The use of game theory to eliminate communication risks of creative activities in project management

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Abstract: - The project success relies on many factors. But none of them has such an importance as the creative thinking in project communication. This paper discusses the importance of properly set up of communication strategy in project management. It mentions the importance of the impact of creativity on the correct formulation and implementation of communication strategy. Next, it describes one of the less known methods of creativity in communication - game theory. It illustrates the effect of the creative methods on the success of communication with all involved persons in the project. It defines the proper setting of the communication strategy as one of the factors in the elimination of risks in projects. It evaluates the relation between the game theory and creativity towards the successful finalization of the project through the presentation of practical examples. It confirms the Bitlon and Cumming's (2014) hypothesis that the use of game theory makes it possible to understand the needs and interests of the involved persons in a better way and to finalize the project successfully. This paper represents one of the outputs of project KEGA No. 003/DTI-4/2014 with the title of Diagnostics System for Identifying of Competencies of Managers of National and International Educational Projects.

Key-Words: - Project, project management, communication, creativity, risks, game theory

1 Introduction

There is no need to explain the famous quotation of the French mathematician and philosopher René Descartes "Cogito, ergo sum" (I think therefore I am). It stresses the process of thinking as a primary quality of men. However, this specific human skill needs to be developed and supported. That is something every one of us should try to do. Not only learning facts and pieces of knowledge, also creative thinking and using this ideas in communication with all involved parties of a project are essential. It is anticipated that this will lead only to a minimum amount of risks which need to be solved flexibly and which could have negative impact on the success or early finalization of a project.

Creative thinking represents a combination of logical and intuitive approach. Intuitive thinking reflects the nature of men, their ability to react

instantly, as a specific form of cognition and learning. Logical thinking respects the law of origin and development of correct, subsequent linear judgement and making conclusions. At creative solutions, logical thinking has to be supported by the intuitive thinking, and, on the other hand, intuitive thinking needs the logical thinking for checking the correctness of an approach or clarification of an idea to the others and making it applicable for the final solution. Real creative thinking as a basis for a successful project communication, requires therefore merging and combining of both the approaches [16].

Every man is creative. However, courage and a certain amount of general knowledge of options how to develop the creativity are often needed, as well. This can be learnt. Habits, every-day rush and thousands of prejudices, however, suppress our creativity. Being creative means to deal with aspects and options of today and tomorrow. It requires an

open mind to new things and not clinging to known things of yesterday.

The science of understanding the creative mind is called creatology. Psychology describes it as "an open system for self-creation, as well as unfinished upbringing, education, management of people as an option how to predict future, for pro-active and productive being process" [6]. Important factors of creativity are defined by unique features of creative personality. Creative people do not mind taking risks, they state their ideas out loud, have courage to cross boundaries of conventions, play with their ideas, have limitless ideas, humour, originality without trying to draw attention, have great capacity for concentration, are persistent, tenacious, targetoriented, flexible and open to changes, with ability to see all parts of the problem -, not focusing only on one, are curious, always interested in everything around, and highly intelligent.

[13] says, that the thing hindering men in selffulfilment, is stress, fear and different difficult situations, in which the adaptation mechanisms are being established, i.e. different ways of adaptation.

Intrapersonal and interpersonal creative skills at individual members of project team or at the project manager are marked by the ability to join team work, use self-control, self-regulation, self-evaluation and making own decisions. It is also important to prove the ability to verify the gained knowledge, critically evaluate opinions, positions and behaviour of others.

The ability to creatively solve the problems are marked by problem recognition, using all methods and means available at the moment for expressing or describing the problem [4].

According to [7], everywhere it is possible to use any strategy to support creativity, the game theory concept can be applied.

2 Aim

The primary aim of the article is to define game theory as one of the creative methods in project communicative strategy, whose correct setting leads to elimination of project risks.

The secondary aims are:

- defining modern concept of creativity and its influence on communication in project management,
- defining game theory and stating practical examples,
- assessment of the relationship between the game theory and creativity and the success rate of

finalization of projects, stating practical examples.

