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RESEARCH ARTICLE

BLACK SWAN METAPHOR AND CHAOS MANAGEMENT INTERACTION

Siyah Kuğu Metaforu Ve Kaos Yönetimi Etkileşimi

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ABSTRACT

In many branches of social sciences, it is a dominant approach to make predictions or predictions about the future based on the qualitative or quantitative observations and data put forward using systematic models. The Black Swan Metaphor has been used for a long time as a response to the mainstream statistical models that are loved and favored by heterodox economists and social scientists, and are always convinced by their outcomes, and their results. In this study, firstly, discussions about the production of scientific knowledge with the Black Swan Metaphor are included. Then, explanations were made to draw attention to the relationship between Metaphor and Chaos Theory.

Keywords: Black Swan, Chaos Theory, Business, Scientific Thought, Induction.

ÖZET

Sosyal bilimlerin pek çok dalında, sistematik modeller kullanılarak ortaya konulan nitel veya nicel gözlem ve verilerden yola çıkarak geleceğe ilişkin tahmin veya kestirimlerde bulunulması hâkim bir yaklaşımdır. Siyah Kuğu Metaforu, ana akım özellikle heteredoks iktisatçılar ve sosyal bilimciler tarafından sevilen ve her fırsatta tercih edilen istatistiksel modeller ve bunların sonuçlarına her zaman ikna olanlara yönelik bir tepki olarak uzun zamandır az kullanılsa da vardır. Bu çalışmada öncelikle Siyah Kuğu Metaforu ile bilimsel bilgi üretimi konusundaki tartışmalara yer verilmiştir. Ardından Metafor ile Kaos Teorisi arasındaki ilişkiye dikkat çekilmek üzere açıklamalar yapılmıştır.

Anahtar Kelimeler: Siyah Kuğu, Kaos Teorisi, İşletme, Bilimsel Düşünce, Tümevarım.

1. INTRODUCTION

The ongoing debate on the variety of methods in the analysis of issues and facts that science considers as a problem continues. Considering the economic literature, it is seen that the dominant tradition is based on the quantized technique and results. Of course, it may be wrong to advocate the proposal of the Black Swan for every situation, or to claim the opposite is a similar mistake. On the other hand, it can be argued that Black Swan should not be forgotten and to be considered while trying to determine the position by guessing about the unknown based on the known and observed situations and results.

In the scientific world, the Black Swan metaphor can be said to be a challenge to the claim that scientists can conclude that all swans are white with inductive reasoning. Modern philosophers, Bertrand Russell (1870-1970), in his discussions on "Induction" in the Problems of Philosophy (1918-1922), Karl Popper, owner of the "Falsibility Principle" in "The Logic of Scientific Discovery (1934) (1902-1994) and Rafael Sabatini (1875-1950) questioned the inductivist generalizability in "Black Swan (1932)". It was Nassim Nicholas Taleb, who carried the metaphor to the present and put forward a new awareness in this regard.

Scientifically, chaos means unpredictable irregular behavior of nonlinear systems. Chaos Theory, on the other hand, suggests that regularity is irregular rather than the regular in the physical world. Chaos Theory has made it possible to explain the reasons for the emergence of irregular systems with the help of fractal geometry. When the impossibility of the Black Swan metaphor and the propositions of the Chaos Theory are evaluated together, there is a paradox. Because the reference of the known reality is formed by observations and experiments, and chaos still occurs.

2. BLACK SWAN METAPHOR

The validity and accuracy of qualitative or quantitative findings obtained under the guidance of many theories, theories and models related to scientific reasoning are generally accepted. However, the "Black Swan Metaphor" has been proposed to reveal how fragile observation and information about the events that are considered to be "unlikely" to occur according to the description of "general acceptance" and according to Taleb (2007).

It is a very old idiom as the "Black Swan" argument, which is used in the misunderstanding of judgment, proposition and theory making by centering itself and its thoughts. The Roman Poet Decimus Iunius Iuvenalis (Juvenal), who lived in the 1st century, made this rhetoric as a pretense to refer to the natural fragility of any thought system. Juvenal expressed the impossibility by saying “Black Swan” to express a phenomenon or situation (to reinforce the “generally accepted”) that is believed to be impossible (to reinforce the “generally accepted”), to describe the special paradigm and certainty of the whiteness of swans (Panova). 2006: 23-25; Haase, 2013: 6). Moreover, Juvenal and many others who have contributed to science for centuries have adopted the same approach. Juvenal would continue to be right if the Black Swans in Australia were not discovered (Aldous, 2011).

