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CONCEPTS OF THE TERRITORIAL CAPITAL

A TERÜLETI TŐKE KONCEPCIÓI

Jóna György – Tóth Tamás

Absztrakt
A területi tőke koncepciója közel egy évtizede jelent meg a modern regionális tudomány terminológiai rendszerében. A területi tőke kategóriájának bevezetése azért fontos, mert a korábbi mérések a materiális javakat, a közgazdaságilag könnyen mérhető változó vizsgálták. A területi tőke tényezőit több modell is próbálta már rendszerbe foglalni, tipizál bizonyos logika alapján strukturálni. Ebben a tanulmányban ezeket a definíciós modelleket mutatjuk be.

Abstract
The conception of the territorial capital appeared about ten years ago in the terminological system of the modern regional science. The introduction of the category of the territorial capital is important because earlier measurements have only examined the tangible assets and the variables that can be easily measured economically. Several models have already tried to include in taxonomy, to type and to structure the factors of the territorial capital. In this study we introduce these defining models.

Kulcsszavak: Területi tőke. Intangibilis javak. Versenyképesség. Területi tőkejavak klasszifikációja.

Keywords: Territorial capital. Intangible capital assets. Competitiveness. Taxonomy of territorial capital assets.

INRODUCTION

The conception of the territorial capital appeared some years ago in the terminological system of the modern regional science. The introduction of the new terminology is justified because basic vertical and horizontal changes have occurred in the regional processes as a result of the expansion of globalization. In the area globalization has changed the economic, social, cultural and geographical elements and the quantity, quality and the distribution of the capital goods connecting to them. The new category, the conception of the territorial capital can be used to measure and analyze the changed territorial structures and the tangible and intangible capital assets that can be found there. The conception of the territorial capital examines those material and intangible assets which determine the local competitiveness. In this study we introduce the terminology, the classification and the models and the results of the defining experiment of the territorial capital. In the first chapter we examine the functions, innovation possibilities, major characters and the character of its methodical process of the territorial capital. After this we present the defining models of the OECD, Camagni and Tóth territorial capital.

MATTERS AND METHODS
The meaning of the territorial capital

The economic growth[1] of a territory is determined by a factor depicted by several economic, sociological, anthropological and social psychological terminologies. To analyse them more and differently, the conception of the territorial capital is an adequate possibility. This is relatively a new category in the regional science which examines the economic, social, geographic and cultural factors of the region, it is able to − almost without exception − conceptualize and operationalize the tangible and intangible assets that can be found in the region. The territorial capital is a complex measuring tool which can be used to examine and measure the tangible and intangible capital factors of the space structure. The intangible capital assets have been thought to be immeasurable but the territorial capital paradigm convert them to be operationalizable this way the territorial relation systems van be learnt more accurately by the regional empiric researches. It considers the tangible and intangible capital assets together and common.

The introduction of the category of the territorial capital is important because earlier measurements have only examined the tangible assets and the variables that can be easily measured economically. However the value of the certain territory or region is influenced not only by the tangible but also by the intangible capital. "" The regional GDP cannot be the only measurement of the differences because the GDP of the regions can approach to each other while the difference between the situation of the people and societies is increasing. The Barce report, which was made by Fabrizio Barca in 2009 April, claims that the development and efficiency are supported the most if we use and utilize in the furthest extent the endowment, possibilities, potential and territorial capital of every region. With the territorial capital based approaching we can point out that the advantages and disadvantages of the regions measured in regional GDP are not exactly as much as they are shown by the regional GDP". (Tóth 2010: 79) Bordieau has also reasoned by this: "We can judge the structure and operation of the social world correctly if we introduce the concept of the capital not only in the form known from economics but we introduce it in all forms of appearance." (Bourdieu 2004: 123) As a matter of fact the economic development does not always contribute to the reach of welfare because the redistribution channels and the resource allocating mechanisms are dysfunctional on the given territory (Barca 2009). The territorial capital is able to execute the analysis and operationalization of the spatial endogen growing processes and to work out further programs for development with its complex indicator system. The improvement of the economic indicators is only one from the regional growing criteria, because the improvement direction of the spatial processes cannot be expressed in an adequate way by the GDP.

The territorial capital analyzes the whole of the tangible and intangible capital types can be found in the territory, it voluntaries to analyze the local resources. It shows how much and what kind of tangible and intangible assets have been accumulated, how these have been divided how large is the unutilized capital capacity, capital shortage. The tangible and intangible asset factors cannot be divided in an empiric way, these overlap each other in a diffuse way. The differentiation was important because the theoretical analysis is more accurate and deeper.

The territorial capital is a complex concept which is able to examine the deeper relationship system of the economic structure; it can determine the ability to attract of a space structure (ESPON 2011: 80-81). It maps the tangible and intangible capital elements that are located like points or clusters whose determining segments are the local community, the space

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[1] Lengyel's (2012) study gives a plastic analysis about the difference in meaning between the economic growth, improvement and development.

economic conditions and processes, the geographical factors, the territorial milieu, identity and culture (Rechnitzer 2010: 2). The territorial capital presents the major character of a territory in a different way.

The territorial capital is a category concerning the territorial functions and relations (Illés 2009: 217), it is holistic, it has integrated perspective, and it is able to explain the territorial processes in its dynamics (Tóth 2011: 141).

The territorial capital conception and normative perspective that build on each other, can be differentiated well. The descriptive perspective, as its name refers, collects the tangible and intangible capital elements from the space structure in a descriptive way and presents them in a taxative way. It is continued by the normative aspect as it works out problem solving models and alternatives to treat the discovered dysfunctions, reduces the spatial differentiation, it determines the background conditions of the territory development conceptions and it point out directions for intervention. The definition and measurement of the territorial capital is not for their own sake, it contributes to the determination of the development level of the given territory and contributes to its own development. The recognition of it has made the application of the territorial capital concept necessary in the regional science.

The novelty of the territorial capital is that it examines the intangible assets as well and it forms them to be sociologically and economically quantifiable, this way operationalizable. The intangible capital components can be measured no matter that they are characterized as intangible. The intangible – even if in a limited form – becomes measurable. "The territorial capital cannot be fitted into as a continuance of the material and immaterial capital types, but the intangible and physical components have to be totalized in the territorial capital" (Tóth 2010: 78)

To make the conditions of the exposure and reproduction of the immaterial capital components are becoming more and more important because the availability of the material commodities are limited. Presumably the intangible assets are going to gradually displace and finally replace the material commodities. (Tóth 2010: 77-78).

Marshall, one of the founders of the Cambridge school, called the attention for the first time for the significance of the territorial aspect of the intangible resources and nowadays one of the studies from the World Bank has started to emphasize the significant effect of these capital elements on the region. Marshall did not call them intangible commodities but being "in the air" commodities, and these constitute the character of the economic "environment". He listed among its determinants the institutional network, the formal and informal rules, the local researchers of a given territory, the norms of the politicians and producers and their ability to validate their interest and the customs, practices used in the local economy.

The material and intangible capital components found in the region can be connected to the individual, community and the space structure in the same way. The mobility of most part of the immaterial capital assets is not as fast as of the material capital because, we have to recognize, the intangible assets are connected closely to the individuals or the community, this way they are determined socially. Smaller part of the intangible assets is connected to the geographical space and these regularly cannot be moved. The commodities connected to the individuals are influenced by the factors of the domestic and international migration. Sociology, one of the disciplines of the regional science, plays a central function in its analysis.

A smaller set of the immaterial assets belongs to the space structure, are geographically determined, and they are the space itself, by itself it represents immaterial value. The geographical situation and region is not mobile that is why if an unmoveable space represents some kind of intangible value, it represents localizational advantage, stable and calculable value in the territory. Let us recognize the unsteadiness of the economic processes

have different effects on the intangible resources, the change in the economic structure can directly and faster be measured on the change of the material capital components, the affects of the crisis cannot be felt or they can be felt much later on the intangible capital assets.

On the basis of these it is clear that the regional economic processes are not only influenced by the economic externalities but by several social, cultural, religious and psychological factors. This relation system of course affects in the other direction as well: the religious, the cultural and the social structure are significantly determined by the structure of the space economy. They mutually affect each other and meanwhile they form themselves and each other[2]. The improvement and openness of the regional science is proved by the fact that through its territory capital conception it adapts the methods and research results of the partner sciences this way it is able to analyze, direct and improve the territorial processes in a wider perspective.