3 Methods

We used these methods:

- Literary research (monographs, specialized magazines, branch databases, internet sources listed according to the date, importance and relevance to the discussed topic).
- Qualitative analysis by structured interviews with project managers about application of specific approaches and methods to risk management. The managed interviews were carried out in person or by sending prepared questions via e-mail.
- Quantitative analysis by questionnaires sent to project managers with the aim to find out possibilities of usage of a specific method at problem solving within the selected project. The questionnaires were given to the managers in person or delivered by e-mail.

4 Discussion

4.1 Creativity

Creativity means creating something new and useful with the help of imagination. It is the capacity for inventing new, original solutions to problems. Creativity is a mental process, using the right hemisphere. It is related to intuitive thinking, forms and patterns.

It has been a lot said and written about creativity. There is, however a lot of prejudices related to it, as it is visible in chart No. 1. These have to be taken into account when working with creative methods, not only in project communication.

According to [1], creativity consists of five elements:

- 1. Resourcefulness: ability to create a wide flow of ideas.
- 2. Flexibility, brightness: ability to modify an idea or jump from one to another. In the flow of ideas, people usually exploit one category and then go to another.
- 3. Originality: unusual new ideas (red → Red Riding Hood). This type of thinking is supported by crosswords, word and logical games, brain-twisters etc.
- 4. Imagination: birth of ideas that are not obvious at the first sight.
- 5. Effort (tenaciousness): creativity is not only inspiration, but also hard work. If the previous ideas are not sufficient, you need to come up with other; approach the problem

from other point of view. Attempts to solve a problem do not mean that you work the same way, just more tenaciously. You have to try other and wider paths leading to the target (or walk uncharted paths).

Chart No 1. Characteristics of creativity

Prejudice	Reality		
Creativity means	Creative people usually work with		
creating something	existing ideas or basic principles		
completely new			
Only experts can	It is often beneficial to be an		
create something	outsider, as they are not limited by		
new	traditional ideas		
Creativity is a gift	Motivation and desire to create is		
granted only to few	more important than inborn talent		
people			
Creative people	If a creative person wants to		
need to be	succeed, he needs to be quite		
emotionally	confident, have a curious mind, but		
unhinged	not losing general control		
A creativity in a	To be able to show your ideas, you		
person comes	need to push them; a creative		
always out	person needs to advertise his ideas,		
	but tactfully		
Ideas are fruits of	Glimmers of genius are an		
inspiration, not	exception, not a rule; usually, they		
effort	come after a lot of effort, probably		
	as an idea, developed gradually		
Creativity requires	Complexity can destroy creativity;		
advanced	everything should be done as		
technology	simple, as possible (but not simpler		
	- Einstein)		
This is the best it	There is no best solution, but there		
goes	are a lot of good ones; you cannot		
	use the same methods for solving		
	all problems		

Source: [1]

4.2 Methods of creative activities

Every solved problem represents generally doubled benefit: one is the solution for the problem, the other a new solution method. There are a lot of methods for enhancing creative performance – from random choice (Monte Carlo) through iteration method, heuristic methods to vepol analysis and use of game theory. All of them focus on something else. Some are more suitable for a creative individual, some for whole creative teams.

The great importance of creative methods is visible by a big number of published works on this topic. In them, we encounter big intentional incompleteness (e.g. [3], [4], [8], [9], [11], [13], [16], [19]). This is due to the fact that the "technological processes" of mental creation are by far more important and more secret than the products of these activities themselves. It is not

necessary to learn all the methods. You just need to know some of them. The individual methods often overlap, combine and enrich each other. From the point of view of the whole creative process, gradually, more methods are being used, usually according to the phase of the creative process. The existence of a great number of methods allows big number of combinations, which usually result from a compact concept or a general strategy.