The Black Swan Metaphor has been used for a long time as a response to the main statistical models that are loved and preferred by every occasion, especially by heterodox economists and social scientists, and always convinced of their results. It is Joan Robinson who used this metaphor for the first time in the academy, who entered the modern literature from the world of economy and finance. Robinson received the Economic Philosophy (1962) at the entrance of his work, "All swans are white ... until Australia is discovered!" (Harcourt & Kerr, 2009: 23-25; Runde, 2009: 494).

In the scientific world, the Black Swan metaphor challenges scientists' argument that inductive reasoning can conclude that all swans are white (Murphy and Conner, 2012: 331-332). Modern philosophers, Bertrand Russell (187-1970), in his discussions on "Induction" in the Problems of Philosophy (1918-1922), Karl Popper, owner of the "Falsibility Principle" (1902-1994) and Rafael Sabatini (1875-1950) questioned the inductivist generalizability in “Black Swan (1932)”. The American writer, Nassim Nicholas Taleb, with the book “Black Swan - The Impact of the Unlikely Appearance” (2007), which carries the metaphor to the present and suggests a new awareness on this issue (Callahan, 2008; Hajikazemi, et al., 2016: 185-187).

Black Swan largely rejects, if not all, of the inductivist implications that any event / situation experienced in the past may occur in the future, by processing the experience and gains from the past and some data with technical methods about the future, and to obtain the results obtained as a guide. Repetition of the results of "Russell's chicken" or "Pavlov's Dog" should not be expected. As a matter of fact, Taleb criticizes the social scientists who think that they consist of the abstractions and richness of the real world and try to place the real world in the models they develop. In Popper, he also believes that science can never verify the hypotheses that he claims to claim, but only falsifies them (Taleb, 2004: 2007; Werther and Herget, 2013).

3. CHAOS THEORY

The beginning of the phenomenon of chaos began with the history of causality and determinism. In the 300s BC, Aristotle established rules based on his observations for the movement, which were later developed by Isaac Newton and Johann Kepler. According to Aristotle; objects fall with acceleration proportional to their weight. In order for an object to move, a constant force must act on it. Therefore, the rule of causality is valid (Holzner, 2005: 64).

Chaos Theory suggests that regularity is in disorder rather than the regular in the physical world. As a theory of physics, Chaos paves the way for expanding its borders and thus making new philosophical interpretations. In today's scientific sense, chaos; It means unpredictable irregular behavior of nonlinear systems. Nonlinear systems are systems that do not move in a straight line in the physics world and where the cause-effect relationship cannot be determined. For example, when a stone is dropped from a high place, it is a deterministic event (cause-effect). However, the movements of fluids, weather, sociological events, fluctuations in the financial system, human behavior, abstraction etc. examples of nonlinear systems are. Such systems can now be studied with Chaos Theory, and Chaos Theory is a scientifically young theory (Strogatz, 1994: 38; Yeşilorman, 2006: 84-85).

Chaos Theory has made it possible to explain the reasons for the emergence of irregular systems with the support of fractal geometry. Most work on the theory of chaos begins with the quadratic logistic equation (a nonlinear equation that exhibits very complex phenomena when repeated). Logistic equations are mostly used to model processes that can be detected quantitatively. Chaos, on the other hand, is a state of confusion and disorder and there is a lack of organization or order (Kattan, 2012: 3-4). Chaos theory is essentially a field of study mathematics that predicts causality and practices in various disciplines such as physics, economics, biology and philosophy. Chaos theory, in its popular form, examines the behavior of dynamic systems those are very sensitive to the initial conditions of an effect called a butterfly effect. Small differences in initial conditions then give a wide range of different results for chaotic systems. This makes it generally impossible to be prepared for a long-term forecast or an expected but unknown event. Although the events are deterministic, their developmental conditions or emergence are random or entirely new, making it impossible to predict (Strogatz, 1994: 1-4).

Chaos is a concept that has existed since mythologies, but its place in modern science is relatively new. Chaos theorists' arguments lie behind the views that question causality and undermine the trust in Newtonian Mechanics, the pioneer of this theory. Today, Chaos Theory has attracted attention by scientists working in various fields as an interdisciplinary field of research. The basic propositions of Chaos Theory are as follows (Uçar, 2010: 43).

