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RATIONALITY IN DECISION-MAKING WITHIN INTER-ORGANISATIONAL NETWORKS

Abstract. A networking structure is a natural phase in the evolution of organisational forms. An organisational form of a network is a set of interconnected structures and technological elements, i.e. individual economic agents, cultural and social values that arrange inter-organisational relations in a certain order and make network processes operate in a system-like fashion. Effective joint work in inter-organisational networks suggests a need for a common goal, which is perceived to be a critical factor for joint activities.

The paper studies the rationality of decision-making for inter-organisational networks. The analysis of behaviour within inter-organisational networks that consist of agents, like firms, entrepreneurs, governmental authorities, scientific centres, proves that group decisions are not always an optimal method to achieve a goal. There are certain tasks and circumstances when an authoritarian approach to problem solving is more sensible. It analyses a formalized model for joint choice, prevailing practice and rationality of group decision-making in order to reach a strategic balance within a network. The study summarizes key advantages and drawbacks in case a decision is made by a group.

Keywords: inter-organisational networks, rationality, decision-making procedures, strategic balance, cooperative game, coalition.

Problem definition

Current organisational development presents numerous challenges; and a major one is how to change an organisational structure of companies

and transform them into networking unions that can secure effective innovative cooperation. A networking structure is a natural phase in the evolution of organisational forms. When traditional market relations between companies or a hierarchy that occurs as a result of an integration of a few firms under single management turns out to be inefficient, they can be reshaped into a hybrid organisational structure, i.e. a network.

The following factors catalyse the development of networking structures:

- aggravated competition and its upscaling to the global level
- complicated industrial and commercial activities
- highly unpredictable external environment
- elevated importance of information as a resource
- increased value of a time factor, and
- a wide range of product and service offers with their lifecycle being shortened, and innovation pace accelerated.

An organisational form of a network is a set of interconnected structures and technological elements, i.e. individual economic agents, cultural and social values that arrange inter-organisational relations in a certain order and make network processes operate in a system-

like fashion. In order to establish and develop an inter-organisational network the following key conditions are required:

- a number of companies that already interact or can potentially interact in a system of a single business process, and can get united with a view to a potential growth trend in a define market segment
- companies that have common technological features and specialize in certain products or technologies that demonstrate the signs of potential innovative development
- connections with scientific and research centres that have achieved highly entrepreneurial culture, importance and recognition within a scientific environment
- well-developed infrastructure that supports the work of innovative and industrial complexes, and
- national economic policies that encourage networking and clusterization of economy.

Relevance of the problem

The studies of inter-organisational networks reveal many blind spots; in particular, how network agents make decisions while being part of a group. Traditional economic theory does not consider an impact of a type of a decision-making subject on decision content. Only recently, some studies into this issue have been undertaken, i.e. whether a subject that makes a decision is an individual or a group. While analysing the difference between the aspirations for the expected equilibrium felt by individuals and a group, we find ourselves in an understudied area of economics.

Group decisions can be correctly explained neither by merely summing individual variants of a choice in the course of decision making even with a view to a network structure and its strategic goals, nor by a theory of group decision-making used in psychology [1]. A greater number of scientists are striving to learn a difference in behaviour of a group and single individuals, if any, and they apply instruments of experimental economy while analysing the behaviour of individuals and groups in the controlled laboratory environment [2–4].

Setting goals and objectives

The task of this paper is to identify the rationality of joint decisions within inter-

organisational networks. The study is based on the postulate of individualism, according to which group decisions are generated as a result of certain rules of a choice. The methodology should be based on constructive and cognitive approaches to a decision-making system. The first approach stimulates creativity and mental activity, while the cognitive one encourages a quest for universal and multilateral links between various aspects of a decision-making process.

Main material presentation

Let us consider a formalized model of a joint choice and approaches to its analysis and solutions. Imagine, there is a network consisting of a N-number of agents, $N = \{I_1, I_2, \dots, I_n\}$. A problem occurs, when the network runs into a set of objects, like projects, plans, orders etc., and it has to make a choice and select one or a few objects. Here, the objects creating an set $A = \{a_1, a_2, \dots, a_m\}$ are called alternatives. The task is limited to selecting a single element from an A set, and when a single element is chosen, a problem of a decision-making is solved.

