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BIFURCATIONS OF EXPONENTIAL GROWTH OF REFERENCE MODELS

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Abstract: The article discusses the determinants of taking power, its formula and effects on the social structure, and the perception of value. The analyses were conducted in the ontological trend using field interpolation in game theory. The nature of the work has the characteristics of intuitionist polemics. The main aim of the paper is the issue of a broadly understood reference model in the aspect of options for its creation and redesign. The analyses were conducted by identifying topologically uniform structures and cluster structures in relation to the typing of business model forms. The presented content may be helpful in design analyses of spatial order, as well as infrastructural and management projects. Initiating a mathematical and visualization perspective and a design research methodology formulated on this basis may constitute a new research perspective using the topological measure of exponential growth. The article is a theoretical discussion based on a literature review that covers the issues of cost management with the use of reference models.

Keywords: bifurcation, exponential growth, functional, game theory, multiple reality, reference model

JEL Classification: A12, A13

Introduction

The principle of the reason for existence (ultimate reason), as a general expression of causality, is the "embedding" of our knowledge in a contingent, variable, and pluralistic reality (Krąpiec, 2000, p. 107). In this sense, the logic of ruling has no

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translation into a rational system of values, and its main exponent is the desire to dominate and take over space from the weaker. According to social structures, only a few can enjoy unprecedented wealth at the expense of the vast majority of those who work for this existence, and the larger the zone of poverty or slavery, the greater the scale of wealth for the chosen ones. Everything in the world around us evolves, the invariant, i.e., functional nature of human behavior remains the ambivalence of power, money, and pleasure at all costs, regardless of the costs of the human and natural systems subordinate to us, to which we usurp the right by creating our own rules of social order (Grygiel, 2021, pp. 160-180).

Historians, political scientists, and philosophers deal with man in the context of his social class affiliation, when they talk about the agricultural, intelligentsia, or the so-called middle class. Analogously to European thought, references to zones, classes, castes, and the general affiliation of an individual to social groups can be found in secular and religious totalitarian ideologies. Why? Because prosperity, as it sounds, is a commodity. To have it, you either have to work hard in a democratic system or take over the potential of others in totalitarian systems. According to the assumptions of Fermi zones, you have to have a specific spin to get out of your location. The question is: where do you really want to be, where with whom, when, in what place, and in what place according to what rules? In the case of an infinite time horizon, the optimal strategy is sought among stationary strategies. The optimal stationary strategy is defined as the strategy with the largest value of q, i.e. with the largest increase in the expected payoff in the next step after achieving stationarity (Decewicz, 2011, s. 74), (1):

$$v_i(n) = q_i + \sum j \in S \qquad (1)$$

In each of the decisions assumed n (changes), we can obtain the expected payoff v_i increased by the options of subsequent changes (payoffs) – if we choose for each task the assignment of possible solutions of the state $j \in S$. In order to identify the options of moving to a higher stage (zone) of existence and making decisions, it is necessary to determine the environmental conditions, the category of the zone, the potential of the unit and its attachment options, and the chosen strategy that is to serve this purpose, creating a reference model of correlation and assignment in a given zone.

The article was prepared using the method of critical review of the existing scientific literature. The selection and analysis of the literature were based on data obtained from the Scopus database and from secondary sources.

The aim of the study is to make the presented content useful in design analyses of spatial order, infrastructure, and management projects.

Field interpolation in game theory

In order to get out of the lower zone, the particle must have a specific spin, or a specific energy of getting out of a given space at a given speed of this change, momentum. In the real world, we are talking about relational systems, the possibility

of connecting to someone stronger from a higher zone, or taking over power and displacing status. Nevertheless, it is precisely the aforementioned rituals of behavior anointed by the superior power (secular or ecclesiastical), caste, regime, and tyranny that limit the individual's drive to achieve happiness and satisfaction with the quality of life. The mutation operator marginalizes the loss options by marginalizing the gain p (payout) in the inverse of the max function operator j - condition, x_i player (2):

$$\prod_{i=\infty}^{n} \prod_{j=1}^{n} p_i(x_i) \rightarrow \min \forall f_i \qquad (2)$$

Each player has a set limit on decision-making strategies and a winning condition p_j. relative to their adaptation j. The value of the probability of winning (while minimizing losses) depends on the behavior of other players, assuming that they will play:

1. Against each other, making the most probable equilibrium the antagonistic equilibrium in a tautological distribution.
2. Against each other in dissimilar, multiple groups, where uncertainty equilibrium will be most likely. P
3. In agreement with the group (both single and multiple) in opposition to the antagonistic option.