1. Order creates disorder.

2. There is an order within the disorder.

3. Order arises from disorder.

4. Reconciliation and commitment in the new order manifests for a very short time after the change.

5. The new order reaches an unpredictable state through a self-organizing process.

The concept of Chaos Theory, known as the “Butterfly Effect”, which is a corner stone, was first used by Edward Lorenz in 1961. Lorenz, at the meeting he attended in Washington in 1972, the famous Butterfly Effect; "A butterfly flapping wings in Brazil can cause a storm in Texas," he argued. The butterfly effect is also expressed as the 'Sensitive Commitment to Initial Conditions' feature (MIT News, 2008; Ott, 2008).

4. INTERACTION OF BLACK SWAN METAPHOR AND CHAOS MANAGEMENT

Various theories have been put forward in organizations under the influence of different scientific paradigms regarding management functions. For example, according to organic theories, the organization is seen as a living organism and a system. Accordingly, organizations may get sick, their system may be disrupted, or preventive or restorative treatment or inputs are required to maintain their healthy life. In addition, organizations are framed in classical order theories, and therefore, stability, consistency and sustainability are considered as integral features of the organization and concentrated on the "system" (Fragouli, 2016: 74-75; Namaki, 2018: 39-40).

However, since the mid-20th century, the falsities and chaos paradigm directed to the Newtonian paradigm (effect-response) have seriously affected all organizational theories and patterns. Among these theories, the complex system approaches and chaos theory have formed the basis of another paradigm that alone affects other scientific fields in addition to the field of management. Chaos theory, which depicts complexity, has revealed views that the management time is over with the use of hierarchical and predetermined goals or predetermined logic and precise control. Systems constantly move between different dynamic equilibrium in chaos and disorder conditions, and sometimes a small change (eg Butterfly effect) causes large and fundamental changes in the system. Traditional methods for managing change in the complex and chaotic system are no longer as valid as before, and managers must learn and grasp the changes in these systems (Galacgac & Singh, 2016: 517-518; Fragouli, 2016: 74-75).

According to Buzt (1997), in chaos theory, the world is a nonlinear, complex and unpredictable system. While this theory reveals the disorder or complexity, it speaks of systems that contain some sort of order hidden within it. These systems, too, refer to hidden systems that show irregular, nonlinear, unpredictable behavior and believe in a final pattern of order among all these disorders. It is very difficult to present a model of chaos systems as it is nonlinear and also complex. For this reason, some aspects of chaos systems are tried to be explained with the help of examples and computer models, and in this way, suggestions are recommended in decision making in chaotic situations (Galacgac & Singh, 2016: 516-517; Namaki, 2018: 41).

In the traditional management approach, decision making is a predictable process and failure may occur due to inadequate decision-making techniques, lack of experience and limited knowledge. However, decision making efforts in traditional administration should also be continued. For the theory of chaos assumes that decision making and predictions are unpredictable, so the attempt to predict the future is futile. Because the theory suggests that accurate and complete information cannot be obtained completely, events develop continuously and inconsistently (McKenna, 1997: 6-8).

The complexity, inconsistency, and unpredictability in the proposition of chaos theory lead to questioning decision-making models. Propositions put forward by relying on the highest proportional size of the White Swan are ignored in a sense or the “unlikely” effect of the lowest level of the black swan. However, the fact that it has never been seen before does not mean that there will be no tsunami in the Indian Ocean (26 December 2004) (Hajikazem et al., 2015: 185).

Behavioral scientists tend to work with qualitative and quantitative experiences, focusing on details rather than generalizations, since they want to avoid the uncertainty of the possibility of the most extreme events occurring. This idea is shaped according to culture and education based on linear logic, almost all events are handled with a deterministic perspective. The reason for this is the missing perspective or blindness developed specifically for black swans and arising from human nature. Demand listed the five characteristics of human behavior he held responsible for blindness for Black Swans as follows (Nafday, 2009: 192);

1. People tend to categorize their goals by focusing on pre-determined references from contradictions and possible problems on the road to goals;

2. Because of the illusion of narrative, people create and believe stories to explain events and see facts that are not in the data,

3. Human nature is not programmed to imagine Black Swans,

4. People tend to ignore silent evidence and unusual possibilities for failure;

5. People overestimate their personal information and tend to ignore other incompatible models and thoughts, ignoring other sources of uncertainty.