Before the network proceeds with the decision-making, its agents have to examine specific features of every alternative and make their own evaluations. And every network agent builds their own attitude towards alternatives in terms their attractiveness. It is irrelevant, whether an agent is led by subjective reflections, considers an alternative's objective characteristics or adopts a boundary strategy. Based on alternative evaluations and using a certain rule, the network proceeds with selecting a single alternative. The rule used in decision-making is known as a function of a joint choice, a voting procedure, an arbitration scheme etc.

The quality of a group decision-making depends on a few key factors:

- firstly, a task that should be solved
- secondly, a composition of a network
- thirdly, a decision-making procedure (formal or informal).

It is the fact that a hierarchical organisation (well-organised, formalised) is far better in solving structured and define tasks, and is quite poor in dealing with undefined and stochastic jobs. Hence,

a network is likely to demonstrate the opposite, as it does not have any hierarchy.

In management, the most popular rules or procedures for group decision-making are the following:

- Consensus or a rule of unanimity, when all group members agree upon a selected alternative. High costs of unanimous decision-making, when any individual has a right to veto, limit a wide application of this method. In practice, a rule of simple majority is mostly employed. However, it can lead to intransitivity of advantages, which is one of the postulates of rational behaviour. In order to eliminate the intransitivity of advantages, it is necessary to set limits that substantially change the procedure of joint decision-making.

- The rule of simple majority is a procedure when a group choice coincides with a choice of at least $\lceil n/2+1 \rceil$ group members. While knowing individual preferences of all pairs of a_i and a_k in an A set, it is quite easy to identify a group choice: the alternative selected by the majority is in the first place, and the second place is taken by the alternative selected by the rest of the group.

- The rule of a qualified majority is more rational, and implies that the higher the interest of a group member in a certain group decision, the higher the value of a rule of an individual veto.

- When making decisions in a group, international organisations and joint-stock companies often use a rule of weighted majority, when a country-member or a stockholder has a certain number of votes depending upon a size of their contribution or a number of shares they own. However, under these circumstances, an opinion of minority is ignored.

- A principle of dictatorship is a rule when a group decision is a decision of one of its members; the thoughts of other group members are ignored; and it is applied in a force majeure event [5].

- A summation strategy considers an opinion of all group member, and it is widely practiced. According to this strategy, the alternative that gains a higher (or lower) rank in comparison to a define benchmark is considered to be preferable.

Group decision-making rationality implies a state of a strategic balance. In the Nash equilibrium,

the theory of economics decides on an optimal strategy regardless of a decision-making subject. However, when decision-making subjects behave in the way that differs from the one defined by an equilibrium, their behaviour becomes more important for making decisions. The Nash equilibrium correctly describes the stability of contracts implemented by the members of a strategic coalition. It is rightfully criticized, as in order to reach it as a result of a game, all players should choose one and the same equilibrium strategy, even in case there is more than one equilibrium strategies (stationary level).

There are quite a few detailed explanations of the rationality of using equilibrium situations. For example, a reflexive behaviour of a group can result in making decision in favour of an equilibrium situation. Another benefit of the Nash equilibrium is the creation of a 'centre', an advisory body that theoretically provides recommendations for players. At the same time, if a player, on his own, deviates from the suggested recommendations, he cannot win. Hence, it makes sense for him to follow what is recommended by the centre. However, this approach somehow contradicts the principle of a non-coalition game, as the 'centre' formed by all players, in its essence, represents an information coalition.

Pareto optimality is the most widely accepted principle of rationality used in the theory of games. This principle is opposite to the Nash equilibrium which is the pinnacle of a player's individual behaviour. After Pareto, efficiency is measured by the level of cooperation. Pareto says, in order to reach an optimum situation it is often necessary to exchange information between agents, coordinate their actions or even compensate some players for performing certain activities. Theoretical game models that consider such interactions are the subject of the theory of cooperative games. Their core idea is to stop analysing the process of negotiations as such, but analyse its results and make conclusions on how well the results of negotiations are implemented, how stable they are, as well as how stable coalitions of players are. Hence, the elements of a formalized conflict are not the actions of its players, but the outcomes that can be secured by such a coalition.

