

Developing Strategic Thinking in Business Education

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Abstract. *The new business environment becomes more and more turbulent with rapid and unpredictable changes. Operational management focusing on present issues and profit maximization is not able to look into the future and anticipate market dynamics. Companies need to develop strategic management as an overarching framework able to search into the future and construct strategies for achieving a competitive advantage. That needs a new way of thinking and decision making. The core of that process is strategic thinking. The purpose of this paper is to analyze the content of strategic thinking and to investigate how it is developed in business education. I shall analyze the content of strategic thinking using a metaphorical approach and considering a spectrum of monochromatic thinking models based on some determinant features. For the second part I performed a survey based on a questionnaires addressed to 5000 students enrolled in undergraduate and graduate programs of economics and business from the main schools of economic sciences in Romania. The questionnaire contains 47 items able to reveal the dimensions of the strategic thinking pattern we consider of being significant for the managers in this new knowledge economy. Results show the need for improving the content of business education curriculum, and the teaching approach.*

Keywords: *business education, creative thinking, deterministic thinking, dynamic thinking, linear thinking, strategic thinking.*

Introduction

There are many approaches to defining strategic management, but there is a core content on which different authors agree: the capacity of looking into the future of the company and creating strategies for a sustainable development based on competitive advantage (Carpenter & Sanders, 2008; De Geus, 1999; Johnson, Whittington & Scholes, 2011; Kaplan & Norton, 2006; Kim & Mauborgne, 2005; Mintzberg, Ahlstrand & Lampel, 1998; Porter, 1998; Rumelt, 2012; Whittington, 2001). Strategic management can be achieved if and only if managers have developed an adequate strategic thinking. As Ohmae (1982, p.78) remarks, *“Top management and its corporate planners cannot sensibly base their day-to-day work on blind optimism and apply strategic thinking only when confronted by unexpected*

obstacles. They must develop the habit of thinking strategically, and they must do it as a matter of course." Companies should integrate their operational management based on hierarchical structures and profit optimization theory into the strategic management process which should be viewed as *"a dynamic force that constantly seeks opportunities, identifies initiatives that will capitalize on them, and completes those initiatives swiftly and efficiently"* (Kotter, 2012, p.47).

Spender (2014) emphasizes the fact that business goals are chosen, not imposed and to achieve them managers need to overcome many difficulties. If they could be achieved just following known approaches there would be necessary no strategies. He underlines the need of strategic work to find solutions for achieving goals, in a given dynamic context and overcoming unknown barriers. *"Thus, I define strategizing as the judgment or imaginative response to what is NOT known, to the surprising, unexpected, incomplete, or illogical nature of what arises through our practice"* (Spender, 2014, p.21). Thus, strategic work can be defined within a contextual framework by four main dimensions: time, complexity, uncertainty, and innovation. Time is needed because we talk about achieving some goals. Complexity is needed because there are unknown phenomena we have to deal with. Uncertainty is needed because many aspects related to goals achievement are unpredictable or surprising. Innovation is needed because the managers' solutions should bring forth an imaginative response to what is NOT known. Thus, instead of formulating definitions for *strategy* is much better to understand its nature and its structure so that we can strategize being focused on some well-defined goals.

The purpose of this paper is to describe strategic thinking by analyzing its spectrum of monochromatic thinking models, and then by evaluating the level of using these models by students enrolled in undergraduate and graduate programs of business in the main universities in Romania. The first part of the paper is based on a theoretical approach and a framework construct following the main dimensions of strategic thinking: time, complexity, uncertainty, and innovation. The second part of the paper is based on that theoretical framework and strategic thinking spectrum. For evaluating the level of using strategic thinking by students enrolled in business university programs, I conceived a questionnaire containing 47 items. I addressed this questionnaire to 5000 students enrolled in undergraduate and graduate programs from the main business schools in Romania, and I received back 3240 valid questionnaire. These questionnaires have been processed using the SPSS package software.