4.3 Game theory

Game theory is part of applied mathematics. It can be used in biology, politics, international relations or philosophy [17]. It focuses on decision making in teams and groups of people, where the result of every "player" in that situation ("game") is dependent on the activities of other players. Using the game theory, it is possible to predict individual success of an individual in relation to the choice of team members.

When you are a part of the game and decide on the next steps, you need to take the choice of the others into account. However, when you think about their choices, it is necessary to count with that that they are thinking the same way. In the moment of coming up with own strategy reflecting the ideas of the other "players", you need to know they are doing the same. And this goes on and on, as stated by [5]. Simply said, according to [17], "the content of game theory is analysis of a very wide spectrum of decision influencing situations".

The "prisoner's dilemma" is a classic example of game theory [5]. We rank it to the non-zero-sum games. The dominant strategy is non-cooperation, meaning that no matter what strategy the other player chooses, non-cooperation always results in better result for the player than cooperation [21]. In the segment below, we describe an example of game theory application. It is based on true story, with slight changes.

Petr Meternich is a manager of an international project and went to a business trip to Egypt to negotiate better terms for supply of project components he needs for his work. The negotiations went smoothly and were a lot shorter than originally planned in his timetable. Thanks to that, he had time for sightseeing and buying some souvenirs. After buying all he wanted, he ran into a storekeeper who offered him a bottle of luxurious French cognac for only half that money it is being offered at home. As Petr knew about the habits in the Orient, he tried to engage a negotiation about the price. After couple of minutes of arguing about the price, he was able to reduce it to a half. Back home, Petr kept the cognac for a special occasion. A few weeks later, he invited

members of his project team to have a glass of the cognac with him to celebrate the successful finalization of the project they have been working for on for several weeks. They opened the bottle, he explained the circumstances of its acquisition and poured a glass of it to the guests. It is not hard to imagine his horror when he realized that there was no cognac in the bottle, but only tea. Petr would not have to experience this shame, if he knew the game theory and the prisoner's dilemma.

Let us say that the French cognac costs 4 thousand crowns in Czech Republic, whereas in Egypt, it was offered cheaper - for 2 thousand crowns, and our tourist was able to cut it down to one thousand crowns. If they were both honest, Petr would get much more expensive French cognac for his one thousand crowns. The losses and gains of both parties would be the same, as it was a fair trade, where no one benefits from the other (CC result). Fair trade, however, is risky for both sides. As Petr wanted to bring the bottle home as gift, he was not able to open it in front of the storekeeper. Of course, he heard that some of the storekeepers are liars and there can be only colourized water in the bottle. Therefore, Petr, as a Christian, could try to cheat the Muslim with a few fake Egyptian pounds and pays with them. The Egyptian storekeeper would not be able to unveil his cheat immediately. Naturally, there was no UV lamp in his tent, making the fake money unable to identify. He would have found it out only later, in the bank.

If the storekeeper was honest, he would reach a result according to the CL situation. This means, Petr would benefit by 3 thousand crowns from this situation, because he would get cognac for one thousand and save another two thousand crowns. The Egyptian would lose goods for one thousand crowns, his loss being one thousand crowns. If Petr was honest and the Egyptian storekeeper not, the losses and gains would be exactly the other way around. Petr would lose one thousand crowns and the Egyptian gain one thousand crowns, keeping his goods for one thousand crowns (LC result). However, the Egyptian storekeeper might also had heard about cheating Czechs. As soon as he realized his customer was Czech, he might not have hesitated and offered him fake cognac. And so, Petr would use his fake money for getting fake cognac (LL result). Similarly to the KK situation, both sides are equally off at the end, as no of the parties cheats the other. However, as both sides benefit in the CC situation (one gains a bottle of cognac and the other money), in the LL situation, none of the parties gains anything of value (one gains tea for cognac and the other fake money).

