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SYSTEM THINKING IN PROJECT MANAGEMENT

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Abstract. Project management has been used as a tool to improve competitive advantage for several years. This study examines a very important direction which is system thinking in project management. It is proven that in project management, as in other systems, the key issue is to take into account several points of view, not just the only one. In project management it is necessary to take into account four areas: methodology, organization, people and information systems that determine project management maturity in companies. Data were obtained from an extensive literature review and questionnaire surveys.

Keywords: environment complexity, project, project management, system thinking, system analysis, project management maturity.

Jel classification: M10, L20.

1. Introduction

The business environment is subject to constant transformation, the pace of changes has accelerated, and the characteristic stability of the industrial age gave way to unpredictability. Currently, the environment can be described as turbulent, as the changes take the form of radical and revolutionary processes that fundamentally change the economic reality. As a result, it produces a natural need to find new solutions that will enable organizations to achieve competitive advantage. One of the tools commonly used in enterprises, as a strategic tool to achieve various business objectives, is project management. It has become a competence widely used not only by large organizations with high organizational maturity, but also small and medium-sized companies. Taking into account the specific nature of the modern business environment, the complexity of the problem of companies' high performance in the field of project management should be exceptionally emphasized. It is important to perceive project management as a complex system, which consists of several key factors. A holistic approach to recognize all elements of the system and the perception of relations between them, as well as changing and complex environment determines the final performance of project management. The purpose of this article is to show the complexity of project management in today's environment. Data were obtained from an extensive literature review.

2. Modern trends in business environment

It can be assumed that variability, complexity, and increasing risks are all characteristics of the modern world. The business environment is a system and therefore is composed of various elements related with each other. These relationships occur in different directions and with varying intensity resulting in continuous changes within the system. There are several key trends that can be distinguished from the ever-increasing environmental turbulence. These are: turbulence and instability, acceleration and complexity.

Currently, turbulence and instability applies not only to products and technology, whose life cycle has rapidly shortened, but also to the company's position in the market. The dynamics and complexity of the environment cause increased uncertainty and vagueness of operating conditions that radically decline the ability to anticipate and predict. This forces companies to focus their attention primarily on innovations. It is important, however, that these also relate to organization and management of the enterprise, not only products and technologies. There is therefore an increasing trend to improve flexibility and smoothness of organizational structures through flattening and slimming resulting in the reduction and secretion of less significant hierarchical levels. In modern management, a strong need for a fundamental change in the approach to the organization becomes visible. The vision of a company with traditional centralized organizational structures gives way to a vision of a business with less complex structures and ability to timely respond to the challenges arising from the environment.

An important trend occurring in management is accelerating diverse economic activities. Speed is one of the key factors determining the competitive advantage of a company, and is favored by the development of technology and information technology. Businesses responding faster to changing conditions in the environment are becoming more visible, and information exchange is currently becoming more efficient. In an enterprise focused on accelerating organizational learning, which is the creation, assimilation and copying of knowledge by the company in order to increase the efficiency of its operation and development, becomes increasingly important (Maira, Scott-Morgan 1997). Among those factors which have a significant impact on the acceleration of economic processes are also certain changes in the social sphere of the environment. These have the form of growing customer expectations, not only in terms of quality and price of the product, but also the time of delivering a product or a service to the market. Thus it becomes necessary to respond rapidly to signals coming from the market and the time between identifying a need and product delivery must be shortened. It can therefore be assumed that the time factor is in no small part a marketing element. The acceleration of business processes in the company is largely influenced by proper organization and integration of the value chain. The concept of the value chain introduced by M. Porter is based on the assumption that the value of the

product depends on a number of interrelated activities that are controlled by the enterprise and beyond. These are functions such as design, manufacturing, distribution and customer service. Each of these functions takes part in the creation of the product, so it is important to properly organize various links in the chain that affect the value of the final product. Competitive ability of the company relies therefore on how the integration and synchronization of the activities that make up the system of values perform, so that the whole process works effectively and, most importantly, quickly.