Business education

Business education is a generic term which designates university programs preparing students for a large spectrum of jobs related mostly to business administration, management, marketing, and entrepreneurship. May be the more specific are the undergraduate programs in business administration and the well-known graduate programs of MBA and EMBA. Strategic thinking is essential for business education since any business aims toward achieving some strategic objectives. In a turbulent business environment strategizing should become a second nature for the company management (Kotter, 2012; Nonaka & Zhu, 2012; Spender, 2014). Thus, business education aims at preparing future managers, leaders, entrepreneurs and businessmen to perform in such a dynamic environment and to strategize efficiently in achieving their goals. There are many disputes here if business education should focus on knowledge transfer, skills development, critical thinking stimulation or any combination of them (Gosling & Mintzberg, 2003; Mintzberg, 2004; Roglio & Light, 2009; Rubin & Dierdorff, 2009; Seers, 2007). As remarked by Gosling and Mintzberg (2003, p.56), *“Everything that every effective manager does is sandwiched between action on the ground and reflection in the abstract. Action without reflection is thoughtless; reflection without action is passive. Every manager has to find a way to combine these two mind sets – to function at the point where reflective thinking meets practical doing.”* Thus, these above authors emphasize the need to go beyond knowledge transfer to reflective thinking. Also, developing critical thinking is important in order to identify the tacit mental models that influence decision making process and action (Roglio & Light, 2009). In the same line of thinking, Mintzberg (2004, p.92) considers that management education should be a balanced integration between art, science, and craft: *“Art encourages creativity, resulting in ‘insights’ and ‘vision’. Science provides order, through systematic analyses and assessments. And craft makes connections, building on tangible experiences. Accordingly, art tends to be inductive, from specific events to the broad overview; science deductive, from general concepts to specific applications; and craft is iterative, back and forth between the specific and the general.”*

That integration is possible only if university professors can develop adequate thinking models in the minds of students. These models reflect the mental power of people to understand the reality they are living and to process all the data and information necessary for decision making. Senge (1990, p.8) considers that *“Mental models are deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world and how we take action”*. Thus, we can prepare future managers, leaders, entrepreneurs and businessmen if we are able through the

university curriculum to develop adequate thinking models for business students able to help them strategizing. Unfortunately, most of the books dealing with business strategies and strategic management focus on analyses, quantitative methods and economic mathematical models and almost ignore the process of strategic thinking (Davenport & Harris, 2007; Johnson, Whittington & Scholes, 2011; Porter, 1998; Warren, 2008). Also, in many business schools' curriculum is centered on economics thinking. In his critical analysis of MBA programs offered by American and Canadian universities, Mintzberg (2004, p.38) remarks that "*the trouble is that management is not economics!*". Rubin and Dierdorff (2009) consider that for the contemporary management the following competencies are relevant: managing decision making process; managing human capital; managing strategy and innovation; managing the task environment; managing administration and control; and managing logistics and technology. Although these competencies are not very well defined, we see that managing strategy is one of the dominant needed competencies.

Strategic thinking is a complex process which can be understood by using a metaphorical approach (Andriessen, 2006, 2008; Lakoff & Johnson, 1980, 1999). Auderbrand (2010, p.414) remarks that there is a growing interest for metaphors in education since "*Their heuristic value has become widely recognized as carrying useful bodies of knowledge accumulated across a variety of fields*". In a metaphor we have a *source domain* that contains a well-known concept and its attributes, and a *target domain* that contains the less known concept. The purpose is to analyze all the attributes of the well-known concept from the source domain and to see which of them can be mapped unto the target domain for the less known concept. In the present situation I shall consider in the source domain the *white light*, and in the target domain *strategic thinking*. One of the fundamental attributes of the white light discovered by Isaac Newton is the property of being decomposed into a spectrum of monochromatic colors by a triangular prism. "*A prism breaks a beam of white light into a rainbow of colors, spread across the whole visible spectrum, and Newton realized that those pure colors must be the elementary components that add to produce white. Further, with a leap of insight, he proposed that the colors correspond to frequencies*" (Gleick, 2008, p.164). Each monochromatic color represents an electromagnetic radiation with a certain frequency or wavelength. The boundaries of this visible spectrum are given by the red and violet colors. This property of decomposition into a spectrum of monochromatic colors can be mapped unto the target domain, which means that strategic thinking as a complex thinking model can be decomposed into a spectrum of monochromatic thinking models. I underline the fact that the white light spectrum represents a continuum of electromagnetic radiation and not a collection of monochromatic colors. The

same is valid for the spectrum of strategic thinking. It represents a continuum of mental work and not a collection of monochromatic thinking models.

I define a *monochromatic thinking model* as a very simple thinking model which can be characterized by one main explicit feature. Based on literature study and my own research experience I consider fundamental for the theoretical framework of strategic thinking the following axes or dimensions: time, complexity, uncertainty, and innovation. *Time* is necessary since strategic thinking aims for achieving some objectives in the future, and any company expresses its strategic intention by defining a vision, a mission, and strategic objectives. All of them exist only in context aligned along the time axis. *Complexity* is necessary since future reveal new and complex problems that cannot be reduced to old schemes or formulas. Complex problems cannot be anymore decomposed into simpler problems whose solutions could yield by superposition the original problem's solution. *Uncertainty* is necessary since future does not exist as a physical period of time, like present. It exists only in our minds as a field of uncertainty characterized by probable events. Finally, *innovation* is needed since future will brings new problems which cannot be solved by old methods and successful formulas. We need to create new solutions through innovation. In the next section of this paper I shall define on each of these four dimensions some monochromatic thinking models, showing then which of them can be integrated into the spectrum of strategic thinking. All of these monochromatic thinking models co-exist in our mind since they form a continuous and interactive process, but only few of them play the dominant role. If these dominant models are not part of the strategic thinking spectrum, then hardly we can talk about strategizing in making decisions. Thinking models have been created and developed in time through education in family, community, schools, and university. They represent a functional interface between our inner world of knowledge and the external world we are living in (Brătianu, 2007; Brătianu & Murakawa, 2004; Gharajedaghi, 2006; Ohmae, 1982; Senge, 1990; Sherwood, 2002).

