

Interaction of Main Stakeholders in the Innovation Process

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Abstract - The interaction of main stakeholders in the innovation process has been researched using co-operative and non-cooperative game theories. In general, these are analysis and synthesis based methods for studying individual problem elements and process components in order to establish the underlying interactions among stakeholders involved in the innovation process. Innovation will emerge in quantity and quality that is dependent on the outcome of the interaction of four stakeholders: academia, entrepreneurs, government and society.

Keywords – game theory, innovation process, Shapley value, stakeholder interaction.

I. INTRODUCTION

The concept of innovation has been broadened from technology to cover wider social, systematic, organizational and service innovations. The new concept has substantially evolved ever since. In spite of this, the ability to generate new ideas and apply them commercially is an important driving force in the market. This process is equally important for all business areas and sectors (industry, services). According to innovation planning, innovation is defined as a process, where new ideas and technologies from scientific, technical, social, cultural or other spheres are transformed into a competitive and demanded product or service on the market.

According to the European Union (EU) policy, a research and innovation policy measure is defined as any activity that:

- mobilizes resources (financial, human, organizational) through publicly (co-)financed research and innovation programs or initiatives;
- funds the generation or diffusion of information and knowledge (studies, road mapping, technology diffusion activities, advisory services, and public-private partnerships) in support of research and innovation activities;
- promotes an institutional process (legal acts, regulatory rules) designed to explicitly influence organizations undertaking research and innovation;
- implements measures on an on-going or multi-annual basis, rather than being a “one-off event” or a “single project” [10].

Usually economists and planners muse on the innovation concept, innovation types and devote special attention to innovation management and innovation system. Even if innovation management has been considered as the key driver for sustainable growth and competitiveness, innovation

management is an expedient to reach the target of the definite stakeholder. As stakeholders are different with different preferences and goals in the innovation system, it is necessary to discuss the interaction of main stakeholders in the innovation process. Innovation process includes four main stakeholders: academia, entrepreneurs, government and society. Sometimes they have the same goals, but sometimes they have different goals. They rather often use the different ways of how to achieve them. Most probably, the common goal is to improve the welfare of the people in the country, but at the same time rational individuals are willing to maximize their own benefit. For example, companies intend to maximize profit trying to be innovative. Companies, which work and rely mostly on individual creativity, skills and talent, have a higher probability to produce innovative products or services and, thus, maximize the profit. Society usually exploits opportunities to make them better off. Allegedly, the government is interested in the development of national economy, in the increase of society’s welfare and in more effective allocation of resources. They have to act in the public interest. However, public choice theory reveals that rational politicians also exploit opportunities to make them better off.

An economy is a system for coordinating the productive activities of many people. In a market economy, such as the one we live in, coordination takes place without any coordinator: each individual makes his or her own choices. Yet those choices are by no means independent of each other: each individual’s opportunities, and hence choices, depend to a large extent on the choices made by other people. Thus, to understand how a market economy behaves, we have to examine this interaction, in which my choices affect your choices, and vice versa [1].

Therefore, it is useful to analyze the individual choices, behaviour, possible strategies and outcomes of individuals who interact with each other in the innovation system. Situations and actions of stakeholders in the definite circumstances can be conflicting or cooperative, depending on their interests. Therefore, it is necessary to analyze the current situation of stakeholders and their interaction in the innovation process using game theory.

II. STAKEHOLDER ANALYSIS

Innovations, whether they are continuous improvement, effective management, in general, have a potential creating wealth through the generation and exploitation of information, knowledge and intellectual property. Therefore, the alignment

of educational policies plays an important role. Alignment and integration of educational and innovation policies primarily depend on the capability of the education system to produce the required specialists for various fields. On the basis of future labour market tendencies, the courses of the current labor market policy should be based on the stimulation of supply of the mid-level qualification of labour force and the implementation of a more effective higher education supply. It means that the quality aspect should be valued higher than quantity. The essential problem in higher education is that the number of candidates decreases. The number of students in Latvia has been decreasing since 2007. For example, the number of students who matriculated in the 2008/2009 academic year was 102211, in the 2009/2010 academic year it was already 91770 and in the 2010/2011 academic year – only 84235. The number of applicants is forecasted to decrease by 50% (due to a demographic decline) in 2015–2017. Evaluation of tendencies of changes in the number of foreign students reveals that their number keeps growing each year; however, the growth is rather minute, by 4–6% a year on the average, and the number of foreign students accounts for merely 1.2% of the total number of students [12]. The second problem is connected with the proportion of students by thematic groups of education that are funded from the state budget (Fig. 1).