The effectiveness of strategy implementation is determined by a clearly defined goal but also by the options for changing it through a mixed strategy. As Wolny (2006, p. 70) points out, if there is no possibility of exchanging payoffs between players, then, in general, it is not possible to aggregate assessments of decision variants, so the rational approach is to analyze the game from the point of view of minimizing payoffs (benefits), i.e., ensuring a guaranteed win by assuming that the other players will choose strategies in such a way as to minimize the payoff of a given player. The mapping of multivalued functions from set X to Y can be written as: γ: $X \Rightarrow Y$, therefore, the boundary conditions are established (Płatkowski, 2012, p. 28), (3, 4):

1^0 The mapping graph

$$\gamma : E \Rightarrow F,\ E,\ F \subset R^m \text{ is a formula } Gr\,\gamma := \{(x, y) \in E \times F : y \in \gamma(x)\} \qquad (3)$$

2^0 The mapping

$$\gamma : E \Rightarrow F,\ E,\ F \subset R^m \text{ is closed in x if } (x_n \rightarrow x,\ y_n \rightarrow y,\ y_n \in \gamma(x_n)) \Rightarrow y \in \gamma(x) \qquad (4)$$

An if (Kakutani 1941, p. 458):
X - a nonempty, compact, convex subset of n-dimensional Euclidean space < n, f: X $\Rightarrow$ X -mapping t., that conditions (4):
1. $\forall x \in X$ the set f(x) is nonempty and convex (we say that the mapping f is convex).
2. The graph of f is closed [i.e. for all sequences x_n, y_n such that $x_n \rightarrow x$, $y_n \rightarrow y$, $y_n \in f(x_n)$, occurs $y \in f(x)$].

Then the mapping f has a fixed point (i.e. $\exists x \in X: x \in f(x)$.) Therefore, in the topological space y_m (X, γ) interior int A of the set is the largest open set contained in A, in turn, the closure of class A of a set A is the smallest closed set (in the sense of inclusion) that contains the set A. The assignment of elements x_i to the open set and/or open int A depends on the rank of the assignment value and the payment condition. In the pyramid of belonging, the largest group is the most unconscious and poor classes, while those distinguished by themselves stand on the pedestal, those exercising superior power, or in the created sense, close to God. Since each of the zones has a similar potential shared within it, those who have the most to divide the goods in a given zone get the least. Therefore, it is in the interest of the authorities to have as many useful slaves as possible.

The lower the level of existence we are at, the harder it is for us to get out of its bottom, and the lack of internal energy (spin) makes it harder for our descendants to start. Of course, the start-up and the moment of its initiation are important. In the vicious circle of powerlessness, and lack of spin, the individual begins to be only the background of the game for other players (5):

$$\prod_{j=1}^{n} p_i(x_i) \rightarrow \min \prod_{i=\infty}^{n} \prod_{j=1}^{n} f_i(x_i) \qquad (5)$$

The winning options of the selected player tend to minimize the solutions according to the action selection criteria f_i.

In the above philosophical and historical analyses, there is no place for the individual at all, and yet every community or society consists of individuals (atomization), and this thread has escaped the attention of thinkers (Weiss, 2003, p. 49). There is a strong convergence between the functional principles of societies and individuals and the atomistic, cosmological construction, or the principles of physics. The assumption that the authors of the article want to prove is that politics is the main creator of social changes, economics is its tool, and all processes taking place in the global economy can be explained by interpolative mathematics. In the history of the development of societies, there are utopian aspirations for all kinds of equality and equal distribution of all kinds of goods; which, however, are not consistent with human nature itself, nor with the surplus of the human population itself. Since the dawn of time, homo sapiens has shown inexhaustible ingenuity in rejoicing in the suffering of others, taking over their happiness, access to nature, their rights, property, health, and the prospects of a decent life – theirs and their descendants; or limiting their ability to save their health, reproduce, and most importantly – effectively limiting their knowledge of reality, consciousness, or taking away human rights. To this end, with all possible actions and available tools of power: army, religion, administration, law, financial systems, formulas of conflict, and war – in their own imaginary self, holders of power – appointed themselves the rulers of souls, recognizing themselves as God. Analogies can be found both in royal families, when marriage contracts were established within families; or outside the monarchy – business arrangements – within the clan of family and business groups.