Time orientation

Inertial thinking model

Inertial thinking is the simplest model along the time dimension. Paradoxically, it does not contain *time* as a fundamental variable. Thus, its main feature as a monochromatic thinking model is timeliness. Events and phenomena flow due to their inertia, like in physics. Inertial thinking is important in performing routine work and using pre-established solutions for repetitive problems. Thinking is done by our brain in its unconscious zone

and is closely related to fast thinking (Kahneman, 2011), and knowing-in-action process (Roglio & Light, 2009, p.157): *“Knowing-in-action is a spontaneous and usual action that draws on daily practices. It can be identified when practitioners learn how to do something and are able to execute smooth sequences of activity, recognition, decision, and adjustment without having to expend conscious energy thinking about it.”* Although it is very simple, inertial thinking is important for us since it offers a great sense of security and easiness in solving routine problems by using successful formulas from the past. *“Ironically, the likelihood that an organization will fail to respond to a critical technological breakthrough is directly proportional to the level of success it had achieved in a previously dominant technology. Stated another way, the more success an organization has with a particular technology, the higher is its resistance to the prospect of change. The initial reaction is always a denial!”* (Gharajedaghi, 2006, p.6). In organizations inertial thinking has a direct effect keeping things as they are against any forces that try to change them. Since inertial thinking does not contain time it cannot understand and accommodate change. As a result of that situation, inertial thinking will always oppose change of any kind. There is no possible change in an inertial or static environment (Burnes, 2009; Kotter, 1996; Senior & Swailes, 2010). People who have a dominant inertial thinking will tend to oppose always the change in organizations, no matter the purpose and the arguments for change. Change just cannot be explained by inertial thinking due to its timeless nature. Strategic thinking leads to strategies formulation and then to their implementation. However, implementing strategies means change and development within the organization, and managers having a dominant inertial thinking will oppose them. As a result of that effect inertial thinking cannot be a part of the strategic thinking spectrum.

Dynamic thinking model

Dynamic thinking model includes time as a fundamental variable. Thus, from this point of view it is an advanced thinking model. Its main feature is that it is based on reversible processes. A reversible process is one which has the capability of returning to its initial states going through the same equilibrium states. People usually forget about that condition of passing through equilibrium states, although it is an essential requirement of reversibility. The whole high school physics is based on reversible processes and the Newtonian logic. Let us remember the well-known formula for velocity: $V = S / T$. If we consider an automobile traveling between two cities A and B, then S stands for distance between these cities, and T for the time needed to cover the whole distance. Then, V represents the average speed of that automobile. The point I want to make with this formula is that time has only a quantitative dimension measured in seconds, minutes or hours. There is no orientation in time since reversible processes evolve in circles. The immediate result is that

we cannot distinguish between past and future since there is a continuous present. Future returns back to the past position, and past might become the future. This is a strong limitation of the dynamic thinking since organizational and life processes are not reversible. People having a dominant dynamic thinking pattern understand and accept change as a part of life, but they ignore any orientation in time of activities and don't make the effort of thinking of consequences when they make decisions (Brătianu & Murakawa, 2004). This type of thinking is adequate for periodic phenomena or activities, but not for those which follow a given sequence in time. Since there is no clear future and no orientation in time, dynamic thinking cannot be a part of the strategic thinking spectrum.