The results originated from the territorial capital paradigm can be used in the territory development, creating territorial policies and in planning the market investments. The application of the territorial capital is not wanton and can not only be used on a theoretical base but it has advantages in the practice as well. It also fits to the interest of the business because it shows on which territories the higher territorial capital has accumulated, where the rate of investment is shorter, and it shows on which territories the territorial potentials can be utilized. The territorial capital gives an adequate conceptual and methodological base to measure the needs of the market based investments. In that case its task is to map the tangible and intangible capital assets of the territory with the use of which those kinds of products can be produced that serve the needs of the solvent demand. „This teoretical capital generates a higher return for certain kinds of investments than for others, since they are better suited to the area and use its assets and potential more effectively. (OECD 2001: 15-16)

The aim of the territorial capital is to make the intangible and material capital assets measureable by its individual methodological process and to determine the extent, the quality of the territorial capital and the distribution of the capital types. After this it creates a conception how the local society can utilize their endowment. As a result of this the territorial cohesion and the integration of the community improve, the space economy trend develop and the conditions connecting to the initiation of the competitiveness and welfare become available. The territorial capital is such a tool system in the territorial planning, in the city- and territory development, which gives help to the optimal and adequate utilization and strengthening of the capacities found in the certain region. "The country of the supply oriented territorial capital excellently summarizes and categorizes all the factors that can be important at the examination of the endogen development and at the working out of the development ideas organizing from the bottom. This country admits that territorial competition exists, the development is not automatic, and that is why the local community also has to be active to reach development and to work out a kind of "competition strategy" to strengthen the territorial capital".(Lengyel 2012: 163)

With the help of the territorial capital paradigm such scenarios can be created which affects in the direction of the welfare on the regional level (Kai 2011: 57). The territorial capital also reflects on the possibilities and barriers of the developing directions, the territory capital and the territorial cohesion connect closely on the behalf of the improvement of competitiveness of the region (Ágh 2011: 42-43, Faludi 2006: 669). It is able to give a hand in a new way to join the underdeveloped regions because it considers those tangible and

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[2] The work of Schleifer-Glaeser (2003) is outstanding economically; it examines the economic effect of the legal practice of the courts. But I have to mention Kőszegi Botond (2010), who researches the relationship between the human behaviour and the economic decision mechanisms, or Kuran's (2004) works, who analyzed the relationship between the Islamic and the economic growth.

intangible resources of the region that did not or only partly appeared in the regional planning As a result of this only the elaboration of local resource allocating mechanisms and the characteristic individual conceptions concerning the region can result in adequate tool system and developing methods (OECD 2001: 16); only part success can be reached with the global planning that does not take the differences of the territorial potentials and the territorial differences into account.

In the category of the territorial capital the policy of subsidiarity appears significantly which means from the point of view of the development that the advantage originating from the expansion of the local specializations, the agglomeration and urbanization advantages, and from the economies of scale; it has to be stored, formed to be reproductive and sustainable.

The territorial capital, because of its characteristics, prefers bottom-up initiations, the decentralized, local intervention, the multi-level governing and the supply-oriented territory development. The multi-level governing, the democratic, decentralized political-community control and the policy of subsidiary are closely connected to the country of the territorial capital (Ágh 2007). In the territorial capital paradigm the interventional directions connect with the multi-level governing in other word with the preservation of the political autonomy of the territory, and the strengthening of the democratic, deconcentrated and decentralized institution system. It can be partly adjusted to the top-down governed development and the subnational level developments coming into life through state level redistribution mechanisms. (EU Területi Agendája: 10)

The territorial capital is based on complex, plural approach that is why its methodical system is also complex. It follows Max Weber's multidimensional methodical process; it prefers the techniques connecting to multi variable methods. In the regional economic processes everything is connected to everything, the interdependency between the systems and subsystems has already been proved without doubt theoretically and in an empiric way. We cannot put aside the social, political and cultural effects when we examine the regional economic processes, this is the only way how we can get complex result. (Csaba 2008) The effect mechanisms of the intangible capital elements affect in a significant way that appear in the concept of the territorial capital, moreover they can be measured with the help of this concept.

The territorial capital includes several capital components which split in a system-like way and they fit together. It has not had a mature, generally accepted definition yet, we can meet only attempts for the definition. It is made even more complicated by the fact that the different defining models accept separate capital elements. Of course there are overlaps, analogies among the models but we can often find differences as well.

Every region has different territorial capital and the deviation between the capital types can be different occasionally. We have to pay attention to the results of the deviation as well because if we average the value of the territorial elements when we generate the index, the evolvement of the information loss can occur.

Most elements of the territorial capital can be examined in an empiric way by quantitative processes.

THE INTRODUCTION OF THE TERRITORIAL CAPITAL MODELS

Several models have already tried to include in taxonomy, to type and to structure the factors of the territorial capital. In this chapter we introduce these defining models.

At the definition of the capital assets we exclusively introduce those definitions which we apply in the modern regional science and they appear in connection with the territorial capital concept. For example at the determination of the range of meaning only that

definition is accepted that is accepted in the regional science, we do not consider those originating from the structural, functional etc approaches. It is important to note that "the categories and contents of the new capital have not been defined yet" (Tóth 2010: 67)

The definition model of OECD

The territorial capital concept was first defined and applied in the report of the OECD (2001) titled Territorial Outlook. Though it was an immature definition, it can also be used well nowadays it is proven to be abiding. It has given such a complex meaning to this concept system whose concept elements are built on each other and we can experience overlaps in meaning.

The OECD (2001) differentiates three kinds of capital types in its territorial capital taxonomy: tangible factors, untraded interdependences and intangible factors. From the chart we can see that the geographical and economic factors belong to the tangible factors, the untraded interdependencies includes the unwritten tradition and milieu while we can list to the intangible assets the written laws and the institution system thought to be legal interregionally. According to OECD: "These factors may include the area's geographical location, size, factor of production endowment, climate, traditions, natural resources, quality of life or the agglomeration economies provided by its cities, but may also include its business incubators and industrial districts or other business networks that reduce transaction costs. Other factors may be "untraded interdependencies" such as understandings, customs and informal rules that enable economic actors to work together under conditions of uncertainty, or the solidarity, mutual assistance and co-opting of ideas that often develop in clusters of small and medium-sized enterprises working in the same sector (social capital). Lastly, according to Marshall, there is an intangible factor, "something in the air", called the "environment" and which is the outcome of a combination of institutions, rules, practices, producers, researchers and policy-makers, that make a certain creativity and innovation possible." OECD 2001: 15.

It is clear from the above mentioned that the OECD differentiates three segments of the concept of the territorial capital the tangible factors, untraded interdependences and intangible factors. These three categories cannot be separated from each other, they can be separated only on a theoretical level, and in reality they mutually determine each other. The sum and combination of these three parts (beside the natural and territorial factors, the material and intangible capital associated to the members of the local society and the economic characters of the regions) give the value of the territorial capital. The OECD throughout emphasizes the social and cultural (historical) background conditions of the endogen development in its territorial capital concept. (OECD 2001: 15-16) These contribute mutually to the development of the competitiveness and the general regional development.

TABLE 1. Sources of territorial capital of the OECD

Tangible factors	Untraded interdependencies	Intangible factors
geographical location, size, factor of production endowment, climate, traditions, natural resources, quality of life or the agglomeration economies provided by its cities, but may also include its business incubators and industrial districts or other business networks that reduce transaction costs	understandings, customs and informal rules that enable economic actors to work together under conditions of uncertainty, or the solidarity, mutual assistance and co-opting of ideas that often develop in clusters of small and medium-sized enterprises working in the same sector (social capital)	the outcome of a combination of institutions, rules, practices, producers, researchers and policy-makers, that make a certain creativity and innovation possible.

Source: Own edition based on OECD 2001: 15-27.

The evolvement of the clusters had a significant function in the accumulation of the material goods (OECD 2001: 18), because the territorial advantages were strengthened with this and it determines the social processes as well with its multiplicator function. It points out that it is necessary to develop the capital elements connecting to the satisfaction of the needs of the solvent demand. If it is not available, it will be necessary to develop new capital elements to this. In other words the territorial capital shows the resources of the tangible and intangible competitive advantages and disadvantages of the region.