Currently, the complexity of the world is so big, that a comprehensive description of this phenomena is beyond the capacity of any single researcher. Environmental analysis is usually limited to only a few selected areas. An example of this is the approach of many professionals to seek sources of economic crises, which often are viewed solely through economic or political aspects, with no or limited regard to such factors as: social, environmental, psychological, sociological, etc. At this point, a question arises whether such an approach to the economic realities of managing organizations permits us to find new solutions to achieve competitive advantage? (Piekarczyk, Zimniewicz 2010) Is the frequently used oversimplification of the surrounding reality not a dangerous direction in the development of the organization?

A single theory of organization and management should not be unilaterally opted for or indicated us superior over other solutions. In order to see the whole picture, no single perspective should be entirely rejected or belittled (Bratnicki 2000).

3. The nature and importance of systems thinking in management

P. Senge states that in today's reality, man is able to produce much larger amounts of information than he can absorb, establish complex mutual-dependent systems he can no longer manage and accelerate the process of change to a lever he cannot keep up with. Thus the scale of complexity is unprecedented and may consequently undermine the self-confidence and sense of responsibility of many decision-makers (Senge 2006).

Presented trends: turbulence and instability, speed and complexity are tightly linked and mutually dependent. Inability to deal with today's problems is often the consequence of lacking a holistic view on the surrounding reality. According to P. Senge system thinking today is a response to the helplessness many managers experience. Perceiving a whole system significantly alters ways of thinking and reduces the risk of erroneous interpretations and decisions. For years, however, executives have been observed to follow trends in management. In the 1970s it was the diversification of activities, the 1980s was a period of mergers and acquisitions, and the 1990s – a period of dynamic development of concepts of enterprise management, which focused on core activities such as reengineering, lean management, outsourcing, etc. It ought to be noted that this trend is still continuing

in business practice. Rejection of these concepts would be an abuse, but it is worth remembering how easy it is to fall into the trap of uncritically following emerging fashions in management. An attempt to enhance the impact of the organization on the basis of a single concept without a broader, systemic view of reality can have counterproductive effects (Zarębska 2002).

Systematic approach, a way of thinking, system analysis, holism, holistic thinking have been key paradigm in science since the second half of the twentieth century. One of the characteristics of System Thinking is that it perceives the empirical world as configurations of interrelated activities. It focuses attention on the interactions, or interfaces among the entities generating these activities rather than on the entities themselves. Thus, the system-oriented investigator perceives real-world phenomena as a system, that is, as sets of objects together with the relationships between the objects and their attributes. Each system is connected to another one in a serial, random, feedback fashion. In this image of the world, system do not exist in isolation but are parts of a whole, namely, of the universe (Asterios, Kefalas 2001). Holism is a philosophical and methodological standpoint according to which reality and all phenomena must be examined as a whole (Olechnicki, Załęcki 1997). The whole should not be interpreted as a simple sum of all individual components. In many scientific disciplines scientists abandoned the classical paradigm of explaining complex phenomena using simple isolated elements. Physics, biology, social science (including the science of organization and management) finally adopted a relatively new paradigm that the whole is more than the sum of its parts, so there is a need to study various elements not in isolation from each other, but with regard to the relationship of specific properties between them. It is worth noting that the current system of organization and management, which was created in the 1960s and expired as soon as the 1970s, has once again proven its usefulness of studying the dynamics of social systems by identifying different types of feedback loops. It is P. Senge who while referring to it as the fifth discipline, showed that system analysis can lead to surprising conclusions disproving myths and organizational standards (Krupski 2005). The renaissance of the system approach has also been announced by A. Kozminski, who said that system analysis allows for better control of diversity, variability and uncertainty by highlighting dependencies and relationships between the elements. He also emphasized the fact that the design methodology has been refined and developed strongly in response to the criticisms and challenges of practice (Kozminski 2007).

