? Based on the fundamentals of the management and strategic management literature from the past six decades, there can only be one answer to this provocative question: a model for strategies does not exist. The reason for this answer is simple: strategies are unique ways of managing organisations at different managerial levels. Strategies consist of unique goals and require different resources to perform tasks and achieve goals. As each enterprise is different for various visions, missions, goals, and resources it is obvious that each strategy is unique. On the other hand, the literature on the subject gives various definitions of such a model.

Systematic descriptions of objects (or phenomena) that share core elements or important characteristics are commonplace in scientific models. Scientific models can be mathematical, visual, computational, or material and are defined differently across scientific disciplines. The approach most relevant to the subject of this paper is social sciences' (specifically in management) definition of a scientific model. The debate surrounding business models (BMs) is the most important where strategies are

concerned (Timmers, 1998; Osterwalder, 2004; Applegate, et al., 2009). Since the concept of BMs arose during the past three decades, the distinction between strategies and BMs has vanished (Horsti, 2007; Lüdeke-Freund, 2009). The definition and concepts of BMs proposed in the literature range from approaches that completely distinguish them from strategies to those that overlap with strategies. This has led to confusion and a lack of constructive discussion regarding what a BM is, what a strategy is, and what role these two elements play in an enterprise.

## 2 THE THEORY OF SCIENTIFIC MODELS

The research concerning the scientific theory of models should begin from the foundations of all scientific disciplines, that is, from the philosophy of science. Kuhn (1962) indicates that the concept of the paradigm was adopted from Aristotle and translated as an example. Since the time of Aristotle, however, the meaning of the paradigm has changed significantly (Kuhn, 1962). Both Popper (1968) and

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Kuhn (1962, 2000) describe the development of sciences like physics, chemistry, and biology, but social sciences like economics and management have different characteristics and refer to other objects. Therefore, their development and the development of the theory of models represent other issues. These considerations should therefore include the epistemological, ontological, and semiotic issues that define the theory of the model.

## 2.1 Ontological Issues of Model Theory

The ontology of model theory indicates what models are. Without this knowledge, it would be difficult to determine the epistemological value of a model. Therefore, in the ontological fundamentals of model theory, categories of models can be identified. The most common are physical models describing physical objects, such as bridges, ships, monuments and other artefacts, and physical devices. They are created from a specific material and retain the adopted reproduction scale. This category also includes DNA models and the models of living organisms that are prepared in the natural sciences (Schaffner, 1969).

In the natural sciences, there is the widely discussed theory of reduction. Nagel (1961), Hempel and Oppenheim (1965), and Schaffer (1993) argued that the theory of reduction requires the development of 'bridge laws' to create a model of physical or biological objects. Such bridge laws are principles that provide a connection between real objects and their models as the described objects and the model are not the same object. These principles are the content of theory reduction because deduction from theoretical principles is an instance of explanation.

Dowell (2006) and Rosenberg (1978, 2006) argued that a different physical or biological concept may lead to a different implication in the creation of models, therefore, these concepts result a different 'ontological reduction'. Nowadays, it can be concluded that models have become more detailed and specific, however, as a model is not a described object, it must contain epistemological and methodological layers in a bridge. These layers not only 'connect ability assumptions' but also compatibility and unique description and methodology of measures, analyses, tests, and evaluations.

At this point, it can be concluded that ontological reductionism is related to epistemological reduction and methodological reduction (these are discussed in the following subchapters). Similar models and their issues can be found in many different fields of

science. For example, in the economic sciences, the hydraulic model of economics (Boumans, 2004) consists of material components that have an unchanging pattern and describe with mathematical accuracy different physical objects from the real world (Leonelli and Ankeny, 2012). The presented form of models leads to the simple conclusion that the models themselves do not belong to the real world of objects that they describe. Physical models contain material components, but they belong to the fictitious world (Ankeny, 2009). Therefore, this category includes models that describe the hard-to-grasp objects of the real world.

The description of such objects requires the use of imagination in scientific reasoning. An example is the atomic model of Niels Bohr. From an ontological point of view, it can be concluded that the components of this model do not belong to the real world of the objects they describe. This is a distinction that is fundamental when building models. Changes in the component structures of models lead to significant differences in the context of the emergence of new models. There are three criteria that describe the component structure of any model:

- the catalogue of the components that make up the structure;
- the relationships between the components resulting from it;
- the mathematical description of the pattern and relationships.

These three criteria constitute the carrier of knowledge concerning a specific object in the real world. When a model is evolving, these three criteria can distinguish whether changes in the model have led to the creation of a new model or not. As the knowledge level rises, it is important to keep the old model until a new and better one is created (Kuhn, 1962; Popper, 1968).

In the presented scenario, new knowledge about the described object forces three possibilities of changes in the model. First, changes in the components (canvas) of the model lead to changes in the relationships between the new or modified components and this forces the mathematical description to change. Second, a situation can be imagined in which the canvas of the model remains unchanged, therefore, the catalogue of the components is the same, but the relationships between the components change. This change in the relationships then requires a new mathematical description. Third, the canvas and relationships between components remain unchanged in the model, but a new mathematical description is created.