Tóth Balázs István's definition model

Tóth differentiates the tangible and intangible segments of the territorial capital. According to him the tangible capital assets include the produced capital, the financial capital, and the investment capital. The operationalization of these can be made easily by the gross domestic product. According to Tóth the following can be listed to the conceptual elements of the intangible assets:

Intellectual capital

The Swedish research center, the Skandia (1995) began to use this capital type again in one of its reports, which meant the renaissance of this category in the sciences of society. The measuring method of the intellectual capital was explained by the Swedish Ricarda project.

Human capital

According to the document of the OECD connecting to the territorial capital the human capital has to be defined as all the abilities, skills, knowledge and competency which make the individual capable of establishing and increasing his welfare. According to a later document the human capital "means the treasury of abilities that was maintained and developed with the help of educational training or practice and it also means such knowledge which expands the labour force supply." (OECD 2003: 25) In other words such intangible assets can be listed here that can be obtained in the formal and informal socializing processes and its results appear in the structure of the labour force market. According to Bourdieu (2004: 123-125) to measure the profit ratio and the fiscal and economic return of the educational investment is the task of the human capital.

Psychic capital

Markman's (2007) study analyzes the functions of the psychic capital. During the acquirement of the human capital not only lexical knowledge can be obtained but can be acquire such attitude, behaviour and emotion which make the individual capable of accumulating higher incomes (learning written and unwritten norms, knowledge of protocol etc.)

Creativity capital

The creativity capital connects to the human and psychic capital in an organic way. While learning the individual accumulates knowledge, which gives creative and innovative ideas and this is essential in the case of regional economy development.

Knowledge capital

Stehr (2002) introduced this terminology in the system of the regional economics. This capital element fits to the above mentioned ones to the extent that it is necessary in the case of knowledge based economy in the work needing higher qualification. In the underdeveloped economies it is less needed.

Organizational capital

The organizational and the relational capital are also called structural capital. (Skandia 1995, Sveiby 1997). The category of the organizational capital appeared for the first time in Tomer's (1987) study which can be interpersonal and not connected to individual (inter organizational). Its tangible and intangible components can be highlighted "for example the basic and applied research, the results of the development, the value of the equipments developed by themselves, the valuable, introduced brand name – and infrastructural equipments – moreover the philosophy of management, the culture of the organization, formal and informal communication systems, relations, networks of investors, financial institutions and others." (Tóth 2010: 69) The organizational capital can be accumulated and reproduced by organization development, whose precondition is to have human capital. The accumulation of the organizational capital depends on the human capital.

Relation capital

According to the Skandia group the relation capital appears both in the individual and in the collective interdependency. In the territorial capital concept both relation system play important roles. Some say that the interpersonal capital assets cannot be listed here, only the relations independent from the individuals (clusters, networks, R&D, institutional system, etc.). (Tóth 2010: 69-70) "According to the definition of Capello and Faggiani (2005) and Camagni (2008) we consider the cooperation as relation capital between the economic characters even the knowledge transfer and the change of experience not only on the level of companies but also on the level of countries and regions, cities." (Tóth 2010: 70) Relation capital can be obtained only from the actually available relation structure.

Cultural capital

The meaning of the category of the cultural capital is connected to the work of Bourdieu (2004) in the regional science. The reason why this category is more and more important is that knowledge, in a wider extent the culture, as an intangible capital element, can be converted into economic capital. We can highlight three types of the cultural capital: the cultural capital being in the (1) incorporated form, (2) objective form and in the (3) institutionalized form. We can list among the incorporated assets the emotions, attitudes, behaviour, mentality and habit that we acquire at home by learning through formal and informal socializing mechanisms. During the reproduction strategies the acquirement of the non-lexical knowledge and skills happen in this field. Only the affected individual can be responsible, other individual cannot be involved into it. The competencies acquired this way become the property of the individual with the help of which he can transform his available resources into other capitals. It is typical that the more incorporated cultural capital is

available the higher extent it can be transformed into other capital. To measure the incorporated assets the time is used that is needed to acquire the assets, which can be several years, even decades.

The convert of the objected cultural capital is easier and faster than the previous one. The process of the accumulation of this is foregone by the existence of the incorporated capital and it depends on the other. It is easy to measure; this capital type is usually manifested in the possession of books, lexicons, paintings, works of art, valuable artistic works. We have to take into account that through inheritance or disposition inter vivos only the devolution of ownership occurs, the transmission of the knowledge and competency does not occur in every case.

The cultural capital element has a major role in the evolution of the territorial processes and in the regional growth; the cultural capital significantly determines the economic expectations of a territory. (Radvánszky-Sütő 2011) The society of the territory has accumulated a kind of special tacit knowledge by their tradition, local history and relation system that has become the organic part of the territorial capital.

The institutionalized cultural capital element is objectified in academic compellation and symbols. Science is unequivocally creating levels and hierarchy and in the life of university it means the recognition of competencies. It can be measured in the tertiary institutions and the research institutes of the certain region by the number of people having academic grade. It is worth considering those academic grades which assumes about the instructor that he will pass over marketable knowledge in the region. (Polónyi-Tímár 2001).

Social capital

In the regional science the social capital means social integration which is one of the conditions of the economic development. According to Bourdieu (2004) the social integration measures the success of the individual's integration and the individual's belongingness to the society; the belongingness to the group in itself makes profit. "The social capital is the aggregate of the actual and potential resources which belong to the ownership of the constant network of the institutionalized relation based on mutual acquaintance and recognition or in other words they are such resources that are based on the belongingness to a group." (Bourdieu 2004: 130) The social capital embraces only those social relation systems which can be mobilize on the economic, psychic, social, etc. behalf of the individual. It depends how much and what kind of capital types the mobilizable people have already collected. We have to highlight that the individual's relation net usually include those layers where he comes from. In other words those having higher and more capital elements for the solution of their problems can mobilize easier such people who also accumulated several kinds of capital types – and it is true vice versa which generates and reproduces regional inequality. The social capital does not evolve by itself; it has to be created artificially and has to be maintained to make profit.

Significant relationship can be pointed out between the space structure and the social capital, the social capital belongs to a territory. The social events and activities are connected to a space where the capital conversion and the accumulation can happen. The maintenance of the relation is a conscious activity which needs time and financial expenditure.

The belongingness to certain formal or informal groups means capital in itself directly or indirectly. At the evolvement of the clusters the relation net is widened by the mechanism of join with which even profit can be reached.

CAMAGNI's definition model

Camagni (2008, 2009) in the classification of the factors of the territorial capital highlights not only two factors (material and intangible) but determines three components (material,

mixed goods and intangible).[3] By this we get a more accurate meaning of the territorial capital. He defines the nine elements of the territorial capital on the basis of the manifestation of the competition and the different goods.

TABLE 2. A theoretical taxonomy of the components of territorial capital

	Tangible goods (hard)	Mixed goods (hard + soft)	Intangible goods (soft)
High rivalry (private goods)	Private fixed capital stock Pecuniary externalities (hard) Toll goods (excludab.) c	Relational private services operating on: - external linkages for firms - transfer of R&D results University spin-offs i	Human capital: - entrepreneurship -creativity -private know -how Pecuniary externalities (soft) f
(club goods) (impure public goods)	Proprietary networks Collective goods: - landscape - cultural heritage (private "ensembles") b	Cooperation networks: - strategic alliances in R&D and knowledge -p/p partnerships in services and schemes Governance on land and cultural resources h	Relational capital: -associationism - cooperation capability - collective action capability - collective competencies
(public goods) **Low rivalry**	Resources: - natural - cultural (punctual) Social overhead capital - infrastructure a	Agencies for R&D transcoding Receptivity enhancing tools Connectivity Agglomeration and district economies g	Social capital (civicness): - institutions - behavioural models, values - trust, reputation d

(left margin label: **Rivalry**)

Source: Camagni 2009: 123

In the taxonomy of the territorial capital the following things have significant meaning: financial resources, local engineering infrastructure, human resources, marketable knowledge that can be found locally and can be developed, the relation network, the inheritance of objects and history which determines the identity of the territory.

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[3] In the study we list the mixed goods to the intangible capital elements.

A.) Public goods and resources

According to Camagni the material capital and the infrastructure found in the territory can be listed to this category. They are the fundament of the attraction of the economic territory. The advantage of this can be distorted by the increase of the farming lease, the amortization, and the unsustainable and environment polluting use of the land. These can be corrected by decentralized regulation and perhaps the damages can be restored from the resourced gained from the fines.

B.) Intermediate, mixed-rivalry tangible goods

We can find those private and public goods in this group which are parts of the engineering infrastructure, the communication system, the road system and the cultural inheritance. If the function of the cultural inheritance strong in the certain local space, the local identity and belongingness will be important, the economic and social interactions will improve, which encourage the economic growth.