The concept of the system is understood differently in various fields of science. G. Fuchs in his study gives different interpretations of the concept of the system. According to the author the system should be seen as a set of elements (or things, objects, components, parts), which are connected by relations (dependencies, relationships, couplings, chains) (Fuchs 2004). Another approach is presented by T. Pszczółowski, who notes that the system consists of at least two elements that are related by relationships (Pszczółowski 1978). In this inter-

pretation, the main role is assigned to elements and relationships that exist between them. The concept of the system can also be associated with an order, an organized whole, a whole or with a shape. Taking into account the different definitions of the system a conclusion can be drawn, that the essential features of the system include: elements, relations, properties. Special attention should be given to the importance of relations (relationships) that occur in the systems. They allow for an exchange of energy, matter and information between systems. The concept of relationships can be used to characterize the quality of the system. On the basis of systems theory quality is understood as a complexity and results mainly from the number of elements making up the structure, but also from the variety of relationships that occur between the elements. It is worth noting that the relationships between the elements vary in time and therefore have their own dynamics. In system thinking each component of the system may affect other parts, and no element can operate effectively without the help of others.

Managing business based on a broad perception of the environment and referring to system thinking requires a change in the way organizations function, which will be used to optimize the intellectual capital of employees. Companies should increasingly develop the so-called intangible assets, which essentially are skills of individual employees, teams and the organization as a whole, as well as broadly understood organizational culture. Assets defined as competencies have very large competitive potential, but need to be created in a long-term staff training process, cooperation, mutual learning, and creative development of people (Borowiecki, Romanowska 2001). Having met such conditions companies are able to stand up to challenges of system thinking in management. Employees have the necessary competencies to solve problems of the company at a strategic, tactical and operational levels with regards to the holistic approach to the complexity issues.

4. Project management in the context of systems thinking

Considering project management in the context of system thinking, it is necessary to start with defining essential pillars of project management. It is based on two groups of factors:

- Hard factors such as: appropriate organization of project structure, project management process and IT tools.
- Soft factors including: human potential of the project team, along with the specific skills and predisposition of members of the management and operating team.

It can be concluded that the effectiveness in project management measured by the effects achieved by the project team depends on the optimal combination of the factors outlined above. In addition, the success of the project also depends on many other factors such as the size of the implemented project, the level of its complexity, industry, etc. (Kopczynski 2010).

In the modern economic reality, it is hard to imagine organizations that are not involved in any projects. Development of new products, technological solutions, organizational changes, restructuring, integration after mergers and acquisitions, outsourcing and implementation of strategy are examples of initiatives that are today managed as projects. Skillful management of projects has become a tool of competitive advantage. Therefore it became essential to answer the question of what determines that some business organizations have been consistently performing better in implementing projects than others in categories such as fulfilling deadlines, budget, scope and delivering anticipated results. It can be assumed that these organizations are at a higher level of maturity and therefore achieve better results as a whole. The relationship between the level of maturity in the field of project management and effectiveness of implementing projects is a subject of numerous empirical studies. These include one particular study conducted by C. W. Ibbsa and Y. H. Kwak from University of Berkley, which shows that the higher the maturity of project management, the more projects finish on time and within budget (Juchniewicz 2009). Theoretically, the more mature the organization in terms of consequence (stability), with which it operates with equal regard to methodology, appropriate project organization, people and computer systems, the higher its efficiency in project management should be. Research on the assessment of the level of project management skills development influenced the creation of the concept of project management maturity. Given the research achievements in the field of project management maturity companies should therefore take into account the following four key factors determining the efficiency of project management: methodology, organization, people and information systems. The combination of the strengths of each of these elements, as well as the balance between them, determine the overall efficiency in project management of the organization. This is confirmed by research consultancy firm Pricewaterhouse Coopers, which had the opportunity to get acquainted with a number of examples of project management in different types of organizations. In addition, in early 2004 Pricewaterhouse Coopers conducted a survey to assess the current level of project management maturity in organizations (Pricewaterhouse Coopers 2004). One of the main objectives of the survey was to determine whether leaders and organizations that achieve the best results show a higher level of maturity in project management. The results unequivocally show that the balance between methodology, organization, people and information systems produces measurable benefits in project management (Smurawa 2000). It becomes apparent that the maturity of project management can be somewhat identified with system approach, where all the components of the system are interrelated with dynamic relationships between them. In addition, significantly important is the appropriate arrangement and management of this network system.