Value evaluation analyses can be conducted in the historical (temporal), geopolitical-spatial, cross-sectional stream: selecting the influence of politics on the economic development of the region, and the world. Subjective and objective perception of events, i.e. present truth and precision versus abstraction of mental creation of the future. Because "natures, which make up concretes, are hierarchically ordered from the concrete, narrowest nature, haecceitas (...) to the widest nature, the all-encompassing nature of being". And the truth of human cognition is one of the areas of truth, which can be discussed in the existential order – as ontic truth, in the moral order, as the truth of moral conduct in accordance with the rules of morality, and in the cognitive order, as the compliance of our cognition with reality grasped cognitively (Krąpiec, 2000, p. 115). Innovative strategies for taking advantage of opportunities are based on several important processes and simple rules that regulate them (Obłój, 2002, pp. 163-165):

- the first of them are executive rules (how-to-rules), which specify how the main processes are ordered in the organization and what the main decision-making criteria are;
- the second is boundary rules, separating opportunities worth using from those that the company should give up;
- the third category are rules that prioritize the importance of strategic goals;
- the fourth set of rules concerns decision-making in time, to synchronize the decisions and actions taken with specific opportunities occurring in the environment;
- the fifth set of rules concerns the criteria for abandoning an action.

The development path often has many starting points, often deviates and runs in the wrong direction, and depends on many accidental encounters and changes of direction (Morgan, 2001, p. 94). What seemed obvious at first ceases to have reference to real changes taking place in the network. At the same time, development and changes are characteristic of the herd growth model, and hence the system of equations with the same parameters a, b, c, d and the same initial states must take into account different parameters g and h. According to the analyses of interactions in the network and the creation of value in it, we can use assumptions based on binary tautology to present the above (Borel, 1914), (6):

$$x(\phi(x, y) \rightarrow y(\varphi(x, y) \wedge -\phi(x, y))) \qquad (6)$$

The quantifier calculus in notation (6) means that for each field of estimates φ (x, y) of optimal actions in the network, there is a possibility of its application to real conditions, when there is a decision area determined by variables x, y. Since x, y belong to the decision space in the field x, the quantifier in relation to the estimated field x, y can take a negative value. Of course, the above notation referring to the assignment of variables in a given field has a binary characteristic, and at the same time, the formula (6) referring to the variable y in the space x indicates the possibility of assigning the notation to the estimated function in the predator-prey area. The concept of risk minimization in a multi-criteria, finite decision problem is based on

the analysis of the problem on the basis of the theory of multi-person, non-cooperative games, the analysis of which is based on the rules of game theory. The basic assumption of building the model is to identify the player with the decision-maker, who in a special case may be a collective and considers the problem from the point of view of each criterion separately (Wolny, 2006, p. 69). Given that the main quantifier of the response field evaluation is power, the estimation of the response rank is reversed ("for every good deed, you will meet a deserved punishment").

In the sphere of influence, we are bound by the escalation of the domination of selected decision-making units on the fates of millions. Suffering does not ennoble, it is a tool in the hands of the oppressors. And there would be nothing groundbreaking in the above if not for the fact that the negotiation of preference systems gives profit to the chosen ones, at the expense of millions of people with no chance of changing their lost fate. While these rules of the game are common sense and the scale of influence is stable, in the heat of shaping a crisis, common sense decisions lose their value in favor of the preferences of influence of selected spheres (Jakimowicz, 2019). Management is assumed to be the proper use and allocation of resources remaining in the sphere of the decision-maker's property. In the literature on the subject, we find a number of definitions that refer to the directions and philosophies of management. Nevertheless, it becomes crucial in this respect to determine the proper allocation of resources based on the options for obtaining capital, and the speed of its transfer in the conditions of a changing environment, which in consequence should provide the possibility of creating added value. The efficiency of the chain depends on the functionality of its individual links and their location in the entire network system (Kowalska-Napora, 2018, p. 25). Cost can be expressed as any possible loss in the moral, financial, freedom, energy, material, etc. sense. Cost itself can have a philosophical aspect. A philosophical view of profit/loss allows for the ranking of costs in the form of the loss of the option to change. The alternative cost of a given good is the amount of another good that must be given up in order to be able to produce a unit of the first good (Begg et al. 2007, s. 37).