C.) Private fixed capitals and toll goods

The private fixed capital belongs to this traditionally. The long term goal is to create such a regional environment that this capital type should stay and accumulate in the region. To reach this, several legal, social and economic conditions have to be available. The private capital will not transmigrate if the products produced in the region fit to the solvent demand of the region. To the toll goods belong all the goods that are owned by the society and charged with a rental fee and from this fee their amortization, maintenance and operation are paid.

D.) Social capital

Like at the approach of the other concepts, Camagni list the social capital to the intangible assets. This is collective and − as its name refers to − of social origin. This capital element gives cohesive strength and organizing policy in the region or even on the interregional level in the economy, institutional and social relation system. It includes the written and unwritten norms of the society, which affects intensity and quality of the interactions significantly influencing the economy. The social capital contributes to the improvement of the market efficiency as there is a need for the creation of the formal and informal communication channels to improve the innovative potential. According to the author, the social capital can be economically quantifiable on the basis its effect on the space economic processes which manifests first of all in the trust appearing in the economic and social relations. If this trust exists between the characters, this creates such an advantageous economic milieu which makes the certain region even more attractive for the other companies.

Trust determines not only the every day life but the economic processes as well. (Hodosi 2011) In economics the function of the trust is to reduce administrative (costs originating from the collection of information which would be collected in the case too if it was not obligatory) and transactional costs (costs originating from the collection of information which is told to be obligatory by the law) if there is a trustful relationship between the economic organization and its partners. Trust makes it possible that there is no need for institutions dealing with enforcement of legal and ethical norms. Trust is formed easier in the special, socio-cultural proximity. Trust is such a cooperative attitude convention by which the suspicion decreases or disappears in the interpersonal relationship. Trust between the interpersonal and economic unity has price reducing function. One of its prominent and rare examples for this was the modern diamond merchantry where the Jewish merchants did not sign any contracts, they did not introduce administration with high costs but they completed the swap by shaking hands. This trustful nexus minimalized the costs connecting to the business processes. This business process is rare but represents the role of the trust in the economy.

All these can be true vice versa: if there is low level trust between the business partners the transactional and administrative costs are going to increase, which results in the

loss of efficiency. In this case it is necessary to involve formal institutions which determine controls and if it is necessary to enforce the norms of the complicated contracts, the incidental litigious cases slow down the economic processes and innovation, the efficiency of production gets worse.

The determinants of the trustful relationship differ on micro- and mezo level. It is determined by four factors on the micro level: impressions at the personal appearance, the other partner's reputation, previous stereotypes, and whether the partner can be checked or not. Factors that are responsible for the evolvement and reproduction of the trustful relationship between companies: the history of the partnership of the company, the characters of the partner, the relationship of the management and the employees, the habits and attitude of the employees. Besides this the "structure of the company, the management form and the composition of the staff" are also important. (Hodosi 2011: 77)

We have to highlight that trust clears its costs not on a short term, but on a long term, this can be thought of as a strategic investment. As trust cannot be created, it has to be merited; its profit can be realized rather in a medium term or long-term. Even at the beginning of the relationship more costs appear at the foundation of the structure of trust. Let us think it over that to found, maintain the relationship costs money and time whose finance will have advantages only later (Tátrai 2003).

The economic function of trust can be analyzed from the aspect of the supply-demand. The coherence system can be recognized that has been described by the category of pure common-interest constructed by Schelling (1963). It means that "the pure common-interest includes the whole cooperative situation built on trust, which is characterized by the absolutely same goals and everybody has the same cost" (Hodosi 2011: 77).

E.) Relational capital

The relational capital is manifested in the cooperation of the economic characters which is determined by the efficiency of the information swap between them. The relational capital appears in three aspects: it reduces the distrust during the economic decisions, by the accumulation of the collective learning, lexical and non-lexical knowledge and experience the conditions of labour force conditions improve. Its third advantage is that in the regional collaboration the interaction between the economic characters shows improvement in quality, the strengthening of the informal relations means a common corporate system in the relations of globalization.

With the evolvement of such relations such local milieu is formed which can guarantee strategic economic advantages on the basis of the similar thinking, general ethics and language. Information circulation is faster in such a space structure which affects advantageously the market processes of the region. This organizes the collective activities of the local economic entities, it selects the unnecessary information during the economic decisions, and it can acquire knowledge and competencies adequate to the needs of the market. It is obvious the relation capital will return earlier at groups having higher livelihood.

F.) Human capital

According to the endogen growth theory the human capitals can have primer role in the regional economic processes, because it improves the local resources and attraction of the territory at the same time. The disposition of cooperation, the enterprising, creativity and the consultation between the characters of the market belong here.

G.) Agencies for the R&D transfers (agglomeration economies, connectivity and receptivity)

The social capital between the regional economic entities can be transformed into economic capital. Later from these bottom-up clusters can emerge those which can become the engines, determining elements of the economic growth. The more effective relations originating from the closeness, the urbanizing and agglomerating advantages can result in the improvement of

the local enforcement of interest. It can be measured in the quickness and accuracy of the information swap. We can adjust to the constant changes in the structure of globalized world economy and we can form the changes for our advantage in the case if we form such mentality and attitude which makes us appropriate for openness.

<div align="center">H.) Cooperation networks</div>

In the conceptual structure of Camagni this segment stands in the middle – not accidentally. The capital element standing in the center of the model integrates the assets being in private and public possession, and the material and intangible ones. On the certain territory the factors of the economic growth are structured by the cooperation networks, which – as one of its functions – has a redistributive function with the knowledge and the institution of R&D, in other words with the innovation potential. They take part in the correction of the failures of the market and the government (Stiglitz 2000).

<div align="center">I.) Relational private services</div>

The economic entities can form relations by the spontaneity of the market mechanisms, but they can initiate consciously non-market based relations (for example with universities, research institutions) from which profit can be obtained on the territory.

CONCLUSIONS

"Territorial capital appears as a new, fruitful concept allowing the direct consideration of a wide variety of territorial assets, both tangible and intangible, of a private, public or mixed nature." (Capello-Camagni 2008: 28) The introduction of the terminology models is important because with the acquaintance of them we can make empiric analysis. The adaption of the theory in practice is a following study.

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ARTIFICIAL INTELLIGENCE AND ITS ECONOMIC OUTCOME
ANDREW LENGYEL

ABSTRACT. This article weights up the significance of Articial Intelligence (AI) and its impact on economic market sector namely on labour jobs. The paper was based on a secondary research materials derived from previous publications on AI from various sources, which are highlighted throughout the article and summed up at the end in Bibliography section. The paper contemplates that while AI is on rise it impacts on our everyday life and causes reduction of human work force in industries. The effectiveness of AI depend on various factors like technological advancements, environment in which it is used and for reason it is employed. The paper concludes that AI is developed in line with its ability to generate profit.

ABSTRAKT. Tento článok posudzuje umelú inteligenciu (AI) a jej dopad na hospodárske odvetvia trhu práce a na zamestnanosť. Príspevok je založený na sekundárnom výskume materiálov získaných z predchádzajúcich publikácií o AI z rôznych zdrojov, ktoré sú zdôraznené v celom článku a zhrnuté na konci v sekcii Bibliografia. V príspevku sa zvažuje, že aj keď AI je na vzostupe, jej vplyv na náš každodenný život je vysoký a spôsobuje zníženie ľudskej pracovnej sily v priemysle. Účinnosť AI zavisí od rôznych faktorov, ako je napríklad technologický pokrok, prostredie v ktorom je AI použitá, aj z dôvodu jej zamestnanosti. Príspevok zhrnie, že AI je vytvorená v súlade s jej schopnosťami vytvárať zisk.

KEY WORDS

Artificial Intelligence (AI). Intelligence Quotients (IQ). Emotional Quotients (EQ). Social Quatients (SQ). Economic Prosperity of AI.

INTRODUCTION

This paper will contemplate on artificial intelligence, reinforcement learning, supervised learning, and evolutionary learning, and will highlight three fundamental problems of AI namely the (1) symbol-grounded problem, (2) situatedness problem, and (3) homunculus problem. This section will further examine intelligence that is the IQ, EQ, and SQ, as well as, touch on analytical and synthetic approach. This part will, highlight common problems that AI is lacking and how can intelligence be educated and evaluated.