The distribution of students by thematic groups and fields of studies has not changed significantly in recent years. At the moment, every other student in Latvia is studying social sciences. The number of degree holders in natural and engineering sciences in Latvia is insufficient and insignificant in comparison with the number of degree holders in social sciences.

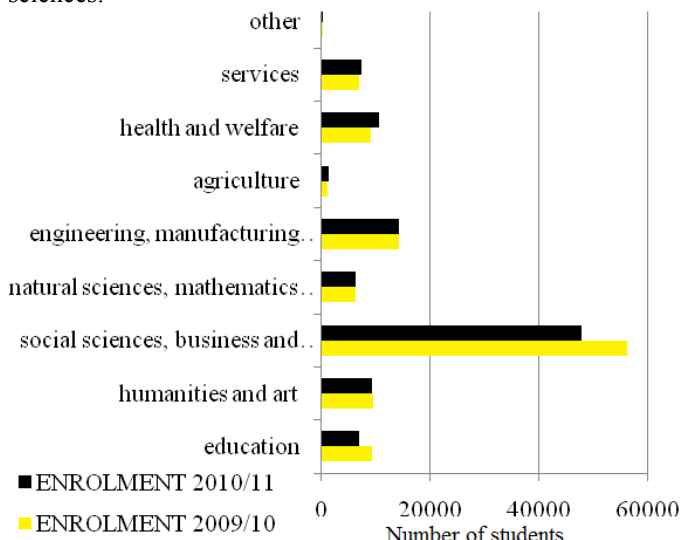


Fig. 1. The distribution of students by thematic groups and study fields [12]

A problem worthy of attention is the number of students dropping out of higher education institutions. Reducing the dropout rate is particularly important from the resource economy point of view, which should be adequately addressed by universities together with the respective state institutions. Unfortunately, the funding from the state budget to higher education in Latvia is quite low. The total expenses per student per year are considerably smaller in Latvia than in

other EU countries. It is not only the total funding volume that matters. Division by funding sources is important as well. It is essential to activate channels that encourage investment of the private sector into research and development, as only under such conditions the spending for research and development steers and boots the effectiveness of the innovation process in the national economy.

A. Research Funding

Many countries make efforts trying to protect research and innovation budgets from general expenditure cuts. Gross domestic expenditures on research and development were cut in 2008 and 2009 according to the state budget consolidation in Latvia. Gross domestic expenditures on research and development (R&D) include total enterprise funding for research and development, total state funding for research and development, total higher education funding for research and development and total funding for research and development by foreign countries.

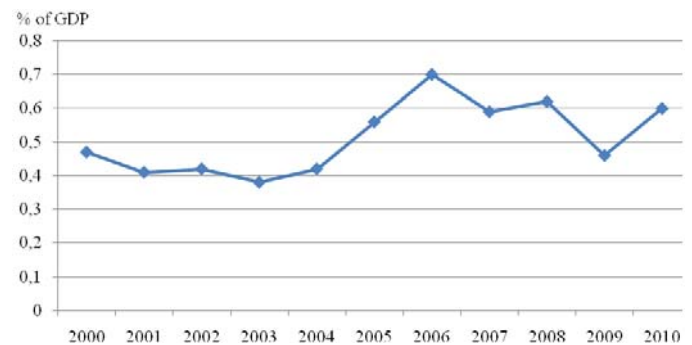


Fig. 2. Research and development expenditure as percent of gross domestic product [13]

Expenditures of R&D reached 0.6% of GDP in 2010 as it was in 2008. Expenditure on R&D by sector and its financing was the following in 2010: total enterprise funding for R&D was 29.9M LVL, total funding for R&D by foreign countries was 25.7M LVL, total state funding for R&D was 20.3M LVL, total higher education funding for R&D was 1.1M LVL (Fig. 2).