In all three cases, newly gathered knowledge causes new knowledge transferred by the model. For this reason, it can be concluded that each of these three changes forces the old model to be abandoned and a new model to be created. On the other hand, if the components' structure and the mathematical description remains intact and only the relationships between the components are modified without new knowledge, then the same model can be kept and a new description simply added to the same canvas. These issues are related to the epistemology of the model and lead to the question: what is the purpose of the created model?

## 2.2 Epistemological Issues of Model Theory

Epistemology leads to the question: why are models built? The purpose of building models lies in the sphere of transferred knowledge about the objects they describe. Models are peculiar relays of this knowledge and relieve people from constantly having to reach real-world objects to gain knowledge about them. Models facilitate and accelerate the process of acquiring knowledge about specific real-world objects. The cognitive role of models is widely presented in the literature as their basic function (Hughes, 1997; Magnani et al. 1999; Magnani and Nersessian, 2002; Osbeck, 2014). If the model has been developed, learning about objects is based on the knowledge transferred by the models. Therefore, models are created to enable simulations and other manipulations to increase the amount of transferred knowledge.

The process of acquiring knowledge proceeds differently. Hugnes (1997) argued that the learning process consists of three stages: denotation, demonstration, and interpretation (DDI). In the demonstration stage, the construction of simulation models allows scenarios of future events to be built. In an epistemological context, it can be concluded that the importance of grasping the variability described by the modern models of the object increases. Considering the demarcation criteria, capturing a given range of variability of the objects described has a special significance in management science. Contemporary models often allow computer simulations in the field to recognise different decision variants for transport, allocation of resources, or to find optimal solutions to decision problems (Anderson et al., 2018).

These models rely on a static approach, however, and are often built with the use of several selected variables, whereas others embrace the *ceteris paribus*

principle (Winston and Albright, 2018). Such models are the transitional stage between the static and dynamic models that will be created in the future. Nevertheless, the epistemological reduction is also related to them and is one of the most discussed issues in the contemporary philosophy of science. As such, it deserves a deep and separate study.

There are two main conclusions from an epistemological point of view for models created in the economic and management sciences. First, the socio-economic environment is subject to constant change and this variability should be taken into account in the modelling process while maintaining the models' coherence. This could be achieved by including the agility of objects in the created models. Second, models should convey up-to-date knowledge about the described objects in the maximal way and try to narrow the epistemological reduction issue. These conclusions make it necessary to build dynamic models in the economic and managerial sciences and indicate methodological issues.

## 2.3 Methodological Issues of the Model Theory: Reductionist vs. Non-reductionist Approach

Contrary to the presented reductionist concepts, there is the (anti-reductionist) holistic approach. This concept tries to represent a unified account of knowledge as entire or whole in relation to particular objects represented by dedicated models. Therefore, the amount of knowledge about the objects that is available through the dedicated models is exactly the same, regardless of whether a reductionist or holistic (sometimes called anti-reductionist) approach is used. An example of these two approaches can be described using electronics. One of the most common elements in electronics is resistors. Electrical resistance (expressed in Ohms) describes how 'difficult' it is for the current to flow through a resistor, but the same resistor is also described by electrical conductance (expressed in Siemens), which is the reciprocal of electrical resistance. In this example the conductance describes how "easy" the current can flow through this resistor. The object is the same for both descriptors, but the knowledge is different and complementary.

This example leads to the next conclusion that the methods used to measure, analyse, test, and evaluate the same object can be different and depend on knowledge the dedicated model pass through, which indicates that 'methodological reduction' is also an important issue. The presented incommensurability of meaning of the same object can make the connect

ability of these theories' expressions, but at the same time, the logical derivation of one theory from another can also be difficult or even impossible. Furthermore, Feyerabend (1962, 1965) and Kuhn (1962) argued that developed theory (earlier and later theory) might use the same terms but with different meanings. This leads to the conclusion that the epistemological and explanatory issues of the same model that develop the theory over time should be treated as layers, which in time bring different knowledge of the same object. This conclusion places attention on the semiotic issues of created models.

### 2.4 Semiotic Issues of Model Theory

Three aspects can be distinguished in the context of a model's semiotics. The first aspect is the correctness of the description of the object by the language expression used in the model. Each scientific discipline has its own specific language and subject range that it deals with. This means that to preserve the semantic correctness of the description, models are built in specific fields of science and transfer knowledge relevant to these fields. The second aspect is the consistency of the description of the components that make up the pattern. The quality of the knowledge transfer through the model depends on this correctness and consistency. The third aspect of a model's semiotics is the pragmatic issue and in this case, it is important to have a linguistic description that is understood by the recipients of the model. The linguistic description refers not only to the components and their compositions in the model, but also to the mathematical description of the object using the components.