Project management is essentially a structured system of processes that organize and increase the efficiency of actions in projects of any size. Therefore, the existence of well-defined project management processes - often grouped

together in the form of project management methodology – disntinguishes companies that consistently achieve good results in projects. This increases to the role of uniform procedures and methodologies, that if used by members of the team, often geographically remote, ensure consistency of the solution. Thus it is becoming widespread in project management to use methodologies and standards that merge general framing with specific procedures and techniques to support the process of managing projects. The best-known methodologies have been developed at the Project Management Institute, USA (PMI methodology), Association for Project Management, UK (APM) and the Central Computer and Telecommunications Agency, UK (PRINCE2). These methodologies have become current standards in most countries and companies around the world (Lada, Kozarkiewicz 2010). However, when studying the achievements in the field of project management, it is hard not to get the impression that their effectiveness depends on the application of relevant methodology in a particular case. Obviously, it is crucial that in order to reach maturity and excellence in project management, one cannot leave anything to chance or risk that random unacceptable mistakes may be committed. On one the hand it is necessary to adopt a structured process that will allow employees to act in a coordinated and efficient manner. On the other hand, it is improper to uncritically believe in the fact that the application of a certain project management methodology will solve all the problems. Use of a particular methodology does not lead to any success and excellence in project management by itself. The need to improve the organization and, above all, rely on the competence of the people involved in the project is becoming most important.

The organizational structure is essential for efficient project management. Adapting the organizational structure to the level of importance of the project within the organization is a key factor in the overall performance of the project implementation. This element is often underestimated or largely ignored by management, which is why a large percentage of projects fail. Aspects of particular importance in this area are the proper location of the project team in the company's organizational structure, proper coordination and control of resources – mainly staff and budget, as well as clearly defined roles and responsibilities supported by the work of a unit, which centrally organizes and coordinates the resources required for optimal implementation of projects (Wysocki, McGary 2005)

One of the major issues that affects the success of project management is the proper location of the project team within the unit implementing a project and the internal organization of the project team. Project teams created within economic organizations often face difficulties in complying with the terms and conditions firmly rooted in the company’s culture. Putting things simply, this can be defined as a conflict between the hierarchical and traditional linear structure and more flexible structure suited to the implementation of the project. It is crucial to realize that the organizational structure of the company is often historically and culturally rooted, having been formed over a long period of time. Project teams are a novelty, which induces resistance to change in the existing structures and their associated

hierarchical systems. Every change is a threat to the position and authority of those who benefit from the current system (Trocki, Grucza 2003). Projects are typically temporary efforts and therefore bring some sort of instability to the organizational system of a company. An important issue is determining the significance and location of the project in the organization and management of the company. This often arises a dilemma of whether the existing organization should focus on the requirements of the project with all its consequences, or the organization of projects should be included in the existing structure (Milgrom, Roberts 1992).

With the increasing number and complexity of projects in organizations, there is a need for a purposely established management unit most commonly defined as the Project Management Office (PMO) or Project Support Office (PSO). Such a permanently established unit offers services aimed at supporting project teams and is responsible for the project portfolio. The purpose of this unit is to support project teams, and reduce the risk of project failure. In many organizations, PMOs differ as to the mission, objectives and functions. At the same time it is necessary to have the awareness that the transfer of a specific area of operations to Project Management Office may be confronted with opposition from the organizational unit, from whom the responsibility has been revoked. Such a unit can consider the creation of Project Management Office as a reduction of its competence and importance within the organization. Thus it becomes important to define the appropriate responsibilities and tasks of the Project Management Office, which should include 3 groups of responsibility: decision-making activities (selecting projects for implementation, determining the path of the project, breaking the project if necessary, approving stages and results of the projects), supporting projects on every stage (essentially - for example, offering an outside point of view; technically - for example, the use of methods, documents; organizationally - for example, resources) and project portfolio management (compliance with standards and procedures, repository of documents) (Kerzner 2004).