A classical cooperative game is a mathematical model of an economic situation that anticipates certain agreements upon common strategic behaviour. When interacting, participants of an inter-organisational network receive commensurable gains that can be soon re-distributed among agents. The game also implies that individual wins are scalable, so that the result's usefulness is transferable for any pair of members.

A coalition based on the Stackelberg equilibrium is stable, as cooperation facilitates information exchange, therefore a behavioural asymmetry is evened. Coalition after Nash is unstable, because an equal weight of its agents entails an equally high level of information asymmetry that cannot be normalized in a short-term period. When information exchange is ceased, the equilibrium is ruined, and as a result, the probability of expected gains in the course of inter-organisational interactions in the equilibrium, changes.

Obtaining information from a reliable source or a mediator, information price and an ability of each agent to make a decision on the basis of such information pose yet another challenge. Modern economic science is unable to offer a method of mass data evaluation that could provide a decisive answer how an agent of an inter-organisational network should behave, in case an information price set by a mediator is very high, or most likely, information asymmetry is high, i.e. information limitations, strong lobby, tough bureaucracy etc.

After Nash and Stackelberg the level of information perception is different, and this makes an impact on the relations among network agents. For example, the value of external information for a Stackelberg network agent is always lower than for a Nash coalition member. In the first case, a leader has an opportunity to influence without a support from his followers; and in the second case, a need to keep the balance of interests makes it impossible for a network member to change his tactics unilaterally.

Effective joint work in MoMax suggests a need for a common goal, which is perceived to be a critical factor for joint activities. In the course of the cooperation, a network should develop and make agreed decisions. Natural limits of human capacities to process and store information are one of the reasons in favour of group decisions: these limits

influence human behaviour and are a source of numerous inconsistencies, contradictions, 'traps' and constraints in decision-making.

Therefore, decision making within a group is more effective, because such decisions are more rational and less subjective. Discussions among agents can thoroughly consider various alternatives and eliminate unfavourable options. A group is more successful when dealing with difficult tasks than individuals due to an objective division of labour depending upon various skills and abilities of network agents. A group can do better situation analysis and offer better solutions, as it has more information and knowledge and makes less mistakes when processing data. The participation of a group in making a decision and then its implementing could substantially increase its efficiency, as such an approach creates a desired effect of involvement, and we can talk about integrated work of individual network agents who gain valuable skills for the future.

While demonstrating clear advantages, group decisions could have a good number of drawbacks; in particular, a group spends more time on making a decision than an individual. The time increases, as it is necessary to prepare a network for joint work, establish and maintain contacts among its agents, agree opinions and summarize results.

A group can sometimes make decisions that do not agree with the goals of a higher organisational level. Insufficient knowledge of network strategic goals, personal motives and contradicting interests of some agents who delegate their candidate to make a joint decision are just a few reasons for such a disagreement.

A typical situation is when a decision made at a higher level, without other company members, faces opposition. It is difficult to deviate from a tradition of group decision making. At the same time, in case decisions are used to be made unilaterally, any attempt to have organisational members participating in decision-making will be likely unwelcome and suspicious.

A problem risk level is one of the core difficulties related to group decisions. As most of the studies show, a group risk is higher than a risk of a decision made by an individual [7]. A risk escalation in case of group decisions is called a risk shift. As Kozeletsky Yu. stated [6], risk shifting

came out as a surprise. Everyday observations look like testifying to the opposite; group decisions are more cautious. However, numerous data, from the area of psychology in particular, prove that a human being that works within a group, is ready to make decisions with a higher risk level. There are a few hypotheses that try to explain the reasons for risk shifting in a group, like a shared responsibility for the results among group members, a desire to follow a leader's choice, and unwillingness to appear more cautious than the other etc.