The abovementioned issues lead to the conclusion that semiotics provide important indications for modelling in management science. As in other sciences, models should be easily understood by professionals in this discipline. The model cannot be controversial. The linguistic description in the model should correctly describe the graphic components of the model using the structured definition knowledge in the field of management sciences. This issue is especially important for management science and in the theory of management there is a common trend that represents the largest level of the conceptual ordering of concepts. There is no ambiguity in understanding concepts and descriptions of objects and model components.

For example, if in management theory many definitions of a strategy can be found, then the model in which one of the components is a strategy must refer to a well-defined strategy definition. The

linguistic description should correctly and clearly interpret and present the characteristics of the object. At this point, before the modelling process begins, what will be and what will not be modelled should be considered. It is therefore about establishing unambiguous demarcation criteria for the described object.

In this subchapter, the most common contexts of model theory have been presented and serve as a background for the consideration of BMs. These contexts refer directly to the field of management theory and science, where the reference of various concepts of BMs to strategy and model theory becomes one of the most important issues. The presented ontological, epistemological, methodological, and semiotics issues could be treated as criteria of respect the principles of scientific discipline and allows falsifications real science from pseudoscience (Popper, 1963).

## 3 DEFINITIONS AND CONCEPTS OF BUSINESS MODELS

Various BM concepts have been created during the last three decades (Braccini, 2008). In the subject literature, about 22 BM concepts are presented and most of these are based on the definition given by Magretta (2002). Of the 22 analysed concepts (Zott et al., 2011), it is possible to specify those which have been developed over 12 years, which is over 50% of the development period of business models present their own definitions of the BM. The development of individual concepts is indicated by publications over 12 years. By adopting the above criterion, the leading BM concepts were identified (see Table 1).

Table 1: The leading concepts of BMs.

Years of publications	Authors	The number of publications till 2018
Internet publication from 2000 till present	M. Rappa	18
2002, 2004, 2005, 2009, 2010, 2011, 2012, 2013, 2016	A. Osterwalder, Y. Pigneur	15
2000, 2001, 2002, 2003, 2005, 2006, 2009, 2011, 2012	L. Applegate	13
2001, 2002, 2007, 2008, 2010, 2011, 2012	Ch. Zott, R. Amit	12

Magretta (2002, p.87; Magretta and Stone, 2002, p.44) provided a description of BMs: "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) that explains how we can deliver value to customers at the right price?”.

This definition could also be the definition of a strategy, however. Planning a strategy simply requires knowledge of product propositions, customer groups, and resources. All these components must be included in a strategy. They imply the way of doing business. Therefore, it can be said that abovementioned elements compose not a business model but rather a strategy, which is an orderly way of performing tasks that leads to the achievement of goals and describes the business method. In conclusion, the presented definition overlaps with the definition of a strategy, causing the concept of a BM and the concept of a strategy to overlap.

As each enterprise prepares and implements different strategies, BMs must be unique. There is no difference between a strategy and a BM and the quoted definition inserts the entire concept of a BM into the concept of a strategy. Osterwalder and Pigneur (2005, p.5) propose a concept of BMs that is closely related to the economic operator's strategy: “A business model is a conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm. Therefore, we must consider which concepts and relationships allow a simplified description and representation of what value is provided to customers, how this is done and with which financial consequences”. It therefore follows that BMs are referred to as:

- a set of objects and concepts and their relationships;
- a simplified description and representation of the value that is provided to customers;
- how this value is done and with which financial consequences.

This type of description is well known in the subject literature and it is the basic description for creating an enterprise's strategy. Without the information this description brings, it is not possible to build any kind of effective strategy. BMs were defined in relation to strategies more precisely by Osterwalder (2004, p.17), however: “...the business model and strategy talk about similar issues but on a different business layer” and “I understand the business model as the

strategy's implementation into a conceptual blueprint of the company's money earning logic. In other words, the vision of the company and its strategy are translated into value propositions, customer relations, and value networks”.

As previously stated, in the different strategy definitions, there is strong diversification between different business levels. Accordingly, the quoted definition of BMs did not recognise business (managerial) levels of strategies as this differentiation belongs to the fundamental knowledge of strategies. Furthermore, the placement of the concept of BMs between the strategy of the organisation as a whole and the operational activities level makes it a tool for the operationalisation of the strategy, thus constituting an element of a strategy (Horsti, 2007; Lüdeke-Freund, 2009). In this way, the tool of operationalisation of the strategic plan, defined in strategies as their important component, was defined as a BM. In a later period, the definition of BMs was modified: “A business model describes the rationale of how an organisation creates, delivers, and captures value” (Osterwalder and Pigneur, 2009, p.14).

Both definitions lead to the conclusion that the focus of a BM is on rational, logical description and justification and how to generate value in an enterprise, which in turn means a close connection with the value generation chain. Both the first and second definition are still part of the strategy operationalisation tool and as such are a component of a strategy known for many decades in the theory of management. It is impossible to imagine a strategy without its operationalisation. Therefore, if no strategy operationalisation has been prepared, then the product we have is not a strategy, but at most a strategic plan according to the theory of management. For the strategic plan to become a real strategy, it must be translated into operational activities and then realistically implemented in the business activity of the enterprise.