Needless to say, a man and his skills are the key assets to manage. However, the essence of projects based on creation, volatility, dynamics and constant communication, necessitates a specific approach to human potential. One of the key elements of project management is teamwork. Project management is based on multidisciplinary teams consisting of specialists from various fields and areas that should be ready to make fast and flexible decisions in order to adapt to changing business needs. Thus, it becomes important to understand the essence of a team, which should be a group of people with strong mutual relations, aimed at achieving the objective or the task. Team members agree to carry out a particular purpose, and accept that the way to achieve it is to work together (Kopczynski 2004). It is extremely important to understand that many groups have common goals, but by no means are a team. The criterion that must be satisfied to consider a group as a team, is the mutual relationship and interaction between team members. (Parker 2007) Stimulation of these relations, however, requires external support for the work of the team, so it is important to have the special abilities of a project

manager. It is becoming more and more clear that managing a project team requires a project manager to have a sufficiently high level of potential abilities. Technical competence is needed to understand and recognize the implications of key decisions. The project manager does not necessarily need to know more than the members of the team who may be specialists in very narrow fields, but he does need to know how to ask the right questions and understand the answers. A project manager (project leader) needs to possess technical knowledge in order to gain credibility and respect in the eyes of the team during the formation - when people expect instructions and support from him. What is becoming increasingly important are not only skill technical but rather competencies such as teamwork, coordination, cooperation with others and the desire to achieve the effect of synergy. Special emphasis should be placed on building so-called "soft" competencies as well as interpersonal and managerial abilities. Effective project management in the current reality is often complex and complicated. The multitude and variety of factors affecting its success is very high, and their sources can be found in many places. These can range from purely technical, relating to the methodology used in carrying out the project, to psychological and depending on the position and attitude of the project manager (Kosieradzki 2000). Successful completion of the project therefore requires the project manager to demonstrate interdisciplinary skills. He should pay extra attention to project management elements such as management style, organizational structure and solving problems (Smith 2000). The project manager should therefore be aware of functioning as a leader and that while creating a team of professionals he should provide them with professional and personal development, within the conditions offered by the employer. Taking into account the fact that the project manager often manages a group of people who in various areas have more talent than himself, he must make a difficult decision on how to manage the team, which should be in the form of a management service towards subordinates.

Proper methodology and project process optimization, project organization, and effective people management are not enough given the growing number of projects and their complexity. Currently a great importance is being assigned to systems and tools that automate processes related to project management and support project managers. It is important, however, that such tools are available across the organization, fulfill all functional requirements, provide reports on various subjects (i.e., program and project management, resource availability, cost tracking, realization of benefits) and offer user-friendly means of communication. The availability of systems and tools designed for project management is currently increasing. In addition to proprietary tools such as MS Project or Primavera, other applications, which are available for free, such as free Open Proj, Project Open Web2Project can be obtained from the Internet. These tools are only in some cases slightly inferior to licensed and recognized IT programs supporting project management. Most important, however, regardless of the particular application chosen, is to implement them appropriately in the organization, taking into account

factors such as characteristics and number of projects, size of the organization and number of people involved in the project, as well as pre-defined processes being carried out during the project. Only then can computer tools prove to be a significant source of support in project management.

5. Conclusions

Turbulence and the complex business environment, makes the persons responsible for project management pay close attention to the factors that determine their effectiveness. Managers seek to answer the question of what determines the effectiveness of projects. It can be assumed that this process is largely affected by treating project management as a complex system in which it is important to discover the balance between four important in project management areas: methodology, project management organization, people involved in the project and systems and tools that automate processes within the project. Management based on system thinking, which includes a wide range of factors and relationships between them and determine the project, can dramatically change the results achieved in projects and eventually affects the entire company.

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