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CONCEPTUAL MODELLING OF ORGANIZATIONS

The article offers an approach to the modelling of organizations that uses three types of representation: behavioural, normative and conceptual. This approach allows to create meaningful organizational models that adequately represent the complexity of modern organizations and may be useful in the management system development and strategic decision-making.

Introduction and Research Problem

Modern organizations are complex entities, created by people from the different by its nature elements: social, cultural, technical, technological and so on. This complexity allows organizations to exist as integral units and create value for its stakeholders. At the same time, the complexity complicates understanding of the organization as a whole, goal setting for them and purposeful behaviour management [1], [2]. The study is dedicated to the modelling of the organization as a whole – namely to the approach definition which can effectively deal with organizational complexity, providing strategic management.

There is already a certain number of approaches to an organization modelling – namely its presentation using metaphors [3] frames [4] culture [5], or links, creating the whole [6], [7], [8]. Understanding complexity as a key feature of the organization one should consider how a particular approach addresses the complexity.

Giving figurative or generalised theoretical representation, most approaches produce narrow-disciplinary models (sociological, psychological, cultural, etc.). Such approaches often consider some aspects of organizational context, or a combination of these aspects but they do not take into account the complexity and therefore do not allow purposefully adjust the management system and implement organizational changes. For the theory and practice of management it is actual to formulate such an approach which will help to understand and represent the organization that will generalize the available approaches. Such approach will provide an effective explanation of the organization and predict its further development.

The aim of the article: to offer the approach to organizations modelling that will enable a comprehensive representation of any organization, sufficient for performing strategic management: understanding, describing, development and transformation.

Resent publication analysis. The organization is an important invention of the mankind, since the organization enables joint activities on formation of cultural artefacts, creation and accumulation of knowledge. This joint work allows an organization create lot of things that one person is not able to do.

Any organization is a complicated structure, which brings people together for the common goal. The complexity of modern organizations requires the development of specific approaches to the representation of the organization. These approaches would allow simulating the behaviour of organizations and using a model developed to address management problems.

The metaphorical approach to the representation of the organization is using the fact that «all theories of organization and management are based on implicit images or metaphors that lead us to see, understand, and manage organizations in distinctive yet partial ways» [3, p. 4]. Metaphor is a powerful way to explain one thing, experience or phenomenon through another. Using some similar properties, the metaphor is focusing our attention on this property. Herein the paradox of the metaphor lies. Any metaphor helps to see better the specific aspect of the organization, while nudging not to see other aspects.

Morgan [3] proposes to solve the problem of one-sided representation, using several metaphors. Such metaphors can be as widespread metaphors –

the organization as mechanism, body or brain that learns as well as new ones. Among the metaphors the author suggests: the organization as a political system, the organization as a psychic prison, the organization as a flow of social transformation.

Metaphor is a very powerful tool of «reading» and explanation of organization, solves the problem of understanding of the organizational complexity through images. The problem with metaphors is that the choice of the metaphors is rather arbitrary, people understand metaphors in very different ways, and metaphors often necessary to explain.

System approach offers its own tools for working with the complexity of the organization. According to [2, p. 9] «While the organization as a whole is becoming more and more interdependent, the parts increasingly display choice and behave independently. The resolution of this dilemma requires a dual shift of paradigm.

The first shift results in the ability to see organization as a multi-minded, sociocultural system, a voluntary association of purposeful members who have come together to serve themselves by serving a need in the environment.

The second shift helps us see through chaos and complexity and learn how to deal with an interdependent set of variables.» The system approach considers the organization as a whole, focusing on integrity and interconnectivity, and based on five key systematic principles [2, p. 30]: openness, emergent property, purposefulness, multi-dimensionality, counter-intuitiveness. With an understanding of the structural, behavioural and functional aspects of the system, the representation of the system within the system approach formed through direct links and feedbacks, designed to predict the dynamic behaviour of the system in time. At the same time, intended to deal with the complexity, a system approach produces models that are often difficult for understanding and use.

The organization as a frame is another way of describing the organization. According to [4, p. 14], a comprehensive picture of organization becomes possible with the help of four dimensions or mental models (frames). The first frame is structure, which acts as a metaphor for the plant or machine. Key concepts in the frame are rules, roles, goals, policy, technology, environment and the leadership carried out with the help of social architecture. The second frame is human resources, which act as a metaphor for the family. Key concepts in this frame are needs, skills, attitudes and leadership by using the strategy of empowerment. The third frame is political which explores the metaphor of the jungle. The key concepts

are the power, conflict, competition, organizational politics, leadership conducted by advocacy. The fourth frame is symbolic or cultural, which presents the metaphor of carnival, temple or theatre. Key frame concepts are culture, meaning, metaphor, ritual, ceremony, stories, heroes and leadership performed through inspiration.