In conclusion, if a strategy is not operationalised, then it does not fulfil the definition of a strategy and it is only a strategic plan without any kind of influence on the real world of business experience. Hence, a strategic plan without operationalisation is not a practical managerial tool, while a real strategy is. The idea of developing a tool for strategy operationalisation is not new and may have come from the research results of Charan and Colvin (1999 as cited in Kaplan and Norton, 2004, p.6), where it was indicated that 70% of the failures associated with strategies did not occur in the planning phase, but in the real-world implementation. Therefore, an effective tool for the operationalisation of strategy

plans could be very useful in the practice of business management.

The problem, however, the notion of the 'operationalisation' was, and still it is today, well-known component of the strategy, and as such is defined and known in the theory of management, but it was only a differently named as BM. The proposal of Osterwalder et al. (2009) contains a set of nine graphic components that form a permanent pattern canvas. These components are also well known in the theory of management and are therefore not new (Graves, 2011). The pattern of the components is new, however, and can be understood as a BM if such a pattern is adequate in ontological, epistemological, and semiotics terms regarding the described objects, which in this case are strategy plans. In the Alexander Osterwalder proposal BMs are strategy operationalisation tools and strategies are unique tools for managing the company, BMs must be part of the strategy and will need to be created for each strategy and each company. As a result, the set of graphic components and the pattern of the canvas is intact, while only description of the content of these components, their relationship is subject to change.

The definitions of individual components are constant, therefore, according to the ontological, epistemological, and semiotics issues of model theory presented in the previous subchapters, only the canvas pattern can be considered as a single BM. Other changes such as the description of the relationship between the same canvas components and the same mathematical description and evaluation mean only different variations of the same BM (same canvas) in business practice. Otherwise, created solutions lead ultimately to create as many BMs as strategies and enterprises. This trend seems to be confirmed by Osterwalder et al. (2016). When both the canvas and the various concepts of its usage in business activities are components of a BM, then the entire concept is named as a BM. Business activities mean a very wide and diverse environment that allows the creation of an infinite number of BMs. At this point, the ontological, epistemological, and even semiotics sense theory of model is vanished.

Rappa (2019, p. 3) presents a classification of BMs and differentiates them from an organisation's strategy: "In the most basic sense, a business model is the method of doing business by which a company can sustain itself -- that is, generate revenue. The business model spells out how a company makes money by specifying where it is positioned in the value chain". Michale Rappa (2019) specifies 25 BMs grouped in 9 categories. These BMs are technology-based business tools that can be used via

the Internet. The number of these tools will grow due to the new possibilities of using the Internet in business, which will become available thanks to the development of communication technologies. At the same time, these models represent 25 more or less complex business tools that can be used on the Internet as a result of technological development. The compositions of these models are unique to each enterprise, exemplify the business model mix concept, and are part of Internet business strategy.

In terms of implementation, however, Rappa (2019) argued that, "The models are implemented in a variety of ways. Moreover, a firm may combine several different models as part of its overall Internet business strategy. For example, it is not uncommon for content driven businesses to blend advertising with a subscription model". Therefore, it can be concluded that the content of BMs may be part of the business strategy of a company conducting business via the Internet. Strategies still play a key role in the development of the company, however. The unique composition of a BM creates a coherent whole and responds to the business needs of the company. Therefore, a BM is identified as a set of business tools used on the Internet by companies. These tools are included in the way the company generates revenue.

At this point of discussion, it should be noticed that it is not possible to identify the source of revenue change because it is the result of simultaneous usage of both the BM and the business strategy. It is the point where the concept of the BM overlaps with the strategy and the factors that cause a company's specific results are not ultimately identifiable.

Zott and Amit (2008, p.5) defined BMs as: "the structure, content, and governance of transactions' between the focal firm and its exchange partners. It represents a conceptualisation of the pattern of transactional links between the firm and its exchange partners". There are two BM types (Zott and Amit, 2008): the novelty-centred business model and the efficiency-centred business model. Zott and Amit argued that BMs can be a source of competitive advantage and that the companies that provide a similar product to the same market and have a similar strategy can gain a competitive advantage through a different BM. They emphasised that the possibility of generating more value for shareholders, which is the essence of BMs, gives the company the potential to gain an advantage and that the implementation of the strategy influences the results achieved by the company. Therefore, the analysis of the results achieved by the company does not provide information about whether the achieved advantages were the result of strategy implementation or a BM.

Zott and Amit (2008) proposed an evaluation equation and analysed the differences between 170 organisations operating on the Internet in terms of the differences between the drawing strategies of the products and the BMs. Based on the obtained results, the differences between the BMs and the one type of strategy named market strategy were determined. Zott and Amit argued that BMs and market strategies are different issues in the theory of management and that a market strategy is one type of many types of strategies. Therefore, the given definition of a BM means that it is not a market strategy.