Entropic thinking model

This is the most advanced monochromatic thinking model along the time dimension. Its main feature is time orientation. Time appears as a fundamental variable and has both a quantitative dimension and a qualitative dimension. The quantitative dimension refers to duration and its metric discussed in the case of dynamic thinking. The qualitative dimension refers to orientation. Time orientation means to have distinguished periods for past, present and future, with a clear sequence:

Past >>> Present >>> Future

That is possible since entropic thinking is based on real processes which are irreversible. This irreversibility eliminates the possibility of returning to the initial state and changing future and past in a cyclic manner. The main concept able to describe irreversible processes is *entropy*, a concept introduced first time in thermodynamics by Rydolf Clausius and then extended in many other fields of science and engineering (Ben-Naim, 2012; Georgescu-Roegen, 1999; Handscombe & Patterson, 2004). Entropy received a new interpretation from Ludovic Boltzman through statistical mechanics. He showed that "*entropy is a measure of disorder in the system, that a multi-particle system has a tendency to develop to a more probable state, and such a more probable state is a state of higher disorder. This development (toward disorder) continues until a system reaches thermodynamic equilibrium, which is the highest state of disorder for any given system*" (Chalidze, 2000, p.11). Since this development in a natural system is irreversible, entropy introduces a time arrow oriented from the past toward the future through the present time. That means that entropic thinking is able to understand future as an unfolding experience and to create a vision about the business achievements. Leaders having that capacity are called visionary leaders. However, not everybody can have a vision about his or her business and

organization. For instance, it is well-known the fact that Howard Schultz being in Italy had a vision about the possible development of Starbucks, the company he was working for at that time. When he returned back to Seattle he explained to the owners of Starbucks his vision and suggested to create a coffee shop like in Italy. Lacking the ability of having an entropic thinking, the owners saw no future for Italian style coffee shops in America due to the cultural differences between the two countries. Schultz left the original Starbucks and started to develop his vision (Schultz, 1997). Today, Starbucks coffee shops have been opened all over the world proving the power of entropic thinking over the dynamic and inertial thinking models.

Complexity dimension

Linear thinking model

Linear thinking model is the simplest model along the complexity dimension. Its main feature is the capacity to approximate any correlation between inputs and outputs with *a linear* one. That means that for any given process the output is proportional with the input. The key word here is *proportionality*. If we denote the output by Y and the input by X, then we write the correlation between the input and output as following:

$Y = aX + b$, where a and b are some arbitrary constants.

This mathematical expression represents the equation of a straight line. We recall from geometry how we can measure any curve by approximating it with linear segments. The same situation happens in our everyday life, when we consider that outputs from a given process are proportional with inputs. For instance, if an employee is paid for a certain job with \$5 per hour, then for a normal working day of 8 hours he will receive the amount of $5 \text{ (dollars/hour)} \times 8 \text{ (hours/day)} = 40 \text{ (dollars/day)}$. The money the employee receives is proportional with the working time. That means that any salary computed by this rule is *a linear* salary. Time is linear and anything measured with a time metric becomes linear. For instance, we may say that students graduating a European university receive linear Diplomas since their intellectual effort and knowledge gains are measured with a time metric. Due to its simplicity linear thinking became almost universal and many people consider that it is the only way of thinking. Some authors consider that linear thinking is identical to rational thinking, and nonlinear thinking is associated to emotions and feelings (Groves, Vance & Paik, 2008). However, that distinction does not withstand in the case of complex nonlinear phenomena. For that reason we should consider the criterion of *proportionality* and not that of *rationality*. For an enlarged perspective we should associate linear thinking to the properties of mathematical linear spaces (Brătianu, 2009;

Brătianu & Vasilache, 2010). Linear thinking is a very useful monochromatic thinking model, but we should be aware of the fact that linearity constitutes a barrier in understanding creative and intellectual processes, as well as emotional knowledge and intelligence. Future is a complex of possible events and processes which cannot be understood in terms of linearity. That is why linear thinking cannot be a part of the strategic thinking spectrum.

Nonlinear thinking model

Nonlinear thinking model is based on any nonlinear correlation between outputs and inputs of any process. A nonlinear correlation can be represented by a polynomial, logarithm, exponential, integral, trigonometric functions or any combinations of them. For a nonlinear process the output is not anymore proportional with the input. Nonlinear thinking model is able to understand and explain complex processes from biology, psychology, sociology, education, organizations, culture, and other domains of life sciences. For instance, knowledge, emotions, feelings, intelligence, love, cultural values, organizational change, motivation, leadership, intellectual capital are just some examples for which nonlinear thinking is more adequate than linear thinking (Brătianu, 2011, 2015; Gardner, 2006; Gladwell, 2005, 2010; Goleman, 1995; Kahneman, 2011; Ohmae, 1982). The metaphor used to explain nonlinear thinking is *the butterfly effect*: a butterfly is agitating its wings in New York and soon a typhoon will start in Tokyo. That means that a small input can generate a large output. Gladwell (2010) explains the nonlinear feature of a certain process considering the evolution of epidemics. For such an evolution, Gladwell remarks three key characteristics: 1) contagiousness; 2) the fact that little causes can generate big effects; and 3) that change happens not gradually but at once. Then, he emphasizes that of these three, *“the third trait – the idea that epidemics can rise or fall in one dramatic moment – is the most important, because it is the principle that makes sense of the first two and that permits the greatest insight into why modern change happens the way it does. The name given to that one dramatic moment in an epidemic when everything can change all at once is the Tipping Point”* (Gladwell, 2010, p.9).