The oscillation between internationalization and nationalization touches on controversial issues of shaping the economic space (see Borowiec et al., 2016; Wydymus & Maciejewski, 2015), and is thus shaped between emotions and economic pragmatism (Kołodko, 2013; 2014), where morality arises from the calculation of one's own interest (Midgley, 1998, p. 31): the first is based on obvious human frailty. People are simply not as prudent or consistent as this approach would assume (...); the second reason is the equally well-known range of good human traits. People who openly make an effort to behave decently act in this way out of a completely different motivation, directly taking into account the claims of others. Value in economics means the net profit that can be brought by the exchange of a given thing; it is measured either by the quantity of goods received or by a certain medium of exchange, usually money. The property or quality of a thing makes it useful (Reber & Reber, 2008, p. 850). Human values are supra-situational goals, acting as principles regulating the life of an individual or a group. In the economic interpretation, value is defined as the utility attributed to an object, determining its price (...). The content

of values is subject to classification according to the motivation they express (Manstead & Hewstone, 1996, p. 701). The political realist wants to protect the autonomy of the political sphere, just as the economists, lawyers, and moralists do in their own fields. He considers benefits in terms of power, just as the economist thinks of benefits defined as wealth, the lawyer thinks of compliance of actions with the law, and the moralist of compliance with the principles of morality (Morgenthau & Thompson, 1985, pp. 13-14). The question then arises: what does "value" mean, what can be the costs of its creation, and as a consequence, can this value be a determinant of an individual's potential? Value, both in the understanding of social and humanistic sciences, but also technical, means something that is a determinant of our efforts, but also their effect, as a set of properties of the expected state. Therefore, it has the dimension of an entity, as matter, and its subjective evaluation. It is therefore difficult to define this value on such divergent planes of understanding the world as economics, sociology, law, and philosophy, which in its quantification does not always provide a measurable picture of the formation of this value. A bigger problem in managing the economic development of units (countries), or their system, is not so much the location, access to deposits, i.e. positional and resource potential, but above all the ability to efficiently and effectively transfer capital (Jakimowicz, 2017; Czekaj & Owsiak, 2014; Czekaj, 2016), where distance does not matter so much, and it is the speed of reaction that guarantees the success of the decision (Kołodko, 2010; Pach et al., 2016). Policy is the degradation of the status quo of the individual versus the actions of secret services, lobbying organizations, big business, and international capital. The ideology that dictates our lifestyle, ideas of what is healthy, good, desirable, beautiful, or fashionable, is shaped by interest groups that derive various profits from it. Thus, we ourselves must take care of our own well-being, not allow anyone to appropriate it, or simply fight for it, or through demonstrations or even war. Your actions aimed at short-term investments in current assets have a long-term impact on value-building achievements (Pluta & Michalski, 2013).

Cluster topology as a growth phenomenology

Selecting optimal solutions does not concern obtaining maximum values, and the solutions themselves do not constitute a reliable answer if they are limited only to space or time.

Until the particles interact with each other, their state seems to be undefined, as is their description. In order to report the course of events and the choice of relations, once you need to have a comparison of states in time, but also options for their changes in a given space of time-space dependence.

A decision space is comparable to another to the extent that the patterns of its evaluation and validation of consequences are invariant in a risk situation (Borel, 1963, p. 76).