Multivariate description of the frame approach company can be useful because it attempts to structure the various concepts used to describe organizations. At the same time, the approach is very similar to the presentation through a metaphor, because in fact this approach uses four key metaphors: factory, family, jungle and temple.

The approach to organization as a culture treats the organization as part of society; concept of culture is useful for such understanding. Culture is defined as the way in which a community of people solves problems and settles dilemmas; relates to the prestige of the organization, its professional obligations or features of ethical behaviour.

There are several ways to describe the organizational culture, among them the most known are approaches of Hofstede [9], Trompenaars [10] and Alvesson [5]. Hofstede's model highlights organizational culture values, which affect behaviour through rituals, examples, symbols and practices. Trompenaars's model highlights beliefs or basic assumptions rooted in the organization. The basic assumptions via norms and values influence the visible artefacts such as behaviours.

Alvesson offers to explain organizational culture using metaphors and insists on the necessity of multi-dimensional representation. According to the author, the culture itself consists of many layers and is unique to each organization. It is also possible to represent an organization as a competences holder [11], via organizational behaviour [12] or through the hierarchy of power as a natural way of organizing social systems [13]. In all cases, the cultural approach refers to the behaviour of people in organizations whose origins explained in different ways.

Treating the organization as a social system, cultural approach tries to link behaviour with deep cultural manifestations, which management team or external observers seek to understand and utilise. The quality of the representation of the organization as a culture largely depends on the comprehensiveness of the chosen model of organizational culture.

All mentioned approaches have contributed to the understanding, helped to accumulate knowledge about organization. However, every approach in general uses a narrow-disciplinary method of representation (cultural, political, behavioural, sociological

or metaphorical). A certain step to a more general and multidisciplinary representation may appeal to the epistemology of Ayn Rand [14] and categorization of knowledge introduced by Karl Popper [15], [16].

At the core of objectivist epistemology of Ayn Rand is the attitude to objective reality that exists and to knowledge (subjective and objective) that relates to the reality in the extent to which this reality is known to us. This attitude allows, on the one hand, act on the ground of available knowledge and on the other, consciously develop knowledge as the new facts (or data –result of observations of reality) discovered. Objectivist attitude to reality based on three axioms – the principles of cognition that perceived directly through experience or understood as abstract concept.

The first axiom is the axiom of existence. It states that reality exists. The reality is independent of our awareness. If it is not, the cognition has no subject. The second axiom relates to identity: everything has its specific nature. To be means to be something specific. If we know anything about a thing or causation, such as their properties, these properties can't disappear. The thing cannot cease to be itself. The third axiom is the axiom of comprehension: things are understandable. The cognition has no sense without this possibility.

The Ayn Rand's method of building knowledge after recognition axiomatic concepts involves three steps: the accumulation of facts about reality; concept formation; creating hierarchy or steps of abstraction. The fact is simply a way of saying: this is what exists in reality, unlike fiction, error or misconception. Facts or data obtained from different sources at different time let understand what we are dealing with. To formulate the knowledge it is desirable to choose variety of methods, participants, tasks and time periods for receiving data.

Formation of concepts needs integration at the level of thought of two or more pieces of data, which have similar characteristics with specific missing measurements. In other words, the concept is the integration at the level of thought of two or more objects that have the same characteristic differences while rejecting the differences of the characteristics.

Rejection of the measure of quantitative characteristics can form a concept at first level: abstraction, formed directly on the basis of perception data. The concept of the first level used for the next abstraction or conceptualization, creation of abstract notions of a higher level of abstraction. Ayn Rand notes the potential infinity of abstract knowledge about the world.

In his work [15] Popper formulated the theory of three worlds. First world (W1) is a world of physical objects, states and phenomena, or objective world. This is the objective meaning, that exists independently of human consciousness. The second world (W2) is the world of subjective states of consciousness (mental and psychic states) and, may be, dispositions to action. This world is the result of people's perception of reality. Human consciousness interacts with reality in this world. This is the world of concrete and subjective knowledge, knowledge given to people through the organs of perception - eyesight, hearing, smell, touch, emotion. The third Popper's world (W3) is the world of objective contents of thought, especially the content of scientific ideas, poetic thoughts and works of art. This is the world of theoretical systems, critical reasoning, problems and problematic situations – the world of abstract or theoretical knowledge.

The reality of the first world (W1) exists in a form of natural objects as well as artificial objects created by humankind. This is the reality available to observation outside the mind of the observer. For the purpose of this paper this objective reality is considered as the reality of human behaviour.

Subjective knowledge of the second world (W2) is partially inherent in people from their birth and partially accumulated during lifetime. Usually it concerns relatively simple objects of reality and causal links between them. At a certain complication of the objects or links our senses begin to miss out, or even require the use of devices that enhance cognitive capabilities (radar, telescope, microscope, thermometer, etc.). Our senses can deceive us because our perception is affected by W2 – our emotional state, physical condition, experience, and by the third world, which is our abstract knowledge.

Third World (W3) is crucial for humankind. That objective theoretical knowledge accumulated by people, the ability of people to study allowed creating a world in which we live. Destruction of manmade material objects while maintaining this knowledge would leave this world the opportunity to recover the world from human beings quite quickly. Destruction of knowledge would throw our civilization for thousands of years ago. The third world of Popper is a world of largely autonomous objective and therefore scientific knowledge. This is the world created by man for man, the world, which is constantly changing. It contains not only true, but false theories, open problems, opinions, suggestions, assumptions and objections.

Describing knowledge of the third world W3, scientists talk about theories, concepts or mental

models. According to [6, p. 35] «A mental model is a «pattern» or a «theory» that guides a person in the decisions and choices he makes when he has to act. ... Mental models influence in a crucial way our way of acting as individuals, but they also are pervasive in their effect on organizations, in the form of operational procedures, ...organizational practices, ... standardized decisional rules, ...and so on». The power of theoretical knowledge is that it helps us to see, understand, describe and explain the reality of the world W1.

Scientific research is actually a movement between the three worlds. According to [17, p. 39], who offers to interpret «theory as body of understanding», the development of the theory is conducted in two stages in three steps. The first step involves observation, description and measurement of the phenomenon, which is observed. Often at this step certain constructs have already appeared. Among these constructs we can single out abstraction, obliged rising on the details and explaining (describe) the phenomenon which is studied. The second step provides the classification of phenomena into categories with certain attributes. The results of the classification are certain schemes of categorization and typology, which help to structure the world in a certain way. In the third step of theory development «researchers explore the association between the category-defining attributes of the phenomena and the outcomes observed» [17, p. 40]. Three steps of theory development can be represented as a pyramid with concrete observations in the basis, and abstract model on the top. The researcher moves from the bottom to the top of the pyramid and back. During these movements «every complete lap around the theory-building pyramid consists of an inductive side and a deductive side» [17, p. 41].

Using cycles of improvement at descriptive stage of theory development researchers form the models of correlation between the phenomenon and consequences; they put forward hypotheses about the behaviour of the phenomenon and verify hypotheses with new observations. Cycles of improvement at the normative stage designed to move from categorizing attributes of the phenomenon to the categorization of the conditions in which the phenomenon takes place; from preliminary statements of correlation to formulation of causality or laws. In the process of improving the theory, anomalies play an important role. Anomalies are observations that cannot be explained with a help of the theory. Such anomalies are the triggers to improve the theory.

A large amount of observations is not a prerequisite for obtaining high-quality theoretical knowledge. Thus, the example of theory of disruption, [17, p. 53] proves that «the fact that many dimensions of the theory of disruption are derived from case studies does not in any way detract from the theory`s usefulness». The source of high-quality construct, concept or theory can even be carefully investigated isolated case. According to [18, p. 22], «research involving case data can usually get much closer to theoretical constructs and provide a much more persuasive argument about causal forces than broad empirical research can». The value of conceptual reasoning and each argument for concept user according to the [18, p. 23] is that «it is this argument that can shape their future thinking and allow them to see the world in a slightly different light».

Unsolved parts of the problem. The concept or construct is a weak version of the theory, very common in the social sciences. However, the requirements for a conceptual representation such as integrity, connectivity, lack of internal contradictions are no less strict than for extensive scientific theory. There is no approach, which let deal with complexity of modern organizations of different nature, for example, behavioural, processual or conceptual. The specific approach to the representation of the organization should let deal with complexity providing models adequate for addressing wide range of management problems.

Purpose and objectives of the Research. The research dedicated to the development of conceptual approach to deal with knowledge about the organization. The approach grounds on the method of Popper worlds structuring, which corresponds with the levels of abstraction of Ayn Rand.

This paper is aiming to provide a) representation of the organization at three levels of knowledge (Z1, Z2, Z3), that correspond to the three levels of abstraction of Karl Popper (Worlds W1, W2, W3) and b) integration of representation of the organization at levels Z1, Z2, Z3, giving strength to theoretical predictions.

Main findings

The knowledge of behaviour is the knowledge at the lowest level of abstraction (level Z1) and is a result of observation of individual events as well as valid generalization of the observations. Certain behaviours can be systematically repetitive and therefore representative. They also can be situational, caused by the situation, or by a

certain person, and do not represent the organization as a whole.

Correct formulation of knowledge Z1 about behaviour requires considerable efforts, structured in three steps a) selecting organizational levels for observation, b) choosing aspects of behaviour that are important for organization modelling and c) determining the method of measurement.

In the ideal case, it is necessary to observe the behaviour at all organizational levels. For example, an observer can choose two levels of organizational hierarchy – performance of business processes and management of business processes. At the level of performance, the objects of observation can be job performance, interaction with other participants of the process, improvement standards of work and/or interaction with other participants. At the level of management, there are methods of decision-making, horizontal and vertical communication, behaviour in conflict situations.

Understanding of the organization activity and knowledge at level Z2 let recognize the aspects of behaviour that are important for observations. The behaviour, which is important for service organization significantly differs from the one, which is important for research organization, therefore for each organization other aspects will be essential. Knowledge of norms and rules of Z2 level also focuses on the observation at performance of formal norms and rules.

The method of measurement is defined by the levels of the organization as well as by the aspects selected for the observation. In practice, it is possible that some ways to measure specific aspects of behaviour cannot be applied, for example, at the level of top management.

Knowledge of norms and rules (level Z2) describes knowledge of formal norms, preferably fixing concepts, as well as informal norms, which characterize actual behaviour. It means that collected and summarized observations are a single source of knowledge Z1. At the same time, there are two sources of knowledge at Z2 level.

Formal norms of Z2 are rules, created specifically and deliberately. They should regulate behaviour. Formal norms may origin from the concept of knowledge Z3, as well as have historical origins, which has become a familiar, convenient and therefore not under review. Active formal rules are related to behaviour that means that observation of their manifestation is possible. Rules, which do not work, respectively, have no behavioural manifestations.

Informal norms of Z2 are rules that were created as a result of action and interaction of employees. Informal rules arise when the formal rules cannot resolve the important aspects of the organization's activity. The formulation of informal rules of Z2 is carried out as conceptualization – generalization and abstraction of knowledge of Z1 level.

Conceptsof level Z3 are the result of a conscious creation as well as result of conceptualization of knowledge at Z2 level. Concepts are notions of a high level of abstraction, like values, mission, identity and meaning.

The value of conceptual representation of Z3 is that it helps to «climb» over concrete behaviour, events, time and space. Concepts allow using the force of theoretical knowledge and let see the patterns and predict future developments or future behaviour. Work on the conceptual level also allows creating the future in a certain sense, designing desirable state or behaviour for quite complex objects.

Conceptual representation also helps personalities to provide better self-reflection and create new images of desired self. For example, self-concept, well known in the psychology, is nothing but the representation of a person at the conceptual level.

Connectivity of representation requires special efforts for building logical links between levels of knowledge. Transition from level to level and check the integrity of the conceptual model has to ensure the coherence of conceptual representations.

The correctness of the transition between the levels is ensured by compliance with the rules of abstraction – specificity. According to the presented above definition abstraction provides the usage of more abstract concepts by integrating less abstract concepts with common characteristics at the rejection of the variation of this characteristic. At the same time, specification means adding variation to characteristic, which is used. So it is important not only the transition between levels, but also the direction of such transition.

When moving from the concrete to the abstract, namely from Z1 to Z2 and then from Z2 to Z3, it is important to adhere to the known rules of abstraction. The first rule says that more abstract knowledge must generalise less abstract knowledge. The release of the general characteristics of the variations is the generalization. Thus, the knowledge of Z2 must be more general than Z1, and Z3 be more general than Z2. The transition

from a lower to a higher level means combining knowledge (ideas, concepts) into groups.

According to the second rule, at every level the knowledge must be of a single type, or they must belong to the same category. For example, apples and pears can be grouped into the category of «fruit», tables and chairs – in the category of «furniture». But apples and chairs have no apparent logical ties and they have no narrow enough signs of association. Thus, the specific manifestations of managerial behaviour (Z1) can be summarized in the «decision-making process» or «method of coordination» – the knowledge of level Z2. In turn, the knowledge of how to manage Z2 can be summarized in the knowledge about the organizational model Z3, which is the knowledge of the conceptual level.

The third rule concerns the logical ordering of knowledge at every level. There are four ways of ordering: the establishment of a causal ties, the presence of chronological order; deductive reasoning – a sequence of arguments; reduction of parts of the whole and the identification of structural order; classification in order of importance.

For the shift from the abstract to the concrete, namely – from Z3 to Z2 and from Z2 to Z1, the correctness of the transition between the levels means checking the connectivity. So, if at the higher level it is determined that we are dealing with «dried fruit» thus at a lower level we should be interested in dried apples, dried pears, dried plums. In this sense, the knowledge of the higher level is the criteria for examination of the lower level.

Such verification should take place at each transition from a higher to a lower level. Creating new rules at the level of Z2 there is a need to check their compliance with the concepts of level Z3. Practicing the behaviour at the level Z1, it is necessary to check the compliance with the norms of level Z2.

Checking the connectivity is the second of the two methods to ensure the integrity of the conceptual representation. Logical coherence should be verified at every level. Logical integrity is virtually impossible to achieve for the first time so checking the integrity involves cyclical development of conceptual models.

Cyclical development means repetition of logical ordering at each level as well as verification of the connectivity of these levels. Possessing enough data, several iterations may construct a holistic abstract model. Having the abstract model, it is pos-

sible to build rules and frames of behaviour that correspond to abstract model.

Checking the integrity and connectivity can be performed through getting answers to the question: «Do we have enough data?», «Is our generalization correct?», «Does our concept correspond to generalized data?», «Is our concept logical and internally consistent?», "Does the rule correspond to the concept?", "Do our behaviours correspond to our rules and concepts?".

Conceptual representation at three related levels of Z1, Z2 and Z3 becomes a useful tool of strategic management because it helps managers to have a coherent set of answers to the question «What to do?», «How to do?» and «For what purpose to do?» This integral complex of explanations is the key tool in governing the organization.

Knowledge of behaviour Z1, norms and rules Z2 and concepts Z3 are those foundations, which may make an organization the whole. Ideally, all three levels of knowledge should be a) interrelated and b) evenly distributed across the organization. Clearly, this is not always the case. Formal and informal rules do not always correspond to the concepts and behaviours declared. Organizational learning is aimed to create common mental models as it is an important and conspicuous task of management, bearing the different level of experience and diversity of employees. Impact of knowledge integrity and extension of this knowledge in the organization on organizational integrity and desired behaviour of the organization as a whole are the main subjects of further research.

Conclusions and Further Research Suggestions

The conceptual approach to organizations modelling based on the concept of Carl Popper's three worlds W1, W2, W3 proposed. The approach involves representing the organization at three levels of abstraction: behavioural (W1 world of Karl Popper), normative (W2) and conceptual (W3). Conceptual integrity of the models in the approach is provided by the use of different types of knowledge about the organization (Z1, Z2, Z3) and the existence of links between the three levels of models' representation. The conceptual approach takes into account the complexity of modern organizations, as it implies an exhaustive representation of organizations in the form of sustainable behaviours frames, rules that should normalize the behaviours and concepts that describe the causal relationships

between abstract beliefs, more specific norms and specific behaviour.

Further studies are related to the use of conceptual models of individual, organization and society. These models are elaborated in various disciplines like sociology (values, meanings), political science (power), the economy (individualism, institutions), philosophy (identity, authenticity), formulation and application of conceptual models, which are useful for strategic management of organizations, their understanding, explanation, development and transformation.

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КОНЦЕПТУАЛЬНЕ МОДЕЛЮВАННЯ ОРГАНІЗАЦІЙ

Запропоновано підхід до моделювання організацій, що використовує три типи представлення: поведінкове, нормативне та концептуальне. Підхід дає змогу створювати змістовні організаційні моделі, які адекватно представляють складність сучасних організацій та можуть бути корисними при розбудові системи управління та прийнятті стратегічних рішень.

Ключові слова: концепція, модель, організація, поведінка, управління.