The article will in addition, look at AI and it impact on economic market with a particular focus on owning machines and its impact on labor jobs.

The paper will end with conclusion and bibliography.

AN INTRODUCTION TO ARTIFICIAL INTELLIGENCE (AI)

[4]**Artificial Intelligence (AI)** can be attributed to **John McCarthy,** a well-know computer scientist, who received a Turning Award in 1971 for his major contributions to the fields of Artificial Intelligence (AI). "He was responsible for the invention of the term "Artificial Intelligence" in his 1965 Dartmouth Conference and the invention of the Lips programming language". However, in the Dr. Hanson's 1998 paper, "Economic Growth Given Machine Intelligence", he suggested that when machines achieve adequate intelligence, it would become a complete substitute rather than an addition to Human.

[5]In Economic managements requires complex reasoning and problem solving, which Artificial Intelligence mimics such activities thus defining how human work out problems.

In contrast, it is well known that learning from interaction is a foundational idea underlying nearly all theories of learning and intelligence. Learning can be accomplished in this example by (1) reinforcement learning, and by (2) supervised learning, or through (3) evolutionary learning. **Reinforcement learning,** is the learning based on what to do and how to map situations to actions, in order to maximize a numerical reward signal. Here, the learner is not told which action to take, as in most forms of machine learning, but instead the learner must discover which actions yields the most reward by trying them. Whereas, **supervised learning** is learning from examples provided by knowledgeable external supervisors. Finally, **evolutionary learning** means that their operation is analogous to the way biological evolution produces organisms with skilled behavior even when they do not learn during their individual lifetime.

Moreover, to obtain many rewards, a reinforcement-learning agent must favor actions that it tried in the past and found to be effective in producing reward. However, to discover such actions, it has to try actions that it has not selected before. Therefore, the agent has to exploit what it already knows in order to obtain rewards; also, it has to explore in order to make better action selections in the future. The dilemma is that neither exploration nor exploitation can be pursued exclusively without failing at the task. The agent must therefore, try a variety of actions and progressively favor those that appear to be best. In this respect, a stochastic task, each action must be tried many times to gain a reliable estimate of its expected reward. Furthermore, when reinforcement learning involves planning, it has to address the interplay between planning and real-time action selection, as well as the question of how environmental models are acquired and improved. When reinforcement learning involves supervised learning, it does so, for specific reasons that determine which capabilities are critical and which are not.

In addition, there are four main sub elements of a reinforcement learning system i.e. a policy, a reward function, a value function, and, optionally, a model of the environment. A **policy** is referred to as mapping from perceived states of the environment to actions to be taken when in those states. In some cases, the policy may be a simple function or lookup table, whereas in others, it may involve extensive computation such as a search process. Whereas, a **reward function,** maps each perceived state of the environment to a single number, a reward, indicating the intrinsic desirability of that state. Its sole objective is to maximize the total reward it receives in the end. In general, reward functions may be stochastic. On the other hand, a **value function** specifies what is good in the end. Whereas

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[4] (Wikipedia, 2007)
[5] (Some Thoughts on Economuc Theory and Artificial Intelligence, 2007)

rewards determine the immediate, intrinsic desirability of environmental states, values indicate the long-term desirability of states after taking into account the states that are likely to follow, and the rewards available in those states. Nevertheless, action choices are made based on value judgments.

In contrast, modern **artificial intelligence** researchers accept statistical and control algorithms, for instance, as relevant competing methods or simply as tools of their trade. However, there are also some fundamental problems with AI, namely: (1) symbol-grounded problem (2) problems with embodiment, and Situatedness, and (3) homunculus and underlying problems.

The (1) **symbol grounded problem**, referrers to how symbols relate to the real world. In addition, AI symbols are typically districted in a purely syntactic way by how they relate to other symbols and how some interpreter processes them, thus the relation of the symbols to the outside world is rarely discussed explicitly. For example, if the robot is programmed with symbols representing objects and has to interact with its environment on its own, it has to be able to map the sensory stimulation (from e.g. the cup itself) onto its internal symbolic representation (the world "cup") a very hard problem. On the other hand, symbol systems, such as computer programs, in which symbols refer only to other symbols, are not grounded because they do not connect the symbols they employ to the outside world. Thus, the symbols have only meaning to a designer or a user, not to the system itself.

(2) The **problem of embodiment** refers to the fact that abstract algorithms do not interact with the real world. It should be noted, that only if a system is personified do we know for sure that it is able to deal with the real world. Moreover, systems that are not embodied all suffer from the symbol-grounding problem. As embodied systems, robots have the potential to "solve" the symbol-grounding problem, but this requires them to have "**Situatedness**". An agent is "situated" if it can acquire information about the current situation through its sensors in interaction with the environment. A situated agent interacts with the world on its own, without an intervening human. In designing situated agents, adopting the agent's actions is based on the sensor data the robot gets. It should be noted, that embodiment does not automatically imply Situatedness. Agents can be equipped with detailed models of their environment to be used in the planning processes. If these plans are employed significantly in controlling the agent's behavior, it will not be situated. If the real world changes, one of the main problems is keeping the models in tune with the environment. Inspections of the problem of behaving in the real world shows that it is neither necessary nor desirable to develop very comprehensive and detailed models that is, the more comprehensive and the more detailed the models, the more strongly the agent is going to be affected by the frame problem. The situated agent can interact with the current situation: the real world is, in a sense, part of the "knowledge" the agent needs to behave appropriately.

(3) In the **homunculus and underlying problems,** the **homunculus problem**, or the homunculus fallacy, as it is also called, refers to circular accounts of psychological processes. These processes are circular because they ascribe to some internal mechanism (the homunculus) the very psychological properties being investigated in the first place. In a sense, a homunculus is required to perform the function that the formal system is intended to explain. In other words, the homunculus problem and the symbol grounding problem are closely related: a system containing ungrounded symbols will always require a homunculus giving meaning to them. Whereas, the problem of **underlying substrate** is referred to a biological substance i.e. "the true intelligence requires biological substance as a basis", thus

only natural brains can, in this tradition, exhibit "true intelligence". [6]Table 5: shows how Gary Kasparow playing the Deep Blue chess playing supercomputer developed by IBM in 1996, and in 1997.

Table 1: Gary Kasparov playing against Deep Blue computer

(Wikipedia, Deep Blue, 2007)

Likewise, in AI it is important to build a **model of the environment**, this somewhat that mimics the behavior of the environment. For example, given a state and action, the model might predict the resultant next state and next reward. Models are used for planning, by which we mean any way of deciding on a course of action by considering possible future situations before they are actually experienced. To select our moves, in this modeled environment, we examine the states that would result from each of our possible moves, and look up their current values in the table. Most of the time, we move greedily, selecting the move that leads to the state with greatest value that is with the highest estimated probability of winning. Occasionally, however, we select randomly from among the other moves instead. These are called **exploratory moves** because they cause us to experience states that we might otherwise never see. While we are playing, we change the value of the states in which we find ourselves during the game. We accept to make them more accurate of the probabilities of winning. To do this, we "back up" the value of the state after each greedy move to the state before the move. More precisely, the current value of the earlier state is adjusted to be closer to the value of the later state.

The examination of intelligence

Humans, animals, and robots have to interact with the real world, whereas the computer metaphor has focused on abstract virtual or computational worlds and has neglected their relationship to the real world. What we consider intelligent depends also on our expectations. What intelligence is or is not depends on what people find interesting or what they do not.

Intelligence is a descriptive term: it describes certain properties of individuals or groups of individuals. Thus, descriptive terms are largely arbitrary, and it is therefore unlikely that descriptive definitions of intelligence have a common denominator related to novelty and adaptively. Cognitive science has closer ties to empirical sciences like psychology, biology, and neurology, whereas AI (Artificial Intelligence) is more closely associated with computer

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[6] (Wikipedia, Deep Blue, 2007)

science, algorithms, and logic. Most people when asked to define intelligence almost universally mention abstract thinking as stated Rene Descartes "Cogito ero sum". Many people regard creativity as the highest form of human intelligence. On the other hand, an **Emotional intelligence**, refers to the ability to recognize emotions in others, using emotions to support thinking and actions, understanding emotions, and regulating emotions. The general idea is that if you recognize your own emotions, you are better able to perceive the emotions in others and to react appropriately in social situations.