B. Business–Academia Cooperation

Knowledge exchange between business and academia is considered important. Development of knowledge quadrangle: education, research, creativity and innovation would give progress at a national level. In relation to science–industry cooperation, an increasing emphasis is placed on the commercialization of research results and getting ideas to market, as indicated by Izsak and Kilcommons, in 2011 [11].

Institutions that are engaged in research and development in Latvia are shown in Fig. 3.

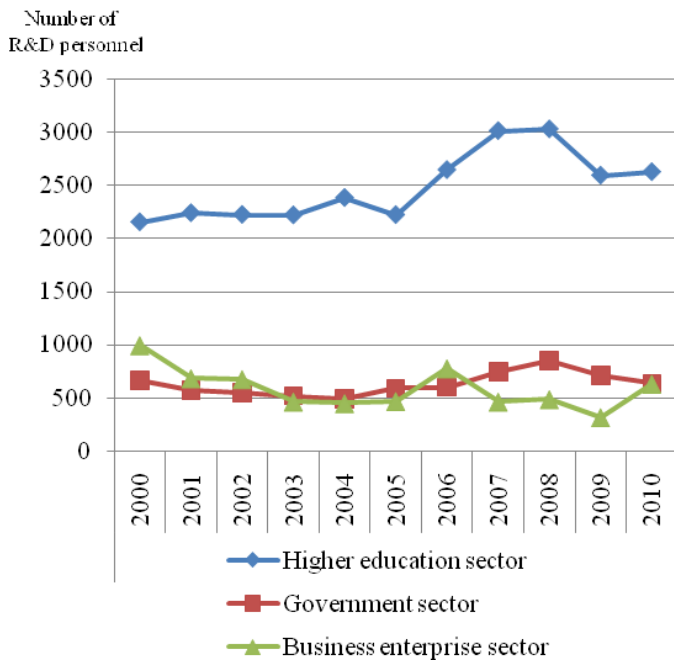


Fig. 3. Institutions engaged in research and development [14]

Higher education sector: including R&D institutions under the supervision of higher education institutions. The survey now covers only those enterprises, where the number of employees exceeds 10. Number of R&D personnel: estimates are based on full-time equivalent employment. Fig. 3 reveals that the number of R&D personnel is the largest in the higher education sector. It was 2629 persons in 2010. Number of R&D personnel was higher in the government sector than in the business enterprise sector from 2007 till 2009. Number of R&D personnel was similar in these two sectors in 2010 (Fig. 3).

Analyzing the share of innovative enterprises in Latvia, it appears that there are more innovative enterprises in the industry. There were 707 innovative enterprises in the period 2006–2008, and 658 innovative enterprises were in the sector of manufacturing. The share of innovative enterprises was 26.9% in the entire industry. In the service sector, there were 469 innovatively active enterprises (14.5%). The share of innovative enterprises in the industry according to the type of innovations is the following: product innovators account for 6.6%, process innovators – 6.8%, product and process innovators – 11.7% and ongoing and/or abandoned innovation activities – 1.8%. The share of innovative enterprises in the service sector according to the type of innovations: product innovators account for 14.5%, process innovators – 2.3%, product and process innovators – 5% and ongoing and/or abandoned innovation activities – 2% [14].

When an individual is willing to create innovations, their development course may go different ways. It is necessary to point out that a single innovation may have many origins. One of the roots of innovation is society's wish to automate daily routines that they experience. Individuals start to think of how to avoid work that requires physical strength or to reduce time-consuming activities. Sometimes innovation may appear to be a system, algorithm or something different from the

usual course of action that is more effective, less time consuming and is right at your fingertips. However, sometimes innovations are created by scientists working in research and development. The number of patents is an important statistic figure, but the number of new ideas that are commercially viable in the market is much more important. Entrepreneurs will be ready to produce the product in the case of forecasted profit growth.