The Tipping Point can be identified in many nonlinear processes and it can be best expressed mathematically by using an exponential function. Understanding the power of the Tipping Point managers can conceive much better the creative work of their employees, and can construct more efficiently rewarding systems. I found that unlike the linear Diplomas given in the European universities, graduating students in the American universities receive nonlinear Diplomas. The explanation comes from the fact that intellectual work there is measured by using the system of *credit hours*

and not the time metric. As a result of that system, a student who decides to undertake an intensive study program can graduate a master program designed for two years, in only one year, if all requirements are met. That explains the phenomena that youngsters can enter a university program at any age, based on their performance. To be a student at the age of 15 years it is not anymore an exceptional case for American universities. That means a legislation system for education based on nonlinear thinking. In management, nonlinear thinking does not allow that complex problems to be decomposed in simple ones and solved sequentially since that approach can change the nature of the initial problem. Peter Senge (1990, p.67) explains that issue introducing an insightful metaphor: *“Incidentally, sometimes people go ahead and divide an elephant in half anyway. You don’t have two small elephants then: you have a mess. By a mess, I mean a complicated problem where there is no leverage to be found because the leverage lies in interactions that cannot be seen from looking only at the piece you are holding.”* Nonlinear thinking model is a part of the strategic thinking spectrum.

Systems thinking model

Systems thinking model represents the most powerful monochromatic thinking model along the complexity axis. It is based on a system approach in understanding and explaining any process. That means to use an integrative perspective where the whole is more important than its components. There are many correlations between inputs and outputs and some of them may be contradictory, which makes the whole analysis more difficult, but in the same time more accurate. As Senge (1990, p.66) emphasizes, *“Living systems have integrity. Their character depends on the whole. The same is true for organizations; to understand the most challenging managerial issues requires seeing the whole system that generates the issue.”* Systems thinking is introduced in the curricula of most engineering schools since complex technologies cannot be designed without such an approach. Unfortunately, management and business schools do not have usually in their curricula systems theories. That is why economic analysis and managerial practice are basically linear processes. Systems approach to business leads to a holistic understanding explained by Gharajedaghi (2006, p.110) synthetically as follows: *“Therefore, structure, function, and process with the context, define the whole or make the understanding of the whole possible. Structure defines components and their relationships; function defines the outcomes or results produced; process explicitly defines the sequence of activities and the know-how required to produce the outcome; content defines the unique environment in which the system is situated.”* Thus, systems thinking has a great capacity of explaining and designing business processes. It must be a part of the strategic thinking spectrum.

Uncertainty challenge

Deterministic thinking model

Determinist thinking and linear thinking models are dominant in our thinking process due to our education. The main feature of the deterministic thinking model is that things and events are considered to be well-defined and well-determined. There is no uncertainty about them. That means that their probability of happening can be only zero when they do not happen, and one when they do happen. We learn in schools that most natural phenomena are governed by fundamental laws which can predict their occurrences and development. For instance, when we throw objects into the air they will fall down due to gravity. Also, the water of a river flows always down the hill due to gravity. The action of the gravity field is certain. It is a deterministic fact. From thermodynamics we learn that heat is transferred always from a body with a higher temperature toward a body with a lower level of temperature. It is a deterministic process. According to Knight (2006, p.204), "*We have, then, our dogma which is the presupposition of knowledge, in this form; that the world is made up of things, which, under the same circumstances, always behave in the same way.*" Since deterministic thinking operates only in conditions of certainty, there are no risks associated to our decisions. We, as human beings, need certainty. It offers security and full predictability. Our mind is averse to uncertainty and risk taking. That is why people conceive many ways to reduce uncertainty from time tables for airplanes and trains to traffic regulations, and from organizational regulations to legislation. Deterministic thinking is used heavily in management in order to enforce controllability of employees' behavior and guaranty high levels of efficiency and work productivity. Command-and-control management is built on the philosophy of deterministic thinking, although real business is not governed by deterministic laws like in physics. Future is not deterministic and all the events that will probably happen cannot be predicted by using some deterministic mathematical equations. Thus, strategic thinking cannot be based on deterministic thinking.