The definition of a BM includes the management of the content and the structure of transactions, however. This means that a BM is a continuous process and that the ability to make decisions about the content and structure of transactions is made by the company. In turn, this means setting goals and actions necessary perform in order to achieve them. Furthermore, a BM is a tool for achieving a competitive advantage. It can therefore be concluded that although a BM is not a market strategy, it is a kind of competitive strategy because it contains all the components included in the definition of a strategy. The final conclusion is that the concept of a BM presented by Zott and Amit (2008) is in fact a definition of a new type of competitive strategy, which is still unique to each company. Therefore, there are as many BMs as companies, which also means there is no scientific foundation that allows this concept to be called a 'model'.

Applegate et al. (2009) presented a BM concept in which strategies play the most important role. A strategy is one of the three main components of a BM, along with the possibilities and values. "Business model defines the linkages among key strategy, capability, and value drivers of business performance" (Applegate et al., 2009, p.50). Therefore, the content of a BM is a driver of business performance. In this concept, drivers are specified by the strategy and capability and the value generated by the business entity. They describe internal relationships between the three components of BMs and the external relationships between the environment and each of these components. These drivers are the content of a BM, therefore, the content of a BM is a description of these drivers. According to definitions of strategies, however, capabilities and resources should be allocated to activities and tasks leading to the achievement of the defined goals, objectives, and targets.

This commonly used strategy logic is described in all definitions of strategies. In other words, the results of these activities and tasks is to achieve the aims,

goals, objectives, and targets of a business strategy and generate value for the stakeholders and the company. The implementation of strategy means how the company perform a business. If a BM describes the allocation of capabilities and resources along with the value generated through the implementation of a strategy, then it is a unique component of the business activities of every company. Therefore, there are as many types of BMs as there are companies conducting business activities. This conclusion contradicts the ontological and epistemological issues of model theory.

A different concept was proposed by Timmers (1998, p.4), who defined BMs as:

- "an architecture for the product, service and information flows, including a description of the various business actors and their roles,
- a description of the potential benefits for the various business actors, and
- a description of the sources of revenues".

Timmers (1998) argued that a marketing model combines two components:

- a description of the BM as opportunities that the Internet environment brings
- a unique marketing strategy of a given company.

It can be concluded that in this concept, a BM is a characteristic of tools that can be used on the Internet, but not the way in which a particular enterprise runs the business. How an enterprise conducts its business activities on the Internet is described in the second component of the marketing model, which is a marketing strategy of a specific enterprise. The proposed concept split strategy from BM, regardless that both components are included in marketing model. This is the main difference between the definition of a BM and the previously presented concepts.

Timmers (1998) argued that BMs are tools used on the Internet and are characterised by the following components:

- the tool's description, purpose, and who it is aimed at;
- potential benefits for the enterprise and customers;
- a description of how revenue will be gained.

This classification is subject to growth according to new communication and technological possibilities. In this proposal, each tool is considered as a single BM. From a scientific point of view, BMs in this concept can be a pattern of these three components, not 12 different tools.

As new possibilities arise due to the development

of communication technology, new tools are created and added to the catalogue. Otherwise, the number of BMs depends on communication technology development not the business environment itself. In this concept, the pattern of the three components are intact, but the description or content of each component of a BM is subject to change and can change the mathematical description. From a scientific point of view, the model can be related to the pattern of the three components included in the concept of a BM. Other changes include various configurations of business tools that can be created for use by any enterprise or actor leading activities on the Internet. The previously presented concepts of BMs were related to the business activities of specific enterprises, while this concept has described tools used in the e-commerce environment. There is also a different object described by the model and the demarcation lines of this object are differently positioned.

It can be concluded from the subject literature that strategies belong to the real world as these are always defined as practical management tools. For over six decades, the definitions of a strategy have included the component referred to as operationalisation, which is the translation of the strategy plan into operational activities in the enterprise. On the other hand, the theory of models implies that it describes in the theoretical world objects belonging to the real world. Furthermore, the theory of models requires demarcation lines that allow the precise boundary between what will be the object of description and what will be excluded from it in the real world to be defined.

The literature also revealed that there are many definitions of BMs that contradict each other. One definition of BMs means operationalisation, which is a component of strategies, while another definition uses entire strategies as a component of BMs. BMs are also defined as practical tools used to achieve strategic goals and generate higher revenue by enterprises on the Internet. Definitions of BMs interfere with the definitions of strategies. Starting from the recognition of strategies as a component of BMs, through to the recognition of the BM as operationalisation, which is a component of the strategy. Definitions of BMs that belong to the theoretical world also overlap with definitions of strategies and other managerial tools that belong to the real world. It is hard to accept such a situation based on scientific reasoning. The only excuse for this situation could be that definitions of BMs are currently discussed in the literature and evolving in time.