It can be argued that the five features listed above may also apply to businesses or organizations. Because organizations are abstract assets, these are also managed by human beings. So, some of the human behavior may be reflected in organizational forms. It is possible to list the typical appearance of human behaviors related to unusual situations as follows (Nafday, 2009: 195-197; Financier, 2013);

- ✓ Confirmation Bias; Confirmation bias refers to the tendency to realize what people have confirmed their beliefs or dominant dogma, seeking, ignoring or underestimating the level of interest of contradictions. An example of a meeting between those who believe that the world is not flat in primitive Europe and those who refuse it, such as Galileo Galilei.
- ✓ Illusion of Understanding or the Illusion of Narration; The narrative misconception means a false sense of constipation resulting from limited data and observations and leads to erroneous results. Behavioral psychologists call this phenomenon "anchorage", which is a straightforward look at the future based on the observed events. This very humanitarian tendency to assign patterns to random data and to create explanatory narratives is the way of focusing on the ordinary ones and causing the extraordinary to be ignored.
- ✓ Ordinary Human Nature; It has been observed that people are not programmed to cope with the expectation trap, waiting for some important events that are expected to occur rarely. People are rarely seen an incident, situation, accident, development, etc. Even if they are prepared for, they may not be able to intervene as soon as the incident occurs due to a weakness or deficiency.
- ✓ Silent Evidence; Silent evidence expresses the difference between the sample created for analysis and reality. Causes systematic errors that cause ignoring evidence due to questioning or biased sampling, for example, if there is a margin of error in a thousand, it is evaluated as an acceptable range or object that is incorrect. Or, if one of every thousand planes will fall, people will focus on the other 999 planes.
- ✓ The Error of Variability; People tend to show a tunnel vision that focuses on known sources of uncertainty and ignores the complexity of reality. Since the unfulfilled events cannot be explained, if they do not have enough information for the prediction, the little thing they do or acceleration can cause huge results, namely the butterfly effect. The delusion of variability can be seen as the Gray Swan.

The impossibility of Black Swan can be seen as the root cause of chaos. Is there a way to predict this? The question arises at this point. According to Request (2007), one of the characteristics of Black Swan is that systematic expectations push the chaos out of the space, since there is no probability sign (or because of blindness) that chaos will occur. (Hajikazemi, 2015: 185-186). Murphy and Conner (2012) state that Black Swan has warning signs and these are small events in size. Werther (2013) states that any element in large flows (data, events, information, etc.) that are small, insignificant, or ineffective should be carefully examined. The author argues that small details or endpoints are not considered sufficiently in the plans based on the projections detailed on big events in the project and management models in general, therefore chaos may arise. For this reason, it is necessary to focus on details by moving away from "big" and "main". While trying to predict strategic risks in management, Dodson and Westney (2014) suggests a special focus on the excluded details.

While every detail is not expected to be a trigger for chaos, it is important in a possible Black Swan discovery. The authors proposed a five-step process in the relationship between chaos and Black Swan (Figure 1).

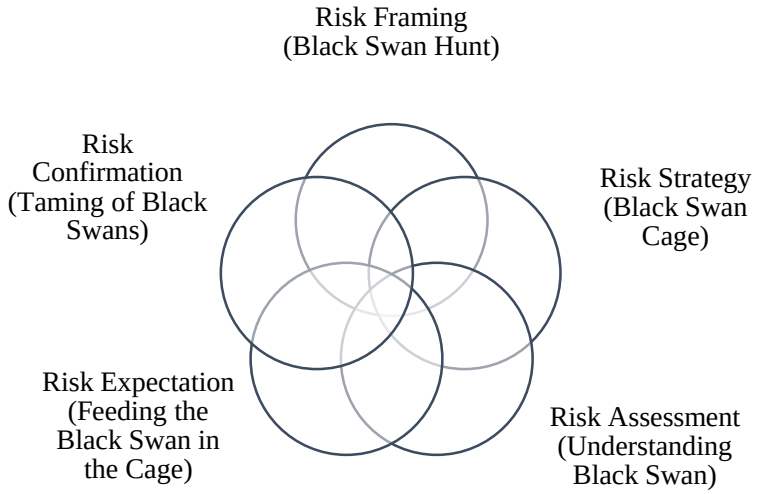

Figure 1: Black Swan Loop

The step description of the Black Swan metaphor shown in Figure 1 in terms of chaos/crisis in stages is as follows (Dodson & Westney, 2014);