Additionally, there are other types of intelligence e.g. (**IQ**) Intelligence Quotient, (**EQ**) Emotional Quotients, and (**SQ**) Social Quotients, where the original IQ test was invented in 1905 by French psychologist Alfred Binet, essentially to find out whether children with certain learning deficiencies would be better off in a special schools. German psychologist William Stern in 1912 turned the test into a general intelligence test for children, and David Wecheser in 1939 developed it into one for adults. He proposed the Gaussian distribution of test results: two third should be between 85 and 115 (100 being the mean), and only 2.3 percent above 130 and below 70.

According to Gardner, there is not a single intelligence, or factor but multiple ones: linguistic intelligence, musical intelligence, logical-mathematical intelligence, special intelligence, bodily-kinetic intelligence, and personal intelligences (for perceiving yours own and other people's moods, motives, and intentions). Very roughly, the main idea is that intelligence thinking can be understood in terms of computer programs: input is provided, the input is processed, and finally an output is generated.

By analogy, the human brain is viewed in some sense as a very powerful computer. It receives inputs from the outside world through sensors (e.g. eyes, ears, skin). These inputs are processed: for example, stimulation received through the eyes is mapped onto an internal representation or model, and you recognize a cup of coffee standing in front of you. Depending on your internal state, your motivation, this percept generates the intention or plan to drink coffee: the processing phase. Finally, the action is executed: the output.

Furthermore, the intelligence is in differentiated between analytic and synthetic approaches. The **analytic approach** is generally applied in all empirical sciences. Typically, experiments are performed on an existing system, e.g. a human, a desert ant, or a brain region, and the results are analyzed in various ways. Often the goal is to develop a model to predict the outcome of the future experiments. The **synthetic approach**, on the other hand, works by creating an artificial system that reproduces certain aspects of a natural system. Such models are typically computer models that, when run, are expected to reproduce the experimental result. The synthetic modeling approach can be characterized as "understanding by building". In the study of intelligence, AI and cognitive science have supported this approach. In addition, it is useful to note a **synthetic methodology** (i.e. an autonomous agent), which can be extended to include not only simulations, but also physical systems, artificial creatures, behaving in the real world. Normally, these autonomous agents have the form of a mobile robot and can be used as models of biological systems, humans, or animals. The autonomous agents actually behave in the real world without the intervention of a human: they have sensors to perceive the environment, and they perform actions that change the environment. This is why they are also well suited to explore issues in the study of intelligence in general, not only of biological systems. We can perform experiments with our robots as we like, creating artificially intelligent systems. Moreover, because the robots physically interact with the real world, they can be used for applications, to perform tasks that humans cannot or do not want to do themselves. Thus, we can pursue three potential goals with the synthetic

methodology: we can model biological systems, we can explore principles of intelligence in general, and we can develop applications. However, there are three agents (1) **Biological agents** exist in nature-we do not have to build them, then (2) **robotic agents,** which is further divided by **research agent,** here research agents are used to model natural agents and to explore general principles of intelligence and **industrial agent,** which are used for practical applications and finally (3) **computational agents** which is also divided to **simulated agents, artificial life agents** and **software agents,** which are computer programs that perform a certain task and interact with real-world software environments and humans by issuing commands and interpreting the environment's feedback. These agents are used in various **modeling** e.g., it is known that the control mechanisms of animals are based on neural structures. Biological neural systems have inspired artificial neural network models. Thus, neural architectures can be understood only in the context of the physical system in which they are embedded. A second application of autonomous agents in cognitive science is to explore principles of intelligence e.g. through **experiments**. Experiments can be conducted using any type of sensors, even that do not exist in nature (like laser scanners, or radio emitted-receivers. What's more, high intellectual ability resulting in a high IQ score may well be due to a complex mix of sensory-motor abilities than in turn depend on the particular social environment.

Then again, it is also important to note, that AI has its **fundamental problems**. The main reason for difficulties and the reason for the fundamental problems of AI in general is that the models do not consider the real world. Much work in AI has been devoted to abstract, virtual worlds with precisely defined states and operations, quite unlike the real world, for instance:

(a)   Chess is a formal game. It represents a virtual world with precisely defined states, board positions, and operations, that is, the legal moves.
(b)   Soccer is an example of a normal game. There are no precisely defined states and operations. In contrast to chess, two situations in soccer are never identical.

In other words, information gathered from the sensors is therefore always subject to errors. It follows that the real world is only partially knowable, and this in turn implies that it is predictable only to a limited extent.

Thus, **AI is lacking** in the following:

(1) **Robustness and generalization:** traditional AI systems often lack robustness, which means that they lack tolerance of noise (i.e. fluctuation of data) and fault tolerance and cannot behave appropriately in new situations. If a situation arises, that has not been predefined in its programming, a traditional system breaks down, or stops operating.

(2) **Real time processing:** because the real world has its own dynamics, systems must be able to react quickly in order to survive and perform their tasks. Systems based on the classical paradigm embedded in real robots are typically slow, because they process information centrally.

(3) **Sequential nature of programs:** the architecture of today's AI programs is essentially sequential, and they work on a systematic basis. By contrast, the human brain's processing is massively parallel, with activity occurring in many parts of the brain at all times.

(4) **Other problems:** classical systems are goal-based, which are hierarchical.

(5) **The frame problem** was originally pointed out by McCarthy and Hayes in 1969. The central point concerns how to model change and how can a model of a continuously changing environment be kept in tune with the real world? Thus, the problem is about the **system environment interaction:** how models of changing environment can be kept in tune with the environment

Principles of educating intelligence
[7]Knowledge takes part in the brain, in other words the brain works in a parallel level i.e. the brain processes wholes and parts simultaneously, as well as, the search for meaning comes through patterning.

Besides, there are three instructional techniques connected with the **brain-based learning** namely:

(1)   **Orchestrated immersion**, happens where learning environments are formed which fully immerse students in a learning experience;

(2)   **Relaxed alertness**, here an effort is made to get rid of the fear while sustaining a highly demanding environment; and

(3)   **Active processing**, where the learner establish and internalizes information, by strongly, processing it.

What's more, the learning should be intended to be developed around the student's interest by also making it contextual. Thus, there must be a personally meaningful challenge. Besides that, students should be placed in groups, where they can easily interact, and the learning should be focused on real problems, thus if it is possible encourage the settings to be outside the classrooms and school buildings. Moreover, students should be assessed according to their learning styles and preferences, a so-called "active processing of experience"; by continuous monitoring, this is due to allowing students to maximize their own learning processes.

Furthermore, in **AI systems**, the learning is mainly done by a passive data-driven process of applying a single learning algorithm to training examples installed to the system. On the other hand, in a **goal-driven learning**, the learning happens through an active and strategically process driven by analyzing information, using alternative learning strategies, and finding opportunities in the environment. Besides, the goal driven learning is additionally separated into the classes centered in the region of **task goals, learning goals,** and **specifications, policies** and **constraints.** Where, task goals determine why the reasoner is learning in the first place, the learning goals, on the other hand, specify what the reasoner needs to learn specification, policies, and constraints influence how learning occurs. In this respect, the task goals force the search for relevant plans in memory and trigger learning of new guides for plan retrieval when failures arise. Learning goals differ from task goals in that, while they too specify a desired state, the specified state is an internal or mental state, that is, a state of knowledge or belief that the learner is attempting to achieve. Task goals, on the other hand, are satisfied through problem solving in the external (physical) world, while learning goals are satisfied through a learning process that, in the goal-driven learning framework, is viewed as problem solving in the "informational" world. In addition, reasoning goals span the broad range of predetermined activities, including activities such as retrieval of relevant information and similarity assessment. Learning goals or knowledge goals, on the other hand, refer solely to goals that acquire or formulate particular types of knowledge.

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[7] (Horn P. S., Teaching the Human Brain - Brain Based Learning, 2007)

Conversely, in AI systems, reinforcement learning that satisfies the Markov property is called a **Markov Decision Process (MDP).** Whereas, if the state and action spaces are finite, then it is called a **finite Markov Decision Process (finite MDP)**. A particular finite MDP is defined by its state and action sets and by the one-step dynamics of the environment. Given any state and action, **s** and **a,** the probability of each possible next state, **s',** is:

(a)
P   **= Pr {st = 1 = s', st = s, at = a}** these qualities are called transition probabilities.
(Ss')

For example, when an agent makes a decision at times determined by external events (or by other parts of the robots control system). At each such time, the robot decides whether it should (1) actively search for e.g. a Can, (2) remain stationary and wait for someone to bring it a Can, or (3) go back to home base to recharge its battery. The **Bellman equation**, in contrast, expresses a relationship between the value of a state and the values of its successor states. In other words, it states that the value of the start state must equal the (discounted) value of the expected next state, and the reward expected along the way. What's more, Bellman optimality equation provides one route to finding an optimal policy, and thus to solving the reinforcement learning problem. The solution relies on at least three assumptions that are rarely true in practice: (1) we accurately know the dynamics of the environment; (2) we have enough computational resources to complete the computation of the solution, and (3) the Markov property. However, for the kinds of tasks in which we are interested, one is generally not able to implement this solution exactly because various combinations of these assumptions present no problems for the game of backgammon; the second is a major impediment.