The idea of this game is that after lying to the other party, the benefits are higher than at fair trade (LC>CC), and this leads to temptation of the players to cheat the opponent. If we wanted to be nonegoistic, decent and cooperative, we would face a big risk of being lied to by the other party who will not hesitate to lie to us. So even an honest person, afraid of being taken advantage of his or her desire to cooperate, cheats as an act of preventive "selfdefence". If both parties think logically, there is only one possible result in the game of the prisoner's dilemma type - LL. Strictly speaking, this is very sad, because both the parties would be able to cooperate and gain more working together. question principal is, under which circumstances a mutually beneficial cooperation (CC) can be arranged.

Chart No. 2 - usefulness matrix - example No. I

	EGYPT		
		honest	lying
CZECH REPUBLIC	honest	CC 1000/100	CL ¹ 1000/2000
	lying	LC 2000/1000	LL 0/0

Source: [own research]

We have been mentioning the Prisoner's dilemma. However, our example should better be called "storekeeper's dilemma". To cheat or not to cheat the customer? [25].

5 Results

The game of "Prisoner's dilemma" brought many discussions about proper playing of the game. To be more precise, what the rational way of playing it was. The answer seems to depend on whether you play it only once or with infinite repetitions. The situation would certainly be completely different, if it was played repeatedly by the same players. In such case, every player gets new strategic options. If the other player chose to confess in the first round, the other player can choose so in the second round, as well and punish his opponent for acting in bad faith. In a repeated game, every player has the opportunity to create a reputation of mutual cooperation and bring the other player to doing the same. Implementation of such strategy will

 $^{^{1}}$ C = cooperate, L = lie

significantly depend from the game being finite or infinite.

Considering the first example, if the player knew that the game would be player 10 times, what would the result be? Let us focus on ten rounds. The players assume they are playing for the last time and it is probable that each player chooses balanced solution at dominant strategy and fails. At the end, when playing for the last time, it is the same as if played only once. So the same results can be expected. Now, what happens in round 9? We have just established that in round 10, both players fail. Then, why not cooperate in round 9? If you cooperate, the other player may fail and take advantage of your good faith. Each player can think this way and both would fail. What happens in round 8? If the opponent fails in round 9... And this goes on and on. If there is no way to secure cooperation in the last round, there is also none in the round before the last etc.

The players cooperate because they hope that the cooperation will lead to more cooperation in the future. This, however, requires a continuous possibility to play. As there is no such option in the last round of the game, none of the players will be willing to cooperate. So why should any of them want to cooperate in the round before the last? And this goes on and on. At the prisoner's dilemma with known number of repetitions, the cooperation solution is being deducted from the end [22].

John Opfer and Ellen Furlog from Ohio State University wrote for Psychological Journal (published in [20],) an article about an experiment they conducted in game theory. In it, the scales of reward were set in this way: both parties gained 3 points for cooperation, cheating a victim who did not see it coming was rewarded by 5 points (naturally, the victim gained nothing), and both parties gained 1 point after cheating each other. This led to an interesting result what the authors mention before publishing it: the peoples' willingness to cooperate grows with the offered reward. If one point represents 100 dollars, people will be more likely to cooperate than at the reward of one dollar for a point. We might not like each other, but if we can earn good money, we are able to put our differences aside. The actual subject of the experiment showed even more interesting results. They showed the influence of numbers on people: 100 cents and 1 dollar are the same. However, subconsciously, people thought that 100 is more than 1, as the authors interpreted the results of the study. If 1 point represented 100 cents, the volunteers were more likely to cooperate than if they were told that one point means one dollar. Furthermore, the people did not differentiate the units. A game with 100 cents had similar cooperation rate than a game with 100 dollars.

The authors of the study used in both cases 48 students (24 played for a dollar, 24 for a hundred cents) as volunteers, who played together 80 game rounds in total [20].