Probabilistic thinking model

Probabilistic thinking recognizes uncertainty as a fact and tries to deal with it using a different approach than deterministic thinking. Events occurrence is characterized by probabilities and their anticipation can be done by knowing their probability distribution functions (Makridakis, Hogarth & Gaba, 2009; Taleb, 2004 2007). May be the most known example for understanding probabilistic thinking is the weather forecast. We learn from newspapers, TV programs or internet about the weather conditions for the

next 24 hours or the next days, but we cannot be sure that it will happen 100%. The accuracy of prediction increases when we shorten the search time interval. However, we learned to accept the uncertainty related to weather forecast. Another known example of probabilistic thinking is games people play in casinos. There are some general rules but the outcomes cannot be predicted in a deterministic way. Decisions must be made by evaluating the risks associated to each possible outcome and considering the maximum accepted risk level. *“The best way we know to think systematically about judgment is to learn the fundamentals of probability theory and statistics and to apply those concepts systematically when we make important judgments”* (Hasties & Dawes, 2001, p.167). In schools many of us solved hundreds of problems in the mathematics, physics and chemistry courses. All of these problems have in common the following: they were formulated by some authors; they had well-defined formulation containing all necessary data and information; there were known equations and formulas to solve them; they had only one solution. We had to apply the known mathematical equations and find their solutions. As managers in real life, we find out that everything is different. There are no *a priori* formulated problems. We have to identify and formulate them in concordance with our goals. These formulations do not have complete data and information. And, all of these problems have many possible solutions. Incomplete information and knowledge about the real situations and future possible events leads to uncertainty. Thus, *“The fundamental fact underlying probability reasoning is generally assumed to be our ignorance. If it were possible to measure with absolute accuracy all the determining circumstances in the case it would seem that we should be able to predict the result in the individual instance, but it is obtrusively manifest that in many cases we cannot do this”* (Knight, 2006, p.218). According to Knight there are three possible situations of uncertainty in which we make decisions using probabilities: 1) *a priori* probability, the case in which we deal with an absolutely homogeneous classification of instances completely identical except for really indeterminate factors; 2) statistical probability, which is based on empirical statistics and computed frequencies; and 3) estimates, when there is no valid basis for classifying instances. Taleb (2007) added to this classification a fourth situation described by rare and highly improbable events. He introduced the concept of Black Swan for such events characterized by rarity, extreme impact, and retrospective probability: *“Black Swan logic makes what you don’t know far more relevant than what you do know. Consider that many Black Swans can be caused and exacerbated by their being unexpected”* (Taleb, 2007, p.xix). Future challenges us with all of these uncertain situations and thus probabilistic thinking becomes an important component of the strategic thinking.

Chaotic thinking model

Chaotic thinking is the most advanced model of thinking along the uncertainty axis. Due to its deep roots in nonlinearity this model has also a complexity dimension. However, its positioning on the uncertainty axis reflects much better its capacity to reveal the interaction between order and disorder, deterministic behavior and unpredictable outcomes (Bird, 2003; Gleick, 2008; Stacey, 2001). Edward Lorenz, a mathematician intrigued by the weather unpredictability, discovered that changing iteratively the initial conditions of a nonlinear system of equations one obtain a mathematical system with a totally new behavior. Mapping the behavior of a nonlinear system formed only of three equations describing the weather, Lorenz found that *"the map displayed a kind of infinite complexity. It always stayed within certain bounds, never running off the page but never repeating itself, either. It traced a strange, distinctive shape, a kind of double spiral in three dimensions, like a butterfly with its two wings. The shape signaled pure disorder, since no point or pattern of points ever recurred. Yet it also signaled a new type of order"* (Gleick, 2008, p.30). This new order represented by the double spiral became known as the Lorenz *strange attractor*. Thus, chaotic thinking should be able to understand this new type of order in disorder base on the behavior of nonlinear systems that demonstrate a sensitive dependence on initial conditions. Future is totally unknown but it depends on present, which means that it is sensitive to initial conditions. Understanding the interactive phenomena that can generate chaos one can be better prepared for creating good strategies for the future. That means that chaotic thinking is a part of the strategic thinking spectrum.

Innovation dimension

Template thinking model

Template thinking is the simplest way of solving problems from the perspective of innovation. It is based on well-established structure or template one must follow. For instance, to write this paper I had to follow a given template. That makes my work easier, and in the same time it assures a necessary uniformity for all the papers sent for publishing in this journal. Like the inertial thinking that contains no time, template thinking contains no innovation since the structure of the template is given. Innovation is needed only in the beginning when the template is created. After that there is no innovation. In this mode, the mind must understand the template requirements and to obey them. Template thinking can be also an algorithm

or a routine work. Since future is not a repetition of the present time, strategic thinking does need no template thinking.