C. Government Policy

State policy on innovation development is a set of measures initiated, performed and coordinated by government: legal acts and administrative norms, priorities and mechanisms for setting those instruments for implementation, etc. that ensures coherent, sustainable and balanced innovation related actions [15]. People behavior, traditions in the state and culture also play an essential role in the innovation system.

Many research papers confirm that the most successful economies and societies are the creative ones [2] – [6]. Therefore, it is important to research interaction of the main stakeholders in the innovation process in Latvia. The main actors are academia, entrepreneurs, government and society (Fig. 4). The effectiveness of innovation development and implementation is dependent on social, political, scientific motivation and, of course, considerable capital investment. Thus, it can be stated that the main actor or stakeholder interaction analysis is crucial for the innovation process. With the help of such an analysis, the practical development model of innovation process can be created. Each stakeholder group's interest can be uncovered, as well as group cooperation prerequisites found.

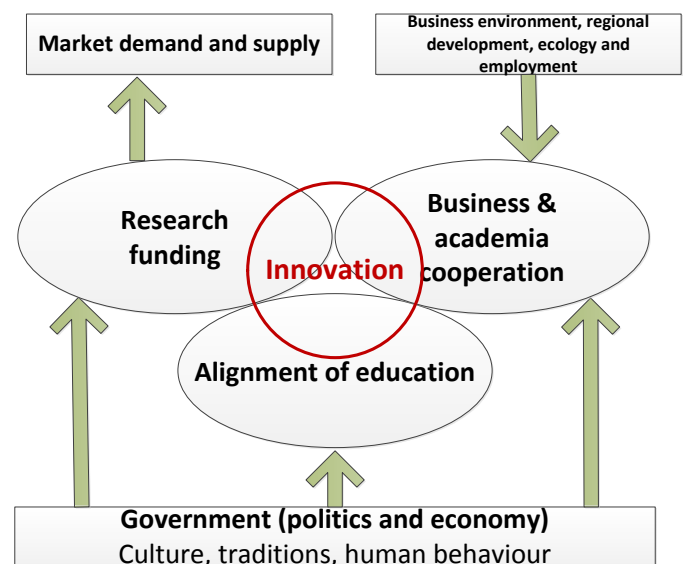


Fig. 4. Interaction scheme of the main stakeholders in the innovation process

III. A GAME THEORETIC APPROACH

We can assume that when solving economic problems, it is often likely to analyse situations, where interests of different groups collide or are shared. In a free market economy these groups pursue different goals. Situations and group actions

under these circumstances can be conflicting or cooperative, depending on their interests. A mathematic theory of conflicting or cooperative situations is, undoubtedly, a game theory. Two or more players' interests can confront each other in a game. If in a multi-player game players create a coalition, the game is cooperative. If there are two or more coalitions, the game becomes a double game.

Solving of such game matrices requires a complete certainty regarding game conditions, number of players, identification of possible strategies for all players, possible outcomes (positive and/or negative). Strategy is a very important element in predefining game conditions. That is a complex of rules that, depending on the game situation, define a certain action of a player. If in the process of game, the player alternately uses a couple of strategies, this game is called mixed, while its elements are pure strategies. A number of strategies each player has can be either finite or infinite. Depending on this fact, there can be finite and infinite games.

Optimal strategy, game outcome and average outcome are important concept terms of a game model. These terms are reflected in the solution definition of the game: strategies A^* and B^* of the first and second players, are consequently called optimal strategies, while number V is the game outcome, i.e., if certain inequalities are true for any A and B strategies: where $M(A, B)$ is the first player's win (average outcome) expectation, if both players select A and B strategies. Thus, from the met inequalities it follows that $V = M(A^*, B^*)$. The outcome equals the first player's win expectation if both players choose their optimal strategies. [7]

In general, we can state that the game theory is the mathematical modelling of strategic interaction among rational and/or irrational agents. There are co-operative and non-cooperative game theories. In the non-cooperative game theory, the players are unable to reach binding and enforceable agreements with one another. Due to this assumption, the non-cooperative game theory is quite individualistic. In contrast, the co-operative game theory analyses situations, where such agreements are possible. The focus of co-operative game theory is, therefore, placed on how groups of individuals committed to each other to formulate rational decisions. This distinction does not mean that the non-cooperative game theory precludes individuals working together. However, it does state that this will only happen if individuals perceive co-operation that is in their own self-interest.