'Group thinking' is another peculiarity of group decision making. This is a style of thinking for people who are fully involved in a single group and in this group an aspiration for unanimity is far more important than a realistic evaluation of potential variant [7]. For these people, it is crucially important to maintain a unity of a group and a friendly environment, to satisfy interests of group members, as well as one's own interests. These impede rational analysis of a situation and decrease the quality of decision-making. Subsequently, it creates a negative attitude about a possibility of another opinion, i.e. if any group member doubts a decision; he is blamed for being non loyal. A group spontaneously produces people who become watch guards and monitor information inflow that could challenge the authority of a group and decisions it makes.

In general, 'group thinking' is characterized by conformism, biased information selection, unjustified optimism, and confidence that a group has all advantages to cope with complex economic and political problems. Psychological studies demonstrate, the stronger the dependency of a group on its leader and the stronger the status of the people that make such a decision in a group (coalition), the higher the risk of 'group thinking'.

'Mistaken agreement' and 'virtual leader' are among other drawbacks of group decisions. The first phenomenon means that because of low competence of certain group members, the weakness of their personal status or unwillingness to put some efforts and improve their knowledge and competencies, they find themselves in some sort of vacuum. They do not participate in group discussions, but clearly emphasize that they entirely agree with an option of a leader or that of a majority, and this is not based on logical arguments,

or moreover, could conflict with their individual preferences. It is important to note, group decision making could also trigger a reverse behavioural pattern, i.e. a desire to 'get noticed' and accentuate one's role in a process. This generates another phenomenon known as '*demonstrative disagreement*' [7].

'Virtual leader' phenomenon is less known though being well studied and explained. This is a subject who does not really exist in a group, but as a meaningful part of a group thinks, should '*soon appear and solve a problem*' [7]. On the whole, this phenomenon is negative, and the only positive moment is that while waiting for a 'virtual leader', in some cases, a group can be very scrupulous in preparing and explaining its choices.

It is worth mentioning one more group phenomenon called '*deliberate conflict expansion*', which is quite often employed by managers [7]. Its task is to aggravate tensions within a group intentionally so that at final stages of decision-making, the key role is not for sensible and meaningful arguments, but for emotional and interpersonal factors. Hence, apparent incompetence of some group members who are most interested in this situation, is shrewdly masked.

Conclusions

The analysis of behaviour within inter-organisational networks that consist of agents, like firms, entrepreneurs, governmental authorities, scientific centres, proves that group decisions are not always an optimal method to achieve a goal. There are certain tasks and circumstances when an authoritarian approach to problem solving is more sensible. It is quite typical when a manager or an expert has far greater knowledge about a situation than the rest of network agents. Decisions made collectively are not always better than those made individually. However, the latest studies confirm that a group decision is more effective in comparison with individual in case it relates to tasks that are not formalized, as well as to problems that require a high level of expertise.

Comparison of individual and group decisions is far understudied, particularly when considering time for making a decision, strategic value of a decision, availability and accessibility of

mass data, psychological and emotional linkages with a network etc.

References

1. Levine, J. M. & Moreland, R. L. (1998). *Small groups. The Handbook of Social Psychology, 4th ed., Vol. 2, P. 415–469.*
2. Bornstein, G. & Yaniv, I. (1998). *Individual and group behaviour in the ultimatum games: are groups more “rational” players. Experimental Economics, Vol. 1, P. 101–108.*
3. Cox, J. C. (2002). *Trust, reciprocity and other-regarding preferences: groups vs. individuals and males vs. females. Avoidances in Experimental Business Research, Vol. 108, P. 331–350.*
4. Blinder, A. S. & Morgan, J. (2005). *Are two heads better than one? An experimental analysis of group vs. individual decision making. Journal of Money, Credit and Banking, Vol. 7, P. 183–191.*
5. Cason, T. N. & Mui, V.-L. (1997). *A laboratory study of group polarisation in the team dictator game. Economic Journal, Vol. 107, P. 1465–1483.*
6. Kozeletsky, Iu. (1979). *Psychological theory of decisions. Moscow: Progress.*
7. Diev, V. S. *Joint decisions: pros & cons. Retrieved from www.philosophy.nsc.ru.*