In conclusion, the concepts of BMs should be more explicitly embedded in the philosophy of science and respect the contemporary scientific achievements in many scientific disciplines, especially the theory of models and theory of management. One of the proposed solutions could be avoiding the definitions of BMs overlapping those of strategies as these belong to the real world. An attempt to formulate such a concept of BMs is made in the following subchapters.

## 4 MATERIALS AND METHOD

Different concepts concerning the reductionist approach and their inadequacy or weaknesses regarding a model's description of objects leads to the conclusion that a model does not consist of comprehensive or completed knowledge about the object it represents. Discussion in physics, biology and natural science cause that complexity theory arises (Mazzocchi, 2012). This trend has also spread to other scientific disciplines, such as economic and management theories (Richardson, 2008; Espinosa and Walker, 2017). The results of these discussions could be taken as a basis for developing a more accurate concept and definition of BMs. There is no doubt that strategies are complex processes. The traditional scientific approach used to describe new and unrecognised objects was based on reductionist methodologies. This approach was commonly used in the 20th century and involved searching for the most important components of complicated objects and then reducing their description and the number of elements needed to explain the entire object. There is no issue related to methodology, but rather inadequate methodology used to describe not only complicated but complex objects as the strategy process is.

According to complexity theory (Richardson, 2008; Cimini et al., 2017), objects are not only complicated but complex when consists of elements, where each of these elements is also complex. The process is definitely complex as people (scientists, researchers, engineers, and entrepreneurs) take part in it (Espinosa et al., 2017). That is the novel point presented in this paper. If the strategy process is complex, the complexity theory paradigms (Cicmil et al., 2017; Espinosa et al., 2017) and the *mutatis mutandis* methodological approach should be used. This approach leads to the proposal of a new design for BMs. In the complexity approach, it should be rather identified components, which constitute each type of strategy, which satisfy the condition sine qua



non of the studied object. In the theory of complexity, it is clear that a comprehensive description of the complex object is not possible. Without reducing the object to several components, however, it is possible to indicate the ones that constitute described object and create a unified spectrum of strategy processes and design a new BM.

## 5 RESULTS, UNIVERSALITY OF MODELS, AND TOWARDS THE DESIGN OF AN AGILE BUSINESS MODEL PROCESS AND LOGIC

In the context of models' universalism, the question of whether universality can be related to models created in the natural sciences arises. If so, what is this universalism? As an example, let us take the well-known law of gravity. This model consists of a mathematical equation and a description. The universality of this law lies in the fact that this description does not concern only one type of material, e.g. stones, iron, or falling apples, but all objects subjected to the impact of this law. Another example is Bohr's model of atom energy in quantum mechanics (Kragh, 2011). This describes the various levels of atom energy depending on electron orbits. The universality of this model lies in the fact that it refers to many chemical elements.

In other sciences, models with similar universality can also be found. For example, Kirchhoff's current law in electronics (Kalil, Swain, 2008). The universality of this model applies to any current in an electronic circuit. Therefore, another question arises: will there be a similar situation in management science? As mentioned previously, strategies are unique managerial tools in enterprises. It can be concluded that an object observed in the socio-economic environment that belongs to business activities conducted by enterprises requires the construction of a model that will transfer knowledge in a complex manner. At the same time, this model will be characterised by universality and agility. Previous BM proposals do not overcome this difficulty. A proposal for such a construction is shown in Figure 1, which also presents the design process of a BM. The first step in the design process is to determine the demarcation criteria of the object chosen to be described by the model (see Figure 1). In this case, it will not be a single object, an isolated business environment, or a single enterprise. It will also not be a set of technological tools used by

enterprises operating in a specific business environment. Attempts to define demarcation lines in this way have resulted in different definitions and concepts of the design of BMs. A BM defined as a description of the socio-economic environment is subject to changes resulting from rapid technological development. Under these circumstances, it is necessary to modify the model when, for example, a new application of the Internet is available. In turn, this indicates the lack of agility of the model.

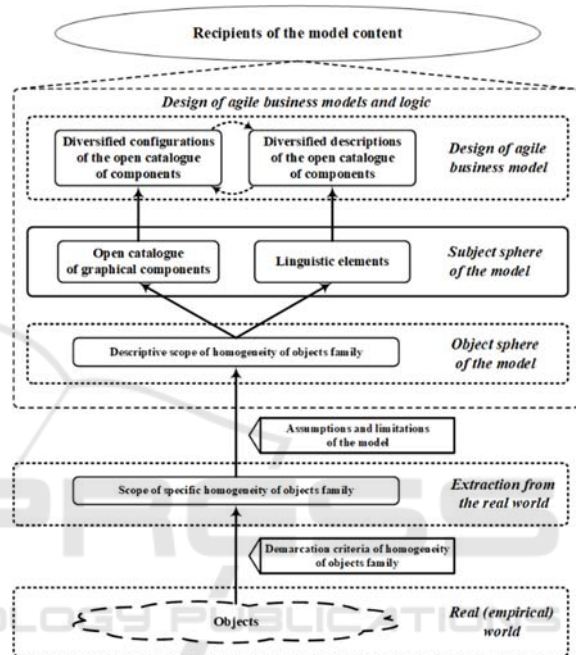


Figure 1: A new design for an agile business model's process and logic.