Petrosyan, Zenkevich and Semina (1998) agree that from this perspective individuals work together not because they have to, but because they voluntarily choose to do so. Nonetheless, it should be realized that in many cases we consider that the cooperative and non-cooperative approaches are not clearly distinguished. For example, in many instances complex organizations such as firms, governments, and, indeed, countries are considered to act as individual decision-makers. Clearly, this is an extreme simplification that ignores how decisions are formulated within these institutions. The value of such simplification is to make the resulting models more tractable. [8]

The second characteristic of game theory is that individuals are assumed to be instrumentally rational. This means that individuals are assumed to act in their own self-interest. This presupposes that individuals are able to determine, at least probabilistically, the outcome of their actions, and have preferences over these outcomes. In many game problems in the field of economics, the uncertainty is caused by lack of awareness about the conditions under which the parties operate and not by competitor's conscious opposition.

A coalitional game with transferable utility is a pair (N, v) , where:

N is a finite set of players, indexed by i ; and

$v : 2^N \rightarrow \mathbb{R}$ associates with each coalition $S \subseteq N$ a real-valued payoff $v(S)$ that the coalition's members can distribute among themselves. We assume that $v(\emptyset) = 0$.

In cooperative games, it is to the joint benefit of the players to form the grand coalition, N , since by superadditivity the amount received, $v(N)$, is as large as the total amount received by any disjoint set of coalitions they could form. It is reasonable to suppose that "rational" players will agree to form the grand coalition and receive $v(N)$. The problem is then to agree on how this amount should be split among the players. In this section, we have discuss one of the possible properties of an agreement on a fair division that it is stable in the sense that no coalition should have the desire and power to upset the agreement. Such divisions of the total return are called points of the core, a central notion of game theory in economics.

Roberto Serrano (2007) defines the Shapley value as a solution that prescribes a single payoff for each player, which is the average of all marginal contributions of that player to each coalition he or she is a member of. It is usually viewed as a good normative answer to the question posed in the cooperative game theory, i.e., those who contribute more to the groups that include them should be paid more. [9]

While the core is defined as a solution concept that assigns to each cooperative game the set of payoffs that no coalition can improve upon or block. In a context in which there is unfettered coalitional interaction, the core arises as a good positive answer to the question posed in the cooperative game theory. In other words, if a payoff does not belong to the core, one should not expect to see it as the prediction of the theory.

The main notion that requires particular attention is that, if acting cooperatively, players can actualize any payoff in mixed strategies in R area. This does not imply, however, that the players can negotiate any outcome of a game. Thus, point $(x_{\max}, 1)$ is more suitable for player 1, and $(1, x_{\max})$ for player 2. None of the players will agree with negotiation results if his/her payoff is below the maximin value, because the player can receive this payoff independently.

This is why S area is the area of possible negotiation clashpoints limited only by border points. The players can further cooperatively negotiate and choose points on the grid, where the payoff is beneficial for all of them.

The set, C , of stable imputations is called the core:

$$C = \{x = (x_1, \dots, x_n) : \sum_{i \in N} x_i = v(N) \text{ and } \sum_{i \in S} x_i \geq v(S), \text{ for all } S \subset N\} \quad (3. 1)$$

The core can consist of many points as in the examples below; but the core can also be empty. It may be impossible to satisfy all the coalitions at the same time. One may take the size of the core as a measure of stability, or of how likely it is that a negotiated agreement is prone to be upset.

In the next section, bearing in mind that the players of a possible game model are the stakeholders in the innovation process, specifically: academia, entrepreneurs, government and society, the authors will develop a concept of the cooperative game model.

IV. A GAME MODEL

The Shapley value defined a fair way of dividing the grand coalition's payment among its members. However, this analysis ignores questions of stability. Unfortunately, sometimes smaller coalitions can be more attractive for subsets of the agents, even if they lead to a lower value overall.