Time is a dimension of space in which certain events occur. The more events, the faster it flows. In Latin, the word *decisio* means a resolution (Panc, 2003, p. 82). In general, a decision is understood as an act of choosing one option of action from

among many possible ones (Pasieczny, 1981, p. 87). A decision, through the act of choosing, is the result of a certain mental activity. This process ultimately leads to some resolution, the choice of a specific action (decision in the strict sense), or behavior related to solving a given problem (decision in the broad sense). The act of choice itself will also be included in the decision process (Drucker et al., 2005, pp. 8-9). The dimension of our life, as well as subsequent options of choice, depends on the decisions made and their implementation, both in the sense of an individual, as an entity, and as a generational entity. Who and what we are depends on the country we live in, who and what our parents were like, and consequently what our capabilities and beliefs are. What happens and the intensity of events affect the dimension of time that does not exist. In the literature on the subject, we find definitions of real-time, funnel-time or space-time, and time curvature. Time, which does not exist, is therefore a determinant of what is happening. Events determine its acceleration or deceleration, and each moment of the course of events creates a transformation of displacement in space-time. In the categorization of events and time, we have demagogy of sequences, the absence of zero, that is, the absence of everything through the absence of nothing. Therefore, the attractor of space bifurcation R takes the value $\left|\Delta 0 \equiv n\infty\right| \rightarrow \det \left| 0 \geq 1 \right|$ because the boundary of the space R can be established.

While the Brouwer degree is a definition of a topological image, it functioned as a principle of assigning an element to a set according to the typing of the criterion of compliance. A functional is an image of a relational function in the Gaussian distribution, where we type the extremum of values according to the established objective function. The objective function can be freedom or survival depending on the escalation of the conflict, or taking over power for this purpose. The principle of typing a solution through assignment is not the search for the maximum, but the optimum of the solution through compliance. The functional is a variable quantity whose values depend on one or more functions. The functional of each function (of a certain class) uniquely assigns a certain number (cf. Gelfand & Fomin, 1979, p. 9). In the theory of perspective, a functional is a certain constant, an axiom, a determinant of our action. On this basis, we establish the selection criteria. In ontological space, it will be love, freedom, and self-determination, in fractal space, it will be income, analysis of measurement deviations in a small increase in time (cf. Kowalska-Napora, 2012, p. 121), (7):

$$S_{\det}(x, y) = \arg(x, y) \qquad (7)$$

The functional S in the typing of the solution according to the criteria x,y constitutes the argument of the typing of the solution according to these variables. Theoretically, there always exists such x, as the extremum of the functional being its argument, for which S = constant. Therefore, defining the limit of the function as arg(x,y) cannot be equivalent to its inverse (8):

$$\lim \arg(x, y) \neq \partial \cdot [x, y] \qquad (8)$$

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The argument boundary in any time interval does not determine the ambivalence of the estimated function of quantifiers x and y, because it is an estimated function. Hence, the judgment of the situation and planning for the future must have the context of the economy of thought and rational premises. As Aristotle wrote, since all people choose above all that which is in accordance with their own nature (a just person will choose a just life, and a brave person a brave life, a moderate person a moderate life), so a wise person will choose above all wise thinking, which is the work of this ability. It is therefore clear that according to the most authoritative opinion, wisdom is the greatest of all goods. When you are at the bottom of existence, will anyone extract from you the meaning of being in a lie (?) For the functional (9):

$$S = \int_{t1}^{t2} L(x(t), x'(t), t)dt \qquad (9)$$

solution of the Euler-Lagrange equation (10):

$$\frac{d}{dt}\left(\frac{\partial L}{\partial x'}\right) - \left(\frac{\partial L}{\partial x}\right) = 0 \qquad (10)$$

is the function x(t) for which S is stationary. This means that for small deviations of x(t), S changes insignificantly. This is a necessary condition for S to take an extremum for x(t).

At any given moment, assuming that time can be a determinant of statics, the value of x(t) assumes a certain constant, comparing two systems at any time, the values at a given moment in individual systems have different values. The functional, which is a constant value and equal to 0, determines the growth level of x_1 and x_2 as a function of time.

The shift of points x with a minimal change in S determines the achievement of an extremum. By comparing the changes in the value of x(t), one can estimate the impact of S, the incremental value of t on the estimated quantities. The functional is the values for which we live, health, freedom, dignity, and love, but also the guarantee of maintaining them. So, the functional is a constant in time, which does not exist, because it has a timeless dimension. Let us not allow anyone to take away our happiness in the name of ideals created by those who want to take over our lives to improve their own lives and their own development.