What is more, reinforcement learning method also uses a **Backup diagrams**, which in other words is a diagram relationships that form the basis of the update or backup operations. These operations transfer value information back to a state (or a state action pair) from its successor states (or state-action pairs).

Besides, backup diagrams, one may use a **grid world, golf, Monte Carlo, or a temporal difference method** to illustrate value functions. It, however, should be noted that, even if we have a complete and accurate model of the environment's dynamics, it is usually not possible to simply calculate an optimal policy by solving the Bellman optimality equation. For example, board games such as chess (see also Appendix 4), are a tiny fraction of human experience, yet large, custom-designed computers still cannot compute the optimal moves. A critical aspect of the problem facing the agent is always the computational power available to it, in particular, the amount of computation it can perform in a single time step. The memory available is also an important constraint. A large amount of memory is often required to build up approximations of value functions, policies, and models.

Goal based evaluation

[8]Both in psychology and in AI, goal based evaluation theories, either, tend to look at the evaluation process as context-independent, or to examine it within a single fixed context. This is then followed by an investigation of how a specific aspect of context (i.e. the overreaching goal of the explainer to use an explanation), determines the information that the

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[8] (Horn P. S., Memory, 2007)

explainer requires when confronted with an anomalous situation. Moreover, the researcher also argued that effectiveness of any explanations satisfies the needs for information that arise from system goals. In contrast, **Attribution theory,** investigates how people decide whether to explain an action in terms of features of its actor, or features of the environment. Most work in attribution theory assumes either that personal or those situational factors will apply, but not both. On the other hand, a **co-variation principle** maintains, that people look at co-variation across different time, people, and other entities in order to decide which type of factor applies. Although attribution theory gives criteria for deciding which class of factors to implicate, it does not suggest how to decide which particular personal or environmental factors are important.

Excuse theory studies how the desire to form excuses makes people manipulate the types of factors to use in attribution, to blame external influences for their own bad performance. Besides excuse theory, in AI, the question of explanation's goodness has been investigated in three main areas. Research in expert system explanation has concentrated on the question of explanation's goodness for explaining system behavior, for the benefit of the system user. On the other hand, research in explanation for text understanding has concentrated on how to select valid explanations from a range of hypotheses, and explanation-based learning research has primarily considered the problem of determining explanations' goodness for learning to improve performance on concept recognition and search.

[9]Conversely, according to psychometric views, human intellectual competence appears to divide along three dimensions, **(1) fluid intelligence, (2) crystallized intelligence, and (3) visual-spatial reasoning**. **Fluid intelligence** is the ability to develop techniques for solving problems that are new and unusual, from the perspective of the problem solver. **Crystallized intelligence** is the ability to bring previously acquired often culturally defined, problem-solving method to bear on the current problem. **Visual-spatial reasoning** is the specialized ability to use visual images and visual relationships in problem solving

An Economic prosperity of AI

[10]It has been suggested, that extensive use of machine intelligence will decrease their cost and could increase economic growth, but will substitute human workers, and thus wages would fall below acceptable level. This is due to human being also the technology consumers and hence reduction in wages would naturally reduce the purchase of intelligent machines. This would lead to the situation where buyers would be not able to afford to pay for the new technology, which would result in falling revenues and business would collapse.

On the other hand, by owning intelligent machines it also encompasses the possessing part of the interest in the economy of the future, which would be sufficient to make up for the decline in wages allowing the population to consume.

On problem with this theory is that the asset values of investments are not determined by the investors' perception about the technology but by their expectation of future cash flow. This inclines that the investors has to have a logical reason to invest and as asset value would increase, due to good investments, it would generate investment income, which would be used to further consume generating future cash flow.

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[9] (Bapi, 1990)
[10] (Hanson, 2009)

What is more, when firms compete with each other, price would have to fall, thus AI is responsible for the fall in human labor jobs. In this scenario, human labor does not determines the output profitability, but considers how much more AI can be added to the production in order to generate more profit in the same market. Although, there can be a situation where a well established firm adopts the new technology but its customer might not support such investment such as the GPS firm like Garmin which is jeopardized by mobile phones GPS devices. This lead to a theory in economics evolution, which suggests that there are two processes namely a (1) creative destruction and (2) complimentary leveraging.

CONCLUSSION

The paper focused on Artificial Intelligence (AI) and how AI can learn through reinforced learning, supervised learning and through evolutionary learning. This part also touched on fundamental AI problems such as symbol-based problems, situatedness problem, and on homunculus problem. The following part of the paper centered on examination of intelligence through analytical approach and synthetic approach with the use of three agents namely (1) biological agents, (2) robotic agents and (3) computational agents. The paper further demonstrated that AI is lacking in robustness and generalization, real time processing, sequential nature of programs, other problems, and frame problems.

The subsequent section, the principles of educating intelligence was discussed, touching on Markov Decision Process (MDP), and on goal-based evaluation of AI, and Intelligence.

However, it support the main argument that productivity impovemets will not ease up purchasing power for other consumptions, but instead it would cumulate more investment. Moreover, the economic prosperity of AI took into consideration Dr. Hanson's points of view with a specific focus on labour market. In this section, the article assumed that due to technological inovations human labour work will be in decline, but only when it cost-effective for a corporation to do so.

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INOVAČNÉ AKTIVITY V PRIEMYSLE NA SLOVENSKU V ROKOCH 2004 - 2008

INNOVATION ACTIVITIES IN INDUSTRY AT SLOVAKIA DURING 2004 – 2008

Štefan HIČÁK

Abstract This article discuss about the level of innovation activities in manufacturing industries between years 2004 – 2008. We present analysis of data gained from Community Innovation Surveys conducted in 2007, resp. 2009. In nowadays innovation is seen as entrepreneurship phenomenon and according lot of studies has important positive impact of competitiveness at micro level or firm level, but also at level of region or country.

Key words: Innovation. Innovation activities. Product innovation. Process innovation.

Introduction

There is broad agreement among economists that research and development is a major source of economic growth .Most of us have already heard about term competitiveness and also probably many economists agree that innovation and innovation activities have strong positive impact on competitiveness of company, sector, region or country (Porter 1998).

In most established markets competition among firms takes non-price forms: for real (e.g., longer service life) of imaginary (e.g., branding) reasons customers are willing to pay for a given good or service, although a less costly alternative could in principle fulfill the same need. As compared to cost competitiveness, competition over "desirability" in established markets (sometimes referred to as real competitiveness) is a multi-dimensional concept and cannot be readily compressed to a single measure. The picture is further complicated by the fact that many firms operate in a number of markets simultaneously, with the objective of maximizing overall discounted profits. A second complication is that firms do not only compete in established markets, they also compete for the introduction previously unavailable goods and/or services, spawning completely new markets. This may be referred to as innovative competitiveness.

Proposed article deals with results from Community Innovation Surveys which were conducted in 2007, resp. in 2009. Content of the survey was related to the reference period 2004 – 2006, resp. 2006 – 2008. Data are the results of the processing of the innovation survey Inov 1-99, which was carried out in 2007, resp. 2009. We put emphasis on industry data which we will try to analyze and evaluate the changes happened, and then we would like to take brief conclusion why did changes happen.

2 Methodology and Database

The methodology of these surveys was based on the statistical methodology of the EU member states and it was harmonized with the Fourth, resp. Fifth Community Innovation

Surveys (CIS 6, resp. CIS 8). There is a little change in defining innovation activities between years 2007 and 2009.

The innovation survey (CIS6) in 2007 was carried out in 3 712 reporting units, the sample corresponds to the 43,8 % of the target population which contents 8 035 units. Results from survey conducted in 2007 are based on 2 678 enterprises, i.e. the response rate was 83,5%. The innovation survey (CIS8) in 2009 was carried out in 3 239 reporting units, the sample corresponds to the 26,6 % of the target population which contents 11 761 units. Results from survey conducted in 2009 are based on 2 296 enterprises, i.e. the response rate was 70,9 % counted from filled in questionnaires.