Let us assume that the academia's interest is to receive funding for research, business requires relatively cheap, but effective innovative solutions for continuous improvement, the government's purpose is to maintain social and economic stability and development, whereas the society is interested in the improvement of living standards.

It must be pointed out that the stakeholders' interests are related to each other. For example, the academia needs funding that the business and government can provide, while the business can receive innovative solutions, qualified professionals from this kind of investment. The government, however, benefits from an increase in GDP, while retaining social stability and successfully combating unemployment. At the same time, society's content as a stakeholder substantially grows as overall GDP per capita increases (we assume that GDP growth is faster than population growth).

We can create a draft model of a coalition game of academia, entrepreneurs, government and society (see below). The game model outcomes can be calculated by a hierarchy method analysis, of which the player's action is the most important/beneficial for the other player's outcome and, thus, their outcome while in a coalition.

| | | | |
|--------------------|-------------------|----------------------|-------------------------|
| | $v(\{1, 2\}) = 4$ | | |
| $v(\{1\}) = 1$ | $v(\{1, 3\}) = 3$ | $v(\{1, 2, 3\}) = 1$ | |
| $v(\{2\}) = 0$ | $v(\{1, 4\}) = 5$ | $v(\{1, 2, 4\}) = 2$ | |
| $v(\emptyset) = 0$ | | | $v(\{1, 2, 3, 4\}) = 9$ |
| $v(\{3\}) = 1$ | $v(\{2, 3\}) = 5$ | $v(\{1, 3, 4\}) = 6$ | |
| $v(\{4\}) = 1$ | $v(\{2, 4\}) = 5$ | $v(\{2, 3, 4\}) = 8$ | |
| | $v(\{3, 4\}) = 5$ | | |

The imputations are the points (x_1, x_2, x_3, x_4) such that $x_1 + x_2 + x_3 + x_4 = 9$ and $x_1 \geq 1, x_2 \geq 0, x_3 \geq 1, x_4 \geq 1$.

It is useful to plot this square in the barycentric coordinates (Fig. 5). This is accomplished by pretending that the plane of the plot is the plane $x_1 + x_2 + x_3 + x_4 = 8$, and giving each point on the plane four coordinates, which add to 8. Then it is easy

to draw the lines. It then becomes apparent that the set of imputations is an equilateral square.

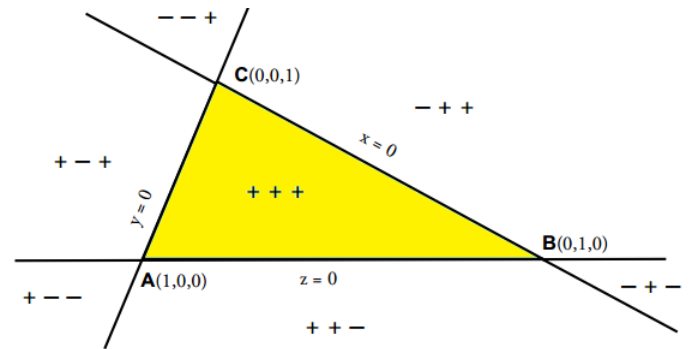


Fig. 5. Barycentric coordinates example for three players

Imputations that cannot guarantee themselves certain outcomes are considered unstable in comparison with their independent action or in a coalition. The core is the remaining set of points in the set of imputations, including the boundary.

V. CONCLUSION

It can be pointed out that a lack of cooperation between higher education institutions and businesses significantly slows down the process of innovation. R&D expenditure can be high, but if patents and engineering innovative solutions created are not bought or even acknowledged by enterprises, their added value can be considered very low. Overall, it can be stated that innovation acknowledgement, exploration and stakeholder cooperation in order to steer the process of innovation forward is crucial for effective all-round economic development.

A game model offers a perspective on how stakeholders may make decisions, not only in terms of what strategies they ultimately choose, but also what they choose not to do. It takes into consideration estimates of what academia, business, government and society are likely to do and offers an outline for determining alternative outcomes and the decision framework to use in order to reach those outcomes. By integrating the market externality theory and implementing a hierarchy analysis on how innovation process stakeholders adopt strategic orientations, this perspective broadens the view of strategic alternatives that they can undertake. This perspective implies that these differing orientations overlap. It is not likely that stakeholders will adopt one pure strategy and remain there; rather, they will continually reconsider these alternative decision clusters as the overall situation changes and other coalition/non-coalition players make their own strategic decisions.

REFERENCES

[1] P. Krugman, Microeconomics, Worth Publishers, Madison Avenue, New York, 2008.
 [2] B.-Å. Lundvall (2002), Innovation, growth and social cohesion: The Danish Model, Elgar Publishers.
 [3] B.-Å. Lundvall and P. Nielsen, 'Innovation, Organisational Learning and Job Creation', with in European Journal of Economic and Social Systems, vol.18, no 1, (2005).

- [4] E. Lorenz and B.-Å. Lundvall, (2006), *How Europe's Economies Learn*, Oxford, Oxford University Press.
- [5] M.B. Jensen, B. Johnson, E. Lorenz and B.-Å. Lundvall (2007) 'Forms of knowledge and modes of innovation', *Research Policy*, vol. 36, nr. 5, JUN. s. 680-693.
- [6] A. Arundel, E. Lorenz, B.-Å. Lundvall and A. Valeyre, "How Europe's economies learn: a comparison of work organization and innovation mode for the EU-15", *Industrial and Corporate Change*, vol. 16, no. 6, (2007).
- [7] N.N. Vorobjov, *Teorija Igr, Nauka, Moskva* 1985.
- [8] L.A. Petrosjan, N.A. Zenkevich, E.A. Semina, *Teorija igr: Ucheb. posobie dlja un-tov: - M.: Vissh. shk., Knizhnyj dom «Universitet», 1998. s. 304 s.*
- [9] R. Serrano, (2007) "Cooperative Games: Core and Shapley Value," Working Papers 2007-11, Brown University, Department of Economics.
- [10] Inno Policy. Trends and Challenges in Demand-Side Innovation Policies in Europe, Thematic Report 2011 under Specific Contract for the Integration of INNO Policy Trend Chart with ERAWATCH (2011-2012) [online] Available: <http://www.proinno-europe.eu/trendchart2011> [accessed Jun 11, 2012].
- [11] Funding Innovation in the EU and Beyond under a Specific Contract for the Integration of the INNO Policy TrendChart with ERAWATCH (2011-2012) [online] Available: http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/files/innovation-funding-trends-2011_en.pdf [accessed Jun. 14, 2012].
- [12] Informative report about necessary reforms in the field of higher education and science, Ministry of Economy, [online] Available: http://izm.izm.gov.lv/upload_file/Normativie_akti/infozin_18122009.pdf [accessed Jun. 14, 2012].
- [13] Statistical database. GDP per capita in PPS, Index (EU-27 =100) [online] Available: http://epp.eurostat.ec.europa.eu/portal/page/portal/national_accounts/data/main_tables [accessed Aug. 14, 2012].
- [14] Statistical database. Total innovation expenditure [online] Available: <http://data.csb.gov.lv/dialog/varval.asp?ma=IN0030a&ti=ING03%2E+TOTAL+INNOVATION+EXPENDITURE+%28mln%2Elats%29&path=../Database> [accessed Aug. 14, 2012].
- [15] PRO INNO EUROPE. An Analytical Report 2011. Innovation Policy Trends in the EU and Beyond/ Report under a Specific Contract for the Integration of the INNO Policy TrendChart with ERAWATCH (2011-2012) [online] Available: <http://www.proinno-europe.eu/inno-policy-trendchart/page/innovation-policy-trends> [accessed 18 April 2011].

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Jevgenijs Leontjevs, Liēna Ādamsonē. Inovācijas procesu galveno dalībnieku mijiedarbība

Inovācijas ir viens no ekonomikas attīstības dzinējspēkiem. Inovāciju procesu var uzskatīt par veiksmīgu, ja tajā iesaistīto pušu mijiedarbības rezultātā tiek radītas dažādas inovācijas t.sk. inovācijas, kuras sabiedrība vēlas izmantot un uzņēmumi vēlas ieviest saimnieciskajā darbībā un/vai pārdot tirgū. Tāpēc ir būtiski analizēt inovāciju sistēmu pēc tajā iesaistītajiem galvenajiem dalībniekiem: uzņēmumi un uzņēmējdarbības vide, uzņēmumu sadarbība ar izglītības iestādēm, laikmetīgi sagatavojot izglītotos tautsaimniecības speciālistus, kas atbilstu valsts un globālā tirgus prasībām un sociālās attīstības vajadzībām. Turklāt ir nepieciešams finansējums izglītībai, pētniecībai un inovācijām, kā arī tālredzīga valdības politika un pilnībā sakārtotā likumdošanas sistēma. Tādējādi, ir būtiski stimulēt katras ieinteresētās puses rīcību augstāk minēto kritēriju izpildē. To var panākt ar katras ieinteresētās puses kopējā labuma palielināšanos kooperatīvi mijdarbojoties ar katru ieinteresēto pusi sistēmā. Par analītisko rīku, kas varētu noteikt, kas būtu noteicoši izdevīgāk kādai ieinteresētai pusei vai to grupai, labuma ziņā, būtu lietderīgi izmantot spēļu teorijas modeli kooperatīvajām spēlēm ar pilnu informāciju. Pēc hierarhiskās analīzes metodes nosaka ieinteresēto pušu labuma koeficientus pie noteiktiem apstākļiem. Rezultātus ieliek spēļu teorijas modelī, kur, attiecīgi, nosakot Šepļa vērtību un spēles kodolu var secināt, ka uzvedīsies ieinteresētās puses vai grupas noteiktajā situācija pie nosacītiem apstākļiem. Šādi ir iespējams atrast optimālo stratēģiju regulējumu veidošanā, budžeta plānošanā un izpildē, kur katrai ieinteresētai pusei būtu maksimāls labums darbojoties kooperatīvi augstāk minēto mērķu sasniegšanā un inovācijas procesa kvalitātes maksimizēšanā, nekā individuāli.

Евгений Леонтьев, Лиэна Адамсонэ. Взаимодействие основных заинтересованных сторон в инновационном процессе

Инновации, несомненно, являются двигателем развития экономики. Инновационный процесс можно считать успешным, если в результате эффективной кооперации заинтересованных сторон появились инновационные решения, приносящие пользу каждой из сторон. Таким образом, это инновации, которые хочет использовать общество, а также предприятия, которые хотят их применять в хозяйственной деятельности или продавать на рынке. Соответственно, важно анализировать систему инноваций по её главным участникам: обществу, правительству, предприятиям, образовательным учреждениям, которые в свою очередь готовят квалифицированных специалистов, соответствующих государственным и глобальным стандартам рынка и требованиям социального развития. Здесь важную роль играет и субсидирование образования, науки и, соответственно, инноваций, а также политика и законодательство государства. Таким образом, особенно важно стимулировать действия каждой заинтересованной стороны в выполнении вышеупомянутых критериев. Этого можно добиться увеличением общей полезности каждой заинтересованной стороны в процессе кооперативного взаимодействия с каждой из заинтересованных сторон в системе. Как инструмент для анализа, который мог бы установить, что было бы естественно выгоднее каждой из заинтересованных сторон или их группе, в смысле полезности, допустимо использовать теоретическую игровую для кооперативных игр с полной информацией. По методу иерархического анализа определяют коэффициенты полезности заинтересованных сторон при определённых условиях. Результаты вставляют в модель, где, соответственно, находят значение Шепли и ядро игры, что позволяет сделать выводы о том, как будут действовать заинтересованные стороны или группы в конкретно обусловленной ситуации. Таким образом, можно найти оптимальную стратегию создания регламента, правил, планирования бюджета и его выполнения, где каждая заинтересованная сторона имела бы максимальную полезность действуя кооперативно для достижения вышеуказанных целей и максимизации качества инновационного процесса, нежели индивидуально.