Summary and conclusion

Security policy, especially related to the conditions of business democracy, is currently being depreciated due to its variability, subjection to the rules of the current game of political forces, instability, and connection with immediate, not long-term interests (Zalewski, 2013, p. 45). The concepts of policy and politics are different embodiments of public activity according to a specific goal of citizens' security. After all, policy is, in the simplest terms, actions according to the intended goal,

while politics is an activity for its implementation (Ryszka, 1992, p. 22). In the evolutionary model of the world of flora or fauna, all changes in the area of maintaining the continuity of species concern the adaptation of the individual's genome and the specificity of behavior to changing environmental conditions. Individuals not adapted to the environment not only cannot evolve in their development but also cannot survive and pass on their genes to future generations. Both in the sphere of species in the initial links of the food chain, but also its higher parts, the bargaining chip is the power of ennoblement and flexibility for change. It would seem, therefore, that in these cognitive categories, individuals from the lower parts of the food chain should evolve, provided they are genetically strong enough in their class, and at the same time flexible enough not to be food for the next element of the chain (Banasiak & Szymańska-Dębowska, 2023). At the level of molecular biology, called genetics by homo sapiens, through crossbreeding and selection, we obtain certain more or less random changes in the population, which can lead to the fact that we receive an answer that is a better solution to our problem. In the current constellations, homo sapiens uses normative → negative selection, and its goal is to create the greatest profit for groups privileged by discretion, regardless of the social, economic, and environmental costs.

In the literature on the subject, there are many references to the term selection, usually identified with biology and thus with negative or positive selection. At least what appears in the assessment: positive selection and negative selection raises many reservations and references, to what point can we speak generally about biological selection, and at what levels of worldview or history; finally – at what point does a discrepancy occur between the biological distinction and its constitution for the purpose of a usurpatory takeover of power.

According to the Authors, the goal of the study set at the beginning has been achieved. The presented content should be helpful in implementing design tasks related to spatial order, infrastructure projects, and broadly understood management activities.

References

Banasiak, J., Szymańska-Dębowska, K. (2023). *Układy dynamiczne w modelowaniu procesów przyrodniczych, społecznych i technologicznych*. Wydawnictwo Naukowe PWN.

Borel, E. (1914). *Introduction géométrique à quelques théories physiques*. Cornell University Historical Math Monographs.

Borel, E. (1963). *Prawdopodobieństwo i pewność*. PWN.

Borowiec, J., Wolska, G., & Baran, B. (2016). *Współczesne problemy ekonomiczne: rozwój zrównoważony w wymiarze globalnym i europejskim*. Uniwersytet Ekonomiczny we Wrocławiu.

Czekaj, J. (2016). *Mechanizmy funkcjonowania strefy euro: wybrane problemy*. Krakowska Szkoła Biznesu Uniwersytetu Ekonomicznego.

Czekaj, J., & Owsiak, S. (2014). *Finanse w rozwoju gospodarczym i społecznym*. PWE.

Decewicz, A. (2011). *Probabilistyczne modele badań operacyjnych*. Oficyna Wydawnicza SGH.

Drucker, P. F., Hammond, J. S., & Etzioni, A. (2005). *Podejmowanie decyzji*. Harvard Business Review. Helion.

Gelfand, I. M., & Fomin, S. W. (1979). *Rachunek wariacyjny*. PWN.