Intelligent thinking model

Intelligent thinking reflects the capacity of the decision maker to choose the best solution out of a multitude of possible solutions for a given operational context. That means the power of analysis and combination such that for a given set of requirements to find out the best answer. Frederick Taylor (1998, p.9) made this idea the manifest of his scientific management: *“Now, among the various methods and implements used in each element of each trade, there is always one method and one implement which is quicker and better than any of the rest. And this one best method and best implement can only be discovered or developed through a scientific study and analysis of all the methods and implements in use, together with accurate, minute, motion and time study.”* Since all these possible solutions are based on known knowledge, innovation refers here only to the way of processing that knowledge and not to creation of new knowledge. Intelligent thinking is concern with the process of finding the best solution by combining indifferent ways known possible solutions and not by creating new knowledge to promote new ideas. It can be illustrated by lateral thinking, a process that *“involves restructuring, escape and the provocation of new patterns”* (De Bono, 1970, p.11). Intelligent thinking is very flexible. It searches for many alternatives of emergent problem and for many possible combinations of all known data, information and knowledge such that from all these combinations to produce the best answer. It is necessary in strategic thinking since it has the power of optimizing solutions by restructuring patterns.

Creative thinking model

Creative thinking model is the most advanced model along the innovation axis. Creative thinking is capable of generating new knowledge for new problems and contexts (Nonaka & Takeuchi, 1995; Nonaka et al., 2008). New knowledge is essential when managers are confronted with new problems for which old solutions don't work anymore. *“The creation of strategy requires invention more than calculation, from connected minds that are able to see a different future. So managers who rely on calculation tend not to create strategies so much as copy them – from other organizations, especially what is fashionable, or by extrapolating, with modifications, the strategies of their own organization”* (Mintzberg, 2004, p.99). Innovation can be done in small steps or in big jumps. Christensen (2003) calls the first way incremental innovation, and the second one disruptive innovation. Incremental innovation implies small investments and as a consequence small risks, while disruptive innovation means risk taking at a higher degree. Disruptive

innovation is based on disruptive technologies and cultures that are not averse to risk. Creative thinking is essential for achieving competitive advantage and changing the business battlefield structure. Companies like Apple, Microsoft, Google, 3M, Facebook, Alibaba, and others became successful for stimulating creative thinking and implementing creative strategies. Creative thinking model must be a part of the strategic thinking spectrum.

Strategic thinking is a complex process which can be decomposed into a spectrum of monochromatic thinking models, which have been presented above. Based on their features and on the future requirements I consider that the spectrum of strategic thinking should contain the following models: entropic thinking, nonlinear thinking, systems thinking, probabilistic thinking, chaotic thinking, intelligent thinking, and creative thinking.

Research design, results, and discussions

The purpose of this empirical research is to evaluate the level of strategic thinking of students enrolled in economics and business in the main universities in Romania. I considered both undergraduate and graduate students. I developed a questionnaire containing 50 items able to reflect the whole strategic spectrum described above. After a pilot testing, I improved the formulation of some items and reduced the total number to 47. For evaluation I used the Likert scale with 5 possible choices, from totally agreement to totally disagreement. There were some items for students' identification: gender, age, undergraduate/graduate, university, and rural/urban area. We distributed 5000 questionnaires to all important schools of economics and business from Romania, and we received back a number of 3240 questionnaires (64.8%). Data from these questionnaires was processed by using a SPSS program. In the first part of our analysis we performed average computations for each thinking dimension and categories of students. In the second part, we performed for each dimension a factorial analysis to identify the main factors which influence the way of thinking of our students. In Table 1 there are average values for strategic thinking dimensions corresponding to undergraduate and graduate students. In Table 2 there are average values for strategic thinking dimensions corresponding to male and female students. In Table 3 there are average values for strategic thinking dimensions corresponding for students coming from urban and rural areas.

Table 1. Average values for strategic thinking dimensions for undergraduate and graduate students

Dimensions	General	Undergraduate	Graduate
Time	3.21	3.18	3.30
Complexity	2.68	2.65	2.73
Uncertainty	2.53	2.52	2.55
Innovation	2.86	2.82	2.96

Results show that for the scale of strategic spectrum from 1 to 5 for each dimension, students have a relatively low level of strategic thinking. The highest values are obtained for time dimension and the lowest values for uncertainty dimension. For each dimension graduate students demonstrated a better understanding of strategic thinking as a result of both university education and working experience.

Table 2. Average values for strategic thinking dimensions for male and female students

Dimensions	General	Male	Female
Time	3.21	3.22	3.21
Complexity	2.68	2.74	2.65
Uncertainty	2.53	2.62	2.50
Innovation	2.86	2.83	2.87

Results presented in Table 2 demonstrate that there are no significant differences between male and female students.

Table 3. Average values for strategic thinking dimensions for students coming from urban and rural areas

Dimensions	General	Urban area	Rural area
Time	3.21	3.24	3.09
Complexity	2.68	2.71	2.52
Uncertainty	2.53	2.56	2.39
Innovation	2.86	2.89	2.72

Results presented in Table 3 show a relative difference in favor of students coming from urban area. That means that living in big cities is more complicated than living in villages and stimulates somehow strategic thinking.