By the term innovation we have described as both the act of invention and the activity required to bring the invention to the market. As a general statement, the incentive to innovate is the difference in profit that a firm can earn if it invests in R&D compared to what it would earn if it did not invest. These incentives depend on many factors, including: the characteristics of the invention, the strength of intellectual property protection, the extent of competition before and after innovation, barriers to entry in production and R&D, and the dynamics of R&D. There is a differentiation between methodology in 2007 and 2009. In 2007 there were four kinds of innovation – product innovation, process innovation, organizational innovation and marketing innovation. These four kind of innovation were grouped to two group – it means technological innovation (product and process innovation are included) and non-technological innovation (marketing and organizational innovation are included). Non-technological innovation was not included in the total innovation activity of enterprises.

3 Innovation activities in industry in Slovakia

Innovation activities include product innovations, process innovations, ongoing or abandoned innovation activities for product and process innovations, organizational innovations and marketing innovations.

Enterprises with innovation activity are those, which has introduced new or significantly improved products to the market or introduced a new or significantly improved process within the enterprise. Further abandoned or on-going innovation activities are also included to this group of enterprises.

Enterprises that have had any kind of innovation activity:
- introduced new or significantly improved products
- introduced new or significantly improved process
- ongoing or abandoned innovation activities for product and process innovations
- Implemented new organizational method
- Implemented new marketing concept or strategy.

Ability to innovate in the industrial sector in 2008 had increased. In comparison with the CIS 2006 survey, share of innovation active enterprises is higher by more than one third, by 10,3 percentage points and it reach 37,1%. In figure 1 is shown share of enterprises with innovation activities on the total number of enterprises. When we take a look on presented data we could make the brief conclusion that innovation activities in all type of enterprises (small, medium and large) were higher. But it is necessary to say that growth of innovation activities is probably a result of including non-technological innovations in the total innovation activity of enterprises.

Successful innovators introduced or implemented product innovations, process innovations, or both products and process innovations. The following figure shows the share of enterprises with innovation activity in total number of enterprises in industry.

Figure 1 Share of enterprises with innovation activity on the total number of enterprises in industry in 2006 and 2008 (share in %)
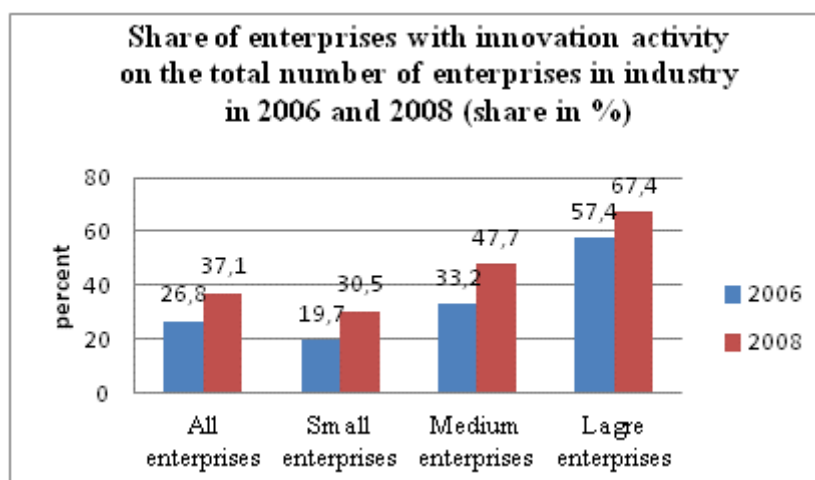
Source: own processing based on documents of Statistical Office of the Slovak Republic (2010)

In 2008 similarly, as in the previous period, the innovation activity of enterprises was directly proportional to their size. Compared with the period of 2004-2006, the proportion of innovation activity increased in industry sector enterprises of all size categories. The most intensive growth of innovation activities between years 2006 and 2008 was recorded in medium size enterprises. The slightest growth was reported in large-sized industrial enterprises, as a result of higher innovation activity in this enterprise segment in the preceding period. When we take a look at data about large enterprises we find out that 2 from 3 enterprises introduce any kind of innovation in contrast with small enterprises where only 1 from 3 enterprises introduced any kind innovation.

The following table shows the numbers and shares of enterprises with any kind of innovation activity in total number of enterprises and in industry in 2006 and 2008.

Table 1 Numbers and shares of enterprises with any kind of innovation activity

Kind of innovation activity	Number of enterprises with innovation actitvity				Share in total number of enterprises in %			
	2006		2008		2006		2008	
	Total	Industry	Total	Industry	Total	Industry	Total	Industry
All kinds of innovation activity	1824	1037	3950	1866	22,7	26,8	33,6	37,1
Technological innovation	n/a	n/a	2339	1333	n/a	n/a	19,9	26,5
Successful innovations	1739	983	2221	1291	21,6	25,4	18,9	25,6
Product innovation only	395	244	442	269	4,9	6,3	3,8	5,3
Process innovation only	655	347	765	460	8,2	9	6,5	9,1
Product and process innovations	689	392	1014	562	8,6	10,1	8,6	11,2
On-going and/or abandoned innovation activities only	85	54	117	41	1,1	1,4	1	0,8
Non-Technological innovation	n/a	n/a	1611	533	n/a	n/a	13,7	10,6
Without innovation activity	6211	2828	7811	3171	77,3	73,2	66,4	62,9

Source: own processing based on documents of Statistical Office of the Slovak Republic

As we take closer look at data in table 1 we will find out that number and shares for industry are higher as in total number and shares for all enterprises. There is 26,8 % share for industry in 2006 vs. 22,7 % share for all enterprises, resp. 37,1 % vs. 33,6 % in 2008.

In period 2006 – 2008 determining share (95,3 %) of enterprises with technological innovation was constituted from successful innovators that introduced or implemented product or process innovation or both type of innovations. Only on-going or abandoned innovation activity were reported by 4,7 % of enterprises with innovation activity. Similar shares were reached in previous period – 95 % vs. 5 %.

4 Innovation intensity in manufacturing industry

Innovation intensity, expressed as a ratio between total spending on innovation in manufacturing industry over total turnover, represented 1,04 % in 2008. Medium enterprises had the highest innovation intensity (1,34 %), followed by large enterprises (1,0 %) and the lowest innovation intensity was in small enterprises (0,78 %). As we can see in comparison with 2006 for all types of enterprises innovation intensity has decreased. Innovation intensity for manufacturing felt down from 2,24 % in 2006 to 1,04 in 2008

Figure 2 Innovation intensity in manufacturing industry in %
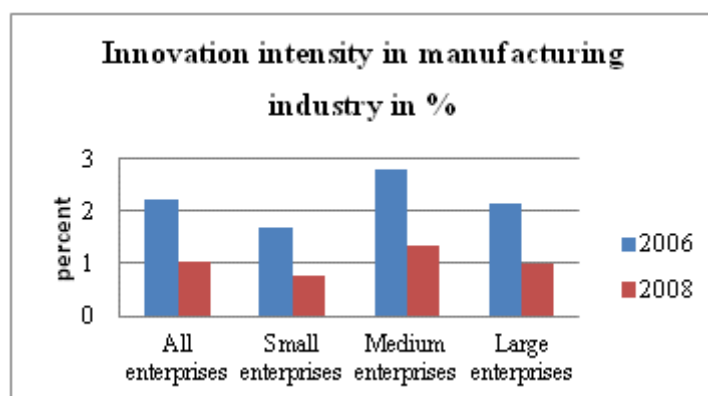
Source: own processing based on documents of Statistical Office of the Slovak Republic

Innovation intensity according to the technological sector is shown in table 2. Definitions of technological sectors used in CIS are based on the OECD/Eurostat classification which takes into account the R&D intensity across different industries in manufacturing.

There are distinguished the following technological sectors, which include the listed activities in manufacturing sector by NACE:

High-tech - pharmaceuticals, office machinery and computers, radio, television and communication equipment, medical, precision and optical instruments, aircraft and spacecraft.

Medium-high-tech - chemicals and chemical products (less pharmaceuticals), nonelectrical machinery, electrical machinery, motor vehicles, railway and tramway locomotives and rolling stock.

Medium-low-tech - coke, refined petroleum products and nuclear fuel, rubber and plastic products, non-metallic mineral metals, basic metals, fabