

The new Concept of the Theory of Organization Based on the Knowledge Bases and the Semantic Web

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Abstract

Leading any kind of organization requires a certain level of understanding of its basic characteristics and principles and in order to be able to efficiently manage it the managers must have adequate knowledge for the organization, decision-making and management. In this paper we deal with the new concept of the application of knowledge base and the semantic web in a more easier way of locating necessary knowledge of all those who make the decisions. In order to be able to effectively make quality decisions in such challenging times, the decision makers must be able to quickly reach the necessary knowledge. Here we present a proposal of the new solution based on the knowledge bases and the semantic web, which has not been applied in the theory of organization so far and especially not in this area. This technological solution can very quickly provide the necessary solution to all those who make the decisions. In order to demonstrate how this concept can function we have updated the knowledge base only with the basic knowledge of the theory of organization.

The keywords: *knowledge base, the theories of organization, quicker decision-making, efficiently decision-making*

1. INTRODUCTION

Existing theories of the organization provide a good basis for understanding of the organization, its nature, its functions, the processes that are conducting in it and the factors of which depends its functioning.

Depending on the time and conditions in which the organizations were functioning, those who dealt with them were faced with certain problems that have in the certain occasions imposed as important for the successful achievement of organizational objectives. All good theories that appeared did not fully replaced one another, but they complemented each other so that each of them has its own value and its own significance, depending on the problem they were focused on and on which question they were supposed to secure the answer. Some of these theories in this paper we take as a basis for the knowledge base that we will update in the “Protégé-OWL” open source platform which the users enable to: read and store the knowledge.

Those who decide should know and use the theory because they must not improvise their activities. They need to rely on the theory and not just on the intuition because using high quality theory may define the course of action thus avoiding the necessary waste of energy. This is why we want to offer a knowledge base for the

use in decision-making and not just that they use the intuition.

In this paper we will offer a different approach to the part of the theories and the necessary knowledge contained in them with the use of the knowledge base and the appropriate tools for their updating and efficient use. It will provide those who want a quick reminder of some theoretical aspects of the organization, for more efficient work and deciding on future steps of action. A new concept that we propose will provide them with much more efficient decision-making based on knowledge and new technological solutions.

In the first part we will deal with the classical school of organization that was formed in the late nineteenth and early twentieth century, which laid the basis on which were upgraded the others.

The emergence of factories in which it is employed a large number of workers leads to the need to organize and coordinate all activities. There are problems of the organization of work and a lot of ideas and ways to solve them. That upon which is then mostly been working on was related to an increase in labor productivity, more efficient use of resources, improvement of the work discipline and responsibility. It was found that labor productivity can be achieved by an efficient division of labor and specialization of workers to perform certain tasks. Working abilities and skills have been perfected in order to increase the speed and intensity of work. In order to achieve this it was necessary to use scientific methods and principles of the effective organization. Discipline at work and work are the two basic assumptions of efficient organization that can be provided through a hierarchy. Efficient management of the organization and the responsibility of the managers for making quality decisions would provide the creation of an organizational environment that will ensure their implementation.

Within the framework of classical school it may be observed: [Jonson, A., 1967[1]] “The Theory of Scientific Management” and “Classical Theory of Organization”.

2. The Theory of Scientific Management

This theory is founded in the late nineteenth century in the United States and studies the problems of work organization. Its creator is an engineer Frederick Winslow Taylor. He started to work as a laborer at the

facility and he stood out with good ideas and perspicacity. His abilities led him to a managerial position passing from the foreman to the head of the facility and the chief engineer. His ideas, Taylor presented in the works of Scientific Management and Shop Management [Taylor, F. W., (1947) [2]] and they represented a major change in the field of organization of work.

Taylor's approach to management presents a complete system of learning about the principles of scientific management, efficient workplace design, realistic standards and work measurements in order to increase economic results and profits of the company. He advocated and suggested to the management of the company rigorous rules of conduct because he considered that it is the only way to get to the good business results. He defined the four principles upon which he based the concept of scientific management:

- **Development of management science** as a set of knowledge that will help to define the best methods for conducting a specific job;
- **Scientifically based selection of workers** in order to achieve agreement between the characteristics and requirements of the job,
- **Scientific education and training of workers and managers** in order that both of them understand the problems they face;
- **Establishing a close cooperation of managers and workers** in order to create a climate of mutual interest for the greater organizational efficiency.

The application of his principles in practice has led to the development of work organization and concept of management whose basic elements are:

- **Division of labor and specialization of the executors**, which led to the routine performance of work and enable mass production;
- **Functional specialization of managers**, which led to the development of their abilities and skills and the emergence of specialists and experts for th specific functional areas;
- **Promoting the efficiency of the individuals** through differentiated reward system, which provided motivation of the employees through economic incentives and affirmed salary systems based on the achieved results.

Taylor has applied his ideas on scientific organization of work in the car factory Ford Motor Co., where he applied a new system of organization of production, based on the principles of chain system, which was carried out by a conveyer belt. Work productivity has incresed dramatically. His teachings had a lot of followers, but

also those who did not respected and applied his theory [Haire, M., (1959[3]).

From the “Theory of the Scientific Management“ in the knowledge base we have entered knowledge about the Development of Management Science (Razvoju nauke o menadžmentu), Scientifically Based Selection of Workers (Naučno zasnovana selekcija radnika), Education and Training (Obrazovanje i usavršavanje), Close Cooperation of Managers and Workers (Prisna saradnja rukovodilaca i radnika), Division of Labor and Specializations (Podijela rada i specijalizacija), Functional Specialization of the Managers (Funkcionalna specijalizacija rukovodilaca), Fomentation of the Efficiency of the Individuals (Podsticanje efikasnosti pojedinaca). See Figure 1 Theory of the Scientific Management

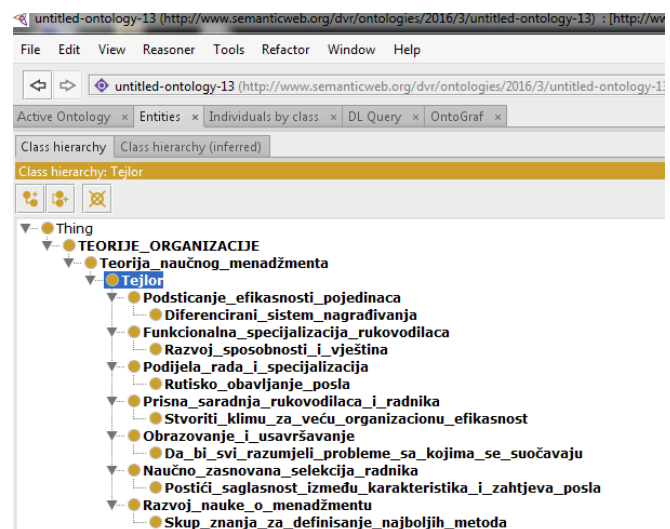


Figure 1 Theory of the Scientific Management

3. Classical Theory of Organization

This theory of organization has been created in Europe also at the end of the nineteenth century and studies the problems of the management organization imposed by a different view at the companies and their problems. Taylor believed that the workers are most responsible for the success of the company while the European authors believed the the management of the company, or the administration which makes the decisions is the most responsible for the success of the company.

The largest contribution to the development of the classical theory of organization and significance of the contributions in the science of organization and management gave Henry Fayol with his administrative doctrine and Weber with his theory of bureaucracy.

3.1. Administrative Doctrine

Administrative doctrine presents a rounded system of learning about the activities of the company, especially about the managerial activities which Fayol calls administrative, by which all his teaching got the title administrative doctrine. All his knowledge and experience in work he has shaped in the appropriate concept of the organization of the company. According to him, all activities in the company are divided into six interrelated and dependent groups of activities [Fayol. H., 1949. [4]]:

- Technical work (production function);
- Commercial work (procurement and sales function);
- Financial work (financial function);
- Security work (technical function, general and legal affairs);
- Accounting work (accounting function);
- Managerial activities (planning, organizing, commanding, coordinating and controlling).

Fayol considers that the basic and the most important activities in the company are the one which their managers do while all other activities are of operational character. He also defined a set of five managerial activities: planning, organizing, commanding, coordinating and controlling. These activities with small changes remained until today.

Fayol is by summarizing his rich experiences has created fourteen basic principles of effective management, that is, how to effectively organize and lead their organizations. These principles are: the division of labor, authority, discipline, the unity of command, the unity of goals, the subordination of individual interests to the general interests, rewarding, centralization, the chain of command, order, justice, stability of the personnel, initiative and corporate spirit. With his work he has broke the one, by then rulling doctrine, according to which it was believed that » managers are not born, but made«.

3. 2. The Theory of Bureaucracy

Max Weber, in the late 19th and early 20th century has dealt with the problems of development and organization of the European society and is the creator of the theory of bureaucracy and one of the pioneers of modern sociology. His model of the organization of the European societies under the name of » the ideal bureaucracy« has transferred to the organizations [Weber, M., 1924. [5]].

In the companies of that time had worked the entire families, close friends and acquaintances, so the organization was faced with the problems of nepotism

and favoritism of individuals regardless of their competence. Weber held that the »bureaucracy« is the most stable cultural value of traditional Europeans societies, so the bureaucracy also on the organizational level represents an ideal organizational form.

The basic elements of Weber's theory of bureaucracy consist of the next elements: specialization, hierarchy, formalizations and impersonal relations.

Specialization required to be carried out a division of labor on individuals according to knowledge and competence, which would provide that each member of the organization does the work for which it is qualified. It establishes an organization in which is precisely known who is doing what to whom and who is responsible for the implementation of tasks.

Hierarchy is a natural arrangement of things and implies that the organizational structure must follow the principle of hierarchy, which means that the members of the lower level are under control of those at the higher level. It is introduced a clear line of command, in which every member of the organization corresponds to one superior manager. Decision-making is centralized and the authority for making the decisions is in the top of the organization.

The formalization of the conduct – should ensure a uniform behaviour, coordination of efforts, continuity and stability. Weber believed that a rational approach to the organization requires a set of formal rules and procedures which ensure that the job is done in a certain way.

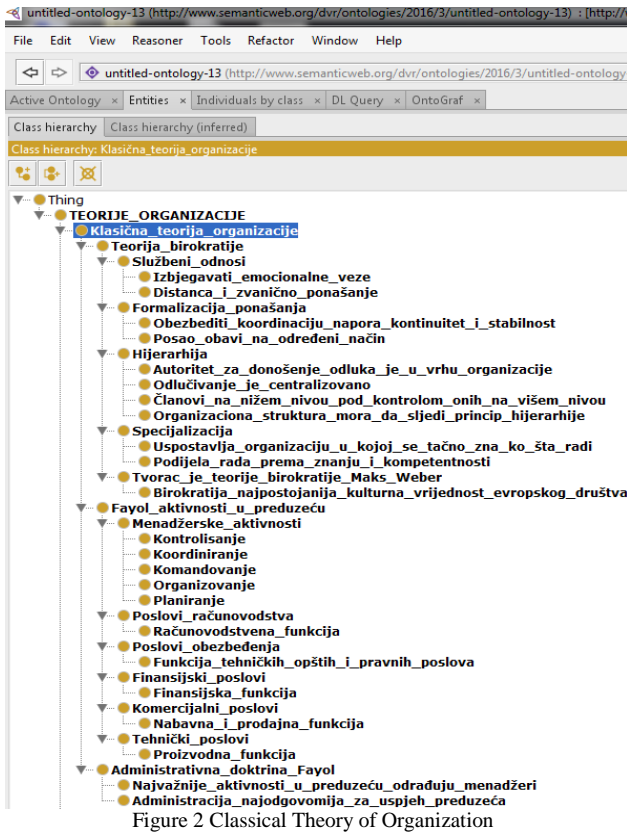


Figure 2 Classical Theory of Organization

Impersonal (official) relationships should introduce distance and official behaviour in the model of bureaucracy. Weber believed that in the bureaucratic order it is obligatory to avoid emotional connections and that efficient and rational decisions can be taken only under this condition. Weber believed that the centralization of decision-making, division of labor and specialization, a clear chain of command and the like ensure that the employees have a sense of security.

From the classical theory of organization we entered in the knowledge base basic knowledge about Administration as the most responsible for the company's success (Administraciji kao najodgovornija za uspjeh preduzeća), The most important activities in the company (Najvažnijim aktivnostima u preduzeću), Technical work (Tehnički poslovi), Commercial work (Komercijalni poslovi), Financial work (Finansijski poslovi), Security work (Poslovi obezbeđenja), Accounting work (Poslovi računovodstva), Managerial activities (Planning, Organization, Commanding, Coordinating and Controlling) and similar. (Menadžerske aktivnosti (Planiranje, Organizovanje, Komandovanje, Kordiniranje i Kontrolisanje)). See Figure 2 Classical Theory of Organization.

4. The Theory of Interpersonal Relationships

In the United States in the 1930s of the 20th century appears the theory of interpersonal relationships. This

theory is advocated by the authors of the humanistic orientation who disagreed with the views of the classical theory about the nature of organizations. At the beginning of the 20th century was seen that the managers faced with hidden barriers which significantly influenced the success of the company. They considered that the solution of the problem lies with the people in the organization. Some were not able to see it because within them had dominated objectives, facilities and physical conditions of work. Some aspects of the organization such as the social aspect which to them was not known.

Professor Elton Mayo accepted Taylor's teachings about the need of the managers to rely on scientific management but was significantly different from Taylor in the views concerning the situation of the employees. Mayo insisted on the satisfaction of the social needs of people on establishing good interpersonal relationships and on spreading the idea that the people are an important factor of any organization. He is considered a creator of the theory of interpersonal relationships because his views were based on experiments which he carried out on several occasions.

All research conducted until then led the organizational science on getting the two extremes: the scientific approach, which emphasized the concern for production and the sociological aspect that emphasized the concern for the man [Jons, G., 2001. [6]]. Complete further course of development of organizational sciences ranged between these two extremes.

5. Contemporary Theories of the Organization and Management

5. 1. The Quantitative Theory of the Management

With considerable introduction of mathematics and informatics in solving management problems occurs the Quantitative theory of the management. Many authors have also used it under the name the science of management. This form of management has mostly emerged in order to be able to solve organizational questions of war and better implementation of the military skills. During World War II, it should be solved complex problems of elaboration of tactics and strategies of war. Teams of experts have worked on that for operational research in order to find the optimal solution. It has started to apply the model of research based on the mathematical models of optimization of solutions and the simulation of occurrences with the support of computer technologies. Such a quantitative approach in the 1950s began to apply in the managing of the company.

In order to make quality decisions in such a turbulent and uncertain environment, the managers besides the intuition must use mathematical models, check up on more alternatives and only then to choose the optimal

solution. The techniques of the operational research and the application of the computer and information technologies have contributed to the inclusion of a number of procedures in the process of solving problems, planning and forecasting the activities of the company.

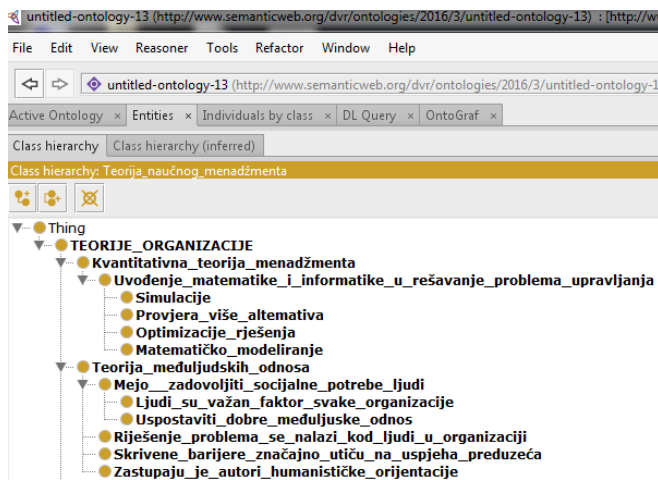


Figure 3 the Quantitative Theory of the Management

Under conditions where the competition is fierce and the companies are buried with data and information, anyone who wants to effectively anticipate, plan, decide and control should use the quantitative approach. Although this is a powerful theory itself is not sufficient for successful management of organization and those who decide, use quantitative theory as an aid to the basic theories.

From the quantitative theory of management, we have entered in the knowledge base the basic knowledge about: Mathematical modeling (Matematičkom modeliranju), Optimization of Solutions (Optimizaciji rješenja), Checking of more alternatives, Simulations and similar (Provjera više alternative, Simulacije,,). See Figure 3 the Quantitative Theory of Management

5. 2. Theory of the System

Theory of the system in the organizational theory introduces a certain categories of the general theory of the system. This theory allows those who decide that in the solving of the organizational and management problems view the company as a dynamic whole. Theory of the system is a general theory which is widely accepted, which opens horizons, rejecting stereotypes and explains the phenomena and processes by means of multivariate analysis. The basic categories of this theory are [Kast, F., 1971. [7]]: the system and subsystems, interactions, environment, feedback and multi objectives.

System – a complex structure composed of two or more subsystems, which are interconnected and relatively independent. The company is one system and its

structure makes a certain number of subsystems. Most parts of the company are independent within its scope of competencies, but are also interconnected by the flows of the work process.