Performing a factorial analysis for all the data related to time dimension, we got the following conclusions: a) students are focused mostly on solving daily problems, and not on thinking for the future; b) students have a strong

inertial thinking and fear changes; and c) students consider that events may repeat themselves and that they can use the old solutions like in the past. For instance, for the item *In solving problems I use always the successful solutions from the past* the average value is 2.76, which demonstrate a clear dominance of inertial thinking. These results should make professors to question their work and students curriculum, in order to improve business education from strategic thinking point of view along the time dimension.

Performing a factorial analysis for all the data related to complexity dimension, we got the following conclusions: a) students prefer simple problems and easy way of getting their solutions; b) students think mostly in a linear way, ignoring the nature of the problem; c) nonlinear thinking and systems thinking are very little developed. For instance, for the item *Efficiency of any process increases when the outcomes are proportional with the efforts done* the average result is 2.13, which demonstrate a clear dominance of linear thinking. I am aware of the power of linear thinking, but business education should contribute much more to the development of nonlinear thinking and systems thinking.

Performing a factorial analysis for all the data related to uncertainty dimension, we got the following results: a) deterministic thinking is dominant; b) students have a high degree of avoiding risks and of reducing uncertainty. Results demonstrate a strong influence coming from culture since in Romania, the index of avoiding uncertainty computed accordingly to Hofstede framework is about 90, a very high value. That shows a clear tendency for deterministic thinking. This conclusion is sustained also by the fact that for the item *I do prefer clear problems, well formulated and with complete data* we got the general value of 1.87! Business education should incorporate new perspectives and study cases able to develop the strategic thinking along uncertainty dimension.

Performing a factorial analysis for all the data related to innovation dimension, we got the following results: a) students prefer job description very clearly detailed, with minimum requirement for creativity; b) in management, controlling is more important than knowledge creation; c) there is a general fear for new problems and change. For instance, for the item *Not everybody in a company can create new solutions* got an average value of 2.12 which shows the belief that knowledge creation in a company can be done only by some talented people. Thinking in terms of entrepreneurship and strategic thinking, business education should improve its contribution to developing an innovation mind.

Conclusions

The purpose of this paper is to present a theoretical framework of strategic thinking and to use it in evaluation of the way students enrolled in business education programs think for the future. Based on metaphorical analysis I considered strategic thinking a complex process that can be decomposed into a spectrum of monochromatic thinking models. I would like to emphasize the fact that this is not a linear decomposition but a nonlinear one as a continuous spectrum of thinking. For spectrum analysis I considered four main dimensions: 1) time, since future needs time orientation; 2) complexity, since future problems will be more complex than problems we face today; 3) uncertainty, since future does not exist as a physical entity but as a mental construction containing probable events; 4) innovation, since future will bring new problems for which old solutions are not good anymore. For each dimension I defined three main thinking models, from the simplest to the more elaborated ones. These thinking models are the following: 1) on time dimension – inertial thinking, dynamic thinking, and entropic thinking; 2) on complexity dimension – linear thinking, nonlinear thinking, and systems thinking; 3) on uncertainty dimension – deterministic thinking, probabilistic thinking, and chaotic thinking; 4) on innovation dimension – template thinking, intelligent thinking, and creative thinking. Based on their features, the following models compose the spectrum of strategic thinking: entropic thinking, nonlinear thinking, systems thinking, probabilistic thinking, chaotic thinking, intelligent thinking, and creative thinking. I would like to stress the fact that in our mind all of these models may co-exist. The issue is that in decision making about the business future to have a dominance only from the thinking models belonging to the strategic thinking spectrum.

In the second part of the paper I presented an empirical research based on a questionnaire containing 47 items and being distributed to 5000 students enrolled in undergraduate and graduate programs of economics and business, in the main universities in Romania. Data collected has been processed using the specialized software SPSS. Results show that strategic thinking is not well developed, and simple thinking models still play an important role in their judgment. That means that business education programs should be improved by introduction of new courses able to stimulate advance thinking models. For instance, beyond fundamentals of business management students should study change management, entrepreneurship, decision making in conditions of uncertainty, knowledge management, critical thinking, and strategic thinking. Even the courses of strategic management should go beyond analyses and generic strategies toward ways of thinking and making decisions in unpredictable and dynamic social and business environments.

Acknowledgement: I would like to thank to my colleagues Ivona Orzea, Ruxandra Bejinaru, and Valentin Hapenciuc for helping me in collecting and processing data from questionnaires.

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