Grygiel, W. (2021). *Jak scena stała się dramatem. Filozofia w kontekście teorii względności*. Copernicus Center Press.
Jakimowicz, A. (2017). *Nowa ekonomia*. Wydawnictwo Naukowe PWN.
Jakimowicz, A. (2019). *Podstawy interwencjonizmu państwowego*. Wydawnictwo Naukowe PWN.
Kakutani, S. (1941). A generalization of Brouwer's fixed point theorem. *Duke Mathematical Journal*, *8*(3), 457-459.
Kołodko, G. W. (2010). *Świat na wyciągnięcie myśli*. Prószyński Media.
Kołodko, G. W. (2013). *Dokąd zmierza świat: ekonomia polityczna przyszłości*. Prószyński Media.
Kołodko, G. W. (2014). *Droga do teraz*. Prószyński Media.
Kowalska-Napora, E. (2012). Klaster – ujęcie wartościujące i jakościowe. In T. Sikora & M. Giemza (Eds.), *Praktyka zarządzania jakością w XXI wieku* (pp. 115-133). Wydawnictwo Naukowe PTTŻ.
Kowalska-Napora, E. (2018). Topologia klasterowa w modelu logistyki biznesu. *Logistyka*, *6*, 25-29.
Krąpiec, M. (2000). Elementy filozofii poznania. In P. Gondek (Ed.), *Rozumieć filozofię i naukę* (pp. 67-163). Instytut Edukacji Narodowej.
Manstead, A., & Hewstone, M. (1996). *Psychologia społeczna – encyklopedia Blackwella*. Jacek Santorski & Co.
Midgley, M. (1998). Pochodzenie etyki. In P. Singer (Ed.), *Przewodnik po etyce*. Książka i Wiedza.
Morgan, G. (2001). *Obrazy organizacji*. Wydawnictwo Naukowe PWN.
Morgenthau, H. J., & Thompson, K. W. (1985). *Politics among nations: The struggle for power and peace*. Alfred A. Knopf.
Obłój, K. (2002). *Tworzywo skutecznej strategii*. PWE.
Pach, J., Kowalska, K., & Szyja, P. (2016). *Ekonomia umiaru: realna perspektywa?*. Wydawnictwo Naukowe PWN.
Panc, J. (2003). *Menedżer w działaniu (Vademecum Menedżera)*. C.H. Beck.
Pasieczny, L. (1981). *Encyklopedia organizacji i zarządzania*. PWE.
Płatkowski, T. (2012). *Wstęp do teorii gier*. Uniwersytet Warszawski.
Pluta, W., & Michalski, G. (2013). *Krótkoterminowe zarządzanie kapitałem. Jak zachować płynność finansową?*. C.H. Beck.
Reber, A. S., & Reber, E. S. (2008). *Słownik psychologii*. Wydawnictwo Naukowe Scholar.
Ryszka, F. (1992). *O pojęciu polityki*. Wydawnictwo Naukowe PWN.
Weiss, E. (2003). *Zarządzanie a przedsiębiorczość*. PWSZ w Wałbrzychu.
Wolny, M. (2006). Koncepcja minimalizacji ryzyka w wielokryterialnym problemie decyzyjnym na gruncie teorii gier. In J. Kacprzyk & R. Budziński (Eds.), *Badania operacyjne i systemowe. Metody i techniki* (pp. 69-74). Akademicka Oficyna Wydawnicza EXIT.
Wydymus, S., & Maciejewski, M. (2015). *Liberalizacja i protekcjonizm we współczesnym handlu międzynarodowym*. CeDeWu.
Zalewski, S. (2013). Polityka a strategia bezpieczeństwa. In J. Gryz (Ed.), *Strategia bezpieczeństwa narodowego Polski* (pp. 44-61). Wydawnictwo Naukowe PWN.

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BIFURKACJE WZROSTÓW EKSPONENCJALNYCH MODELI REFERENCYJNYCH

Streszczenie: W artykule przeprowadzono dywagacje nad uwarunkowaniem przejmowania władzy, jego formułą oraz efektami w strukturze społecznej, postrzeganiem wartości. Analizy poprowadzono w nurcie ontologicznym z wykorzystaniem interpolacji pola w teorii gier. Charakter pracy ma znamiona polemiki intuicjonistycznej. W artykule przedstawiono zagadnienia szeroko rozumianego modelu referencji w aspekcie opcji jego tworzenia i przeprojektowania. Analizy poprowadzono poprzez identyfikację struktur jednolitych topologicznie i struktur klasterowych w odniesieniu do typowania form modelu biznesu. Prezentowane treści mogą być pomocne w analizach projektowych ładu przestrzennego, jak również projektach infrastrukturalnych, zarządczych. Zainicjowanie spojrzenia matematyczno-wizualizacyjnego i sformułowanej na tej podstawie metodyki badań projektowych może stanowić o nowym spojrzeniu badawczym z wykorzystaniem miernika topologicznego wzrostów eksponencjalnych.

Słowa kluczowe: bifurkacja, wzrost eksponencjalny, funkcjonał, teoria gier, rzeczywistość wieloraka, model referencyjny