Interaction – companies are composed of subsystems in which take place certain processes and are conducted certain activities. In addition to internal interactions in the company also take place interactions with the environment. For the decision making is essential to take into account in addition to internal and also external influences that can impair the state of affairs and to disrupt the balance in the company.

Environment – is all that is outside the company, which influences behaviour, structure, efficiency and effectiveness of the company. These include: market with its structure, institutional environment, social-political conditions, new technological solutions, new achievements in the management and similar.

Feedback – the company in the interaction with the environment gets a certain feedback about its business. Based on this information the decision makers control the validity of their decisions and take certain actions in order to adapt the business strategy and organizational structure to the given moment.

Multi objectives – in the system theory the company is seen as a system of multiple goals: survival, growth and development. In this the survival demands a certain stability, while growth and development imply changes and dynamics. Those who decide should create the structure of the company that will ensure the stability and the dynamism.

5. 3. Situational Theory

It emerged in the late 1960s and is linked to the criticism of the universalism of the classical school of organization. Situational theory is used in the analysis of management aspects, such as planning, organizational structuring, organizational behaviour, leadership and similar. The essence of this theory is that there is no best solution. Decentralization must not always be better than centralization; bureaucracy is not entirely bad; explicit objectives are not always good; democratic management sometimes does not match; a strict control can sometimes bring the results. In short, everything depends on the situation.

Situational theory uses the model “situation – solution“. Factors and organizational variables are considered in relation “if – then“ [Kast, F., 1971.]. It is basically based on the system theory, but stands to be more concrete and especially highlights the specifics of the company. It relies on experiment and empirical research ie case studies as the best method for concluding. The big problem of the situational theory is that the companies and its organizational parts are too dynamic to be able to monitor changes and to make adjustments of the

solutions. The limitation of this theory is related to the widespread use of methods of researchers' perception, which can distort the picture of reality. In addition to these and some other objections, the situational theory represents a significant contribution to contemporary management because it shows the weaknesses and limitations of the classical and bureaucratic models of organization [Radivojević, M., 2016. [8]].

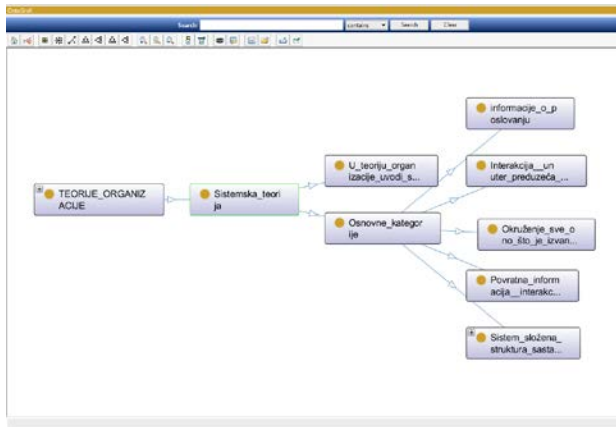


Figure 4 Part of the knowledge - Onto Graph

Part of the necessary knowledge is represented in the knowledge base and updated in the Protégé-OWL platform, we will also present by Onto Graph (figure 4 and 5).

In this paper we presented a new concept of the application of the knowledge base in a easier way of reaching to the necessary knowledge in decision making. With the use of appropriate software tools we have updated only a part of that knowledge in order to show how this new concept can work. This new technological solution is unique and can certainly contribute that in the future this or a similar concept is used for a faster arriving to the necessary knowledge of those who decide.

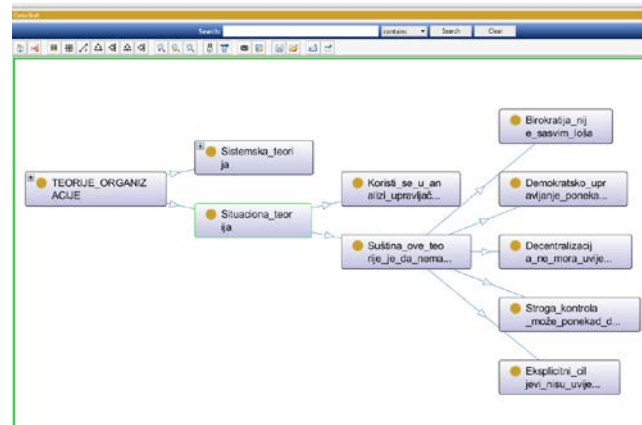


Figure 5 Part of the knowledge - Onto Graph

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