1. Risk Framing (Black Swan Hunting): Risk scenarios and their potential effects are framed by details and excluded minorities,

2. Risk Strategy (Black Swan Cage): Development of strategies such as avoidance, mitigation in case of occurrence or allocation of resources according to the risk diameter,

3. Risk Assessment (Understanding Black Swan): An analysis of the costs (time, money, opportunity) reflecting both tactical and strategic risks and their probabilistic plan,

4. Risk Expectation (Feeding the Black Swan in the Cage): Recognizing possible risks, analyzing the effects, spread and results, and regularly updating and maintaining them,

5. Risk Confirmation (Taming of Black Swans): To ensure that possible scenarios are updated according to the data obtained from the details and managed in case of exposure.

At the beginning of the developments leading to Black Swan in a new project, investment or administrative process, the expected realizations based on the dominant references and techniques are in question. Although this is difficult to prevent, the views and evaluations of the stakeholders involved and concerned about the details should be carefully examined. In this way, it may be possible to prevent chaos or minimize the probability of it.

The relationship between black swan metaphor and chaos theory can be seen as paradox. For while Black swan describes the impossible, chaos expresses the inevitable when favorable conditions are realized. In this case, it is possible to develop a judgment such as measures, strategies or analyzes taken. Green (2011) set up a Black Swan detection or reconnaissance and intervention team for managers on this issue, developing reinterpretations in R&D and engineering perspectives, etc. recommends five-stage optimization as in Figure 1 (Dodson and Westney, 2014). On the other hand, benefiting from Bayesian[1] decision analysis can provide a strong theoretical framework for making

[1] Bayesian factor is the most important point of Bayesian hypothesis testing. Despite the classical p value, the Bayes factor has direct interpretation in testing whether the hypothesis is correct. To obtain the ratio of the probability probabilities, the available data is updated with the proportions of the preliminary probabilities of the two hypotheses. However, the Bayes factor depends on the

ideal decisions in collecting information and making signals. However, it is difficult to make a clear and explicit proposition because of the paradoxical structure in the context of both Black Swan and Chaos Theory. This is an approach and awareness, and can guide those concerned to prepare for chaos management and mitigation.

5. CONCLUSION

The Black Swan metaphor expresses the existence of an unexpected, but not impossible chaos event that no one could plan. The Black Swan fails to predict the probability of occurrence of unpredictable events (qualitative and quantitative), thus making the forecasting systematic and cannot be made prognostic (predictable) by experts / analysts. Therefore, it is necessary to focus on details and minorities outside the main size, not risk management techniques in chaos possibilities. The phenomenon is considered as a metaphor in the conceptualizations ranging from Juvenal to Robinson to Lorenz to Taleb. The common point of the ideas in this field is the questioning of digitized data, deterministic viewpoint and inductive generalizability in the production of scientific knowledge. According to demand (2007), the estimate is based on historical information, while Black Swan says it is unlike the past. Therefore, risk-based approaches and cautious (robust, flexible, adaptive, details-oriented, anomaly-based) attitudes must be balanced in order to face the chaos caused by possible black swans.

As a result of the study, it can be argued that the following suggestions should be considered; Modernist thought's current perception of organizations as mechanical and hierarchical structures, and the theories and concepts put forward from this point of view also include linear analysis and are also based on a deterministic perspective. In the organizational context, trying to reveal generalizable judgments, dogma information based on a certain point, interdependence, asymmetric processes, complex structures, relationships, etc. can cause negligence. Therefore, the black swan metaphor should be evaluated within the scope of strategic management in an organizational sense, and a perspective on the outcomes that seem unlikely and their consequences should be put in mind by considering the conventional and generally accepted concepts. On the other hand, the comprehension, interpretation and actions of the majority / pluralism may not produce the expected benefit. Instead of the "Black Swan" approach, which has capitalist and materialist traces and depends on generalization, more attention should be given to the unexpected results in human behavior.

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preliminary densities of the model parameters related to absence and alternative hypotheses. It also requires a high degree of integral calculation. For these reasons, the Bayesian factor is used less frequently than Classic hypothesis testing. (Terzi, Murat and Cengiz, 2008: 321).

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