6 Conclusion

The projects differ from every-day working activities in several aspects. Among their basic attributes, there is uniqueness (effort to accomplish SMART targets), complexity and complicated structure (solving non-trivial problems with selected methods), team work (cooperation of experts on a selected topic), limitation (costs, time and resources), non-repetitiveness (carried out only once with no further repetitions) and last, but not least above-average risks (unknown environment, lack of information, unexpected traps). Also the triple imperative of the project shows that the risk attribute is very important. Risk surrounds the project, being in the inner, as well as outer environment and having a considerable impact on its successful implementation (meeting the target, observing the budget and timetable). The triple imperative is an equilateral triangle. If the risk changes one factor, the other factors are affected, as

The most important job of a project manager is managing the communication (he spends 75–90% of the time with it) with the involved parties. Among them, there usually are the project sponsor, the customer, suppliers, members of the project team as the project realizers, competition etc. Simply, anyone (an individual, subject or a group) who has an influence on the project or can be influenced by it. There is a lot of communication channels and a communication strategy needs to be established to manage them. The selected communication strategy may be very helpful for the project, as well as severely damaging. Without an effective communication, the involved parties may find themselves missing necessary information and will not understand the needs of the project. A successful project communication should focus on realistic aspects of the project and outputs which should be part of the result, and not hypothetic and negative information from other areas. To prevent creation of negative emotions, the communication needs to be open and intense and need to ensure all relevant project members have the necessary information in time and in good quality. Also the public needs to be sufficiently informed and motivated.

From the above mentioned examples, it is clear that game theory has its place in project

management and is for it quite utilizable. Besides, a well-defined communication strategy built on the principles of game theory may reduce or eliminate the probability of risk (problem) creation. It also helps thinking about the bigger picture.

- What is the aim of the game?
- Who are the main players?
- Which players will have fundamental impact on the result?

The important "players" of the game (project) need to be known very well. Therefore, we ask these questions:

- Who will be in delay and who will finish early?
- Will the players decide independently or will they wait for the decision of the others?
- Which players will need to accept commitments to support the project? What type of commitments will it be? Is it good to prefer them?
- What negotiation procedures may be used?
- What are the aims of the other players? Are they rational?
- What are the preferences, priorities and capacities of the individual players?
- How do we satisfy the needs of the players?
- How do we gain common benefit?

As soon as we answer these questions, we are able to create a strategy with potentially best result.

Also in the current business world, we can find companies which are using different creative methods, incl. game theory, to carry out successful projects. For example, the fashion industry. Every successful company in this sector implements many successful projects every year, as the market is pushing them to renew their product lines, i.e. their brands, every season. They repeatedly enter the market with products the customers did not know they needed, creating such big demand that last year's fashion seems to be terribly old-fashioned. A fashion brand which is not able to be this flexible and creative is doomed to end quickly. Companies in the fashion industry have created a creative organizational model, ensuring continuous ability to implement successful projects, no matter what the economic situation is. The basis of this model is specific partnership in the company management based on fixed communication strategy, trained and supported by different methods, simulations and games. One of the partners, generally named creative director, is the leading creative personality with dominant right hemisphere, producing new ideas every day, being able to channel the future desires of the customers. Another partner, the brand manager or brand CEO, is a person with dominant left hemisphere, a skilled salesman, who feels comfortable with non-sentimental decision making based on analysis.

The most successful companies work within a version of this "brain partnership", which is, however, based on strict communication strategy and endangered by communication risks.

In terms of technological companies, a similar model was visible also within the partnership of the brilliant engineer, Bill Hewlett, and smart manager, David Packard. In the car industry, it was Hal Sperlich and great manager, Lee Iacocca. The former athletics trainer, Bill Bowerman, developer running shoes Nike, and his partner, Phil Knight, took care of the production, finances and sales. Howard Schultz came with the idea to establish a network of coffee shops named Starbucks, and his CEO, Orin Smith, took care of fast development of the chain. However, the best example is **Apple.** Its CEO, Steve Jobs, always played the role of creative director and participated in forming absolutely everything, from product design and user interfaces to customer influence in company stores. And Tim Long, as the COO, took care of the day-to-day operation. Despite the fact that this model was perfected by fashion companies, also companies like Procter & Gamble, Pixar or BMW used it, gaining remarkable results.

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