A similar situation occurs when a BM is defined as a catalogue of tools used on the Internet. Due to technological developments, this catalogue is not permanent, which means that it is necessary to supplement the model with new tools and therefore modify its description. When a BM is defined as a tool for strategy operationalisation, the diversity of strategies resulting from its uniqueness will eventually lead to many changes in the description, even assuming permanent components (canvas) of the model. Enterprises of all sizes conducting business activities in various industries require the use of various and different components of the model, however. For example, if an enterprise from metallurgical industry is compared with a software development enterprise, it is clear that their different production methods and environments require different models. Another issue arises when a big enterprise is compared with small one, even within

the same industry.

These examples lead to the simple but often forgotten conclusion that in a socio-economic environment, the universality of BMs is significantly reduced. The solution, being a tool for the operationalisation of strategy as a unique tool for each strategy, will necessarily result in the creation of more and more BMs, which indicates a lack of agility. Such a tendency can be observed in the subject literature. In this example, the model is not only limited in agility, but it is a denial of the concept of universality, eventually leading to as many BMs as there are strategies, which means building a separate model for each enterprise. At this point, the demarcation criteria of the object being described by a BM are not precisely defined.

Another example is when the definition of a BM consists of a description of the relationships between strategies, capabilities, and the value of an enterprise that determine business drivers. In this case, the same difficulties with the definition of a model arises. As strategies are unique tools for each enterprise, BMs are also unique. In addition, these relationships are complex, especially if the enterprise is big. The determination of the business drivers of a specific enterprise could indicate the need to specify a different demarcation criterion for the described object. It can be assumed that similar business drivers can refer to the group of enterprises, however, there are no demarcation criteria for establishing such groups.

The difficulties related to concepts of BMs result from the lack of adopted definitions, which makes the demarcation criteria imprecise. Hence, the demarcation criteria are not mentioned in these concepts. In the proposed solution (see Figure 1), it is necessary to maintain the continuity of the causal relationship in the vertical, from the lowest level of the real world to the theoretical level of a model, where it will be possible to vary the configuration of the determined components and a flexible description of the same model. Demarcation criteria form the basis for the location and selection of a homogeneous group of enterprises for which a BM will be designed. These criteria constitute the novelty of the proposed solution. Homogeneity in this case consists of the selection of enterprise groups that meet the following demarcation criteria:

- they conduct business activities in a specific business environment, e.g. on the Internet;
- they belong to a selected industry or branch;
- they conduct a specific type of business activities, e.g. production, sales, services;
- they belong to one group in terms of their size, e.g.

number of employees;

- they belong to a group of enterprises conducting domestic or international business activities;
- they belong to a business, social, or non-profit group of organisations.

The selection of an object for a model's design should fulfil at least six specified demarcation criteria. These criteria help define the activities of a given group of enterprises and are determinants for the homogeneity of a selected group. They also lead to the extraction of an object from the real world for which the model will be designed. It is a second step of the model design process (see Figure 1). Selected in this way group of enterprises, allow to identify assumptions and limitation of the model, which in turn, indicate the descriptive scope of homogeneity of objects family, which is a group of selected enterprises. This is the third step of the model's design process and constitutes the object sphere of the model (see Figure 1). This sphere is imprecise and most of the problems with models and their variability belong here. The proposed solution solves this problem.

A group of enterprises being entirely object-described by the designed model allows an open catalogue of graphical components to be identified and also determines the linguistic elements (including mathematics). This is the fourth step of the design process and belongs to the subject sphere of the model. The openness of the graphical components catalogue means it can be supplemented with new business tools or characteristics, which in turn translates into an improved description in terms of linguistic elements. An open catalogue of components is possible because the BM still describes intact groups of enterprises fulfilling all demarcation criteria. Therefore, an open catalogue of graphical components and linguistic elements determines the agility of the designed BM and enables its improvement in the future.

In this way, ABMs are open to innovation in every business activity of the enterprises belonging to the described group. ABMs allow improved knowledge to be transferred to the recipients of the model content. They still transfer knowledge about the same object belonging to the real world (which are the group of enterprises fulfil demarcation criteria) and at the same time, allow diverse configurations of the components and description. This is the fifth stage of the design process and is related to the design of the ABM sphere.

Agility allows to diverse improve entities it describes. Therefore, the proposed concept is not only agile, but also an open business model (OBM) as it allows diverse knowledge to be transferred according

to innovations occurring in the real world of the object. The proposed process of ABM design allows many models to be built that describe a different group of enterprises. The universality of this model relies to a significant extent on its agility. Based on management theory, the proposed solution is a new approach to the design of BMs while maintaining their practical usefulness in the management of enterprises.

On the other hand, the proposed concepts require continuous changes and improvements and the development of an enterprise group described by dedicated ABM. In managerial practice, this is not a new activity, however. It is, for example, known in a competitiveness concept of strategy. An ABM designed using the abovementioned process is an introduction to creating unique strategies and business drivers and using business tools while conducting business activities. It does not interfere and replace strategies in its practical management dimension. It is a complex and open description of how to run a business for an unambiguously homogeneous group of enterprises.

The ABM is also a rich description of how to conduct business in a given branch. It is important to note, however, that not all enterprises belong to the same branches described by the dedicated model. It is also allowed to design ABM for specific part of business activities of selected enterprises belong to the real object described by the model. For example, ABMs may describe the use of intellectual capital in enterprises, i.e. a branch can be described by many ABMs. In this context, the recipients of the ABM can be both managers and future entrepreneurs. This model can provide the information necessary for people who intend to start a business in a specific branch of the business industry. These issues are fundamental in entrepreneurship. The models are not limited to the strategic description and are not only a description of the socio-economic (or business) environment or specific business tools. In this interconnection lies novelty of ABM, practical utility and scientific explanation in management sciences.

## 6 DISCUSSION AND CONCLUSION

The business activity is a very wide and diverse environment of practice, which means it belongs to the real world. It allows the precise selection of an infinite number of objects and the design of a dedicated BM. According to the subject literature, it

can be concluded that strategies are practical tools for management and as such belong to the real world. For more than six decades, the definitions of strategies have included the component referred to as operationalisation, which is the translation of the strategy plan into operational activities in the enterprise. On the other hand, the main BM concepts discussed in the literature are characterised by a large definitional and conceptual dispersion in the object they describe.

At the same time, the proposed definitions of BMs overlap with the well-known and described concepts in the theory of management. The most common overlap is between BMs and strategies. At this point, the ontological, epistemological, and even semiotics sense theory of model is vanished. The scientific theory of model described model as theoretical world, but object described but the mode exists in the real world. The presented concepts of BMs overlap across both worlds and this is why they are incorrectly defined. Models can be designed for any kind of object that belongs to the real world, but BMs are subject to the fundamental requirements of scientific development.

In the presented BM concepts, different ontological, epistemological, methodological, and semiotics issues arise. This leads to the conclusion that at the current stage of development, the BM concepts are questionable from a scientific point of view. For example, Porter (2001, p.73) argues that, "The misguided approach to competition that characterises business on the Internet has even been embedded in the language used to discuss it. Instead of talking in terms of strategy and competitive advantage, dot-coms and other Internet players talk about "business models". This seemingly innocuous shift in terminology speaks volumes. The definition of a business model is murky at best. Most often, it seems to refer to a loose conception of how a company does business and generates revenue. Yet simply having a business model is an exceedingly low bar to set for building a company. Generating revenue is a far cry from creating economic value, and no business model can be evaluated independently of industry structure. The business model approach to management becomes an invitation for faulty thinking and self-delusion".

One of the fundamental principle valid for any kind of science is to keep scientific discipline in any kind of scientific work (Popper, 1963; 1968; 1994; Lakatos, 1980; Nagel, 1984; Hanzel, 1999; Kuhn, 2000). Therefore, although the presented concept is practically useful, there is no scientific foundation that allows the entire BM concept to be called a

'model'. Under these circumstances, however, one solution can be proposed. A BM can be considered as a set of models dedicated to improving a specific business activity in the socio-economic environment, e.g. a canvas for strategy operationalisation model, a revenue and cost-effective drivers' model, and an Internet commerce tools model.

The abovementioned proposal requires reconsideration of each concept. As BMs are a currently evolving concept, it is possible to be more exact and follow the fundamentals of scientific development mentioned in this paper. Specifically, reconsider work allows to:

- point out precisely the described object on the real world clearly stated what is described in the theoretical world of model;
- clearly distinguish the use of the modelled object (which belongs to the theoretical world) from other objects belonging to the real world of business activities;
- keep fundamentals of scientific sense of the proposed concepts and solutions;
- keep scientific discussion in theory of management subject to the fundamentals of scientific development.

Unfortunately, the main result of the current situation is that the contemporary literature dealing with BMs cannot be unambiguously understood until it is determined which definition of the BM has been adopted. This situation leads to confusion and scientific ambiguity in texts that should meet the fundamental principles of the philosophy of science and scientific development. In light of the abovementioned situation, Porter's (2001) opinion is scientifically justified. If the concepts of BMs fulfil the scientific principles of the theory of models, they should be defined and designed in the theoretical world and not as part of the real world. As BMs are currently evolving, it is possible to be more precise, follow the fundamentals of scientific development mentioned in this paper, and unambiguously define discussion subjects. Consequently, in light of the results presented in this article, a new set of models should be created called ABMs. This group will contain only models that fulfil the described demarcation criteria and will be specific to dedicated groups of enterprises and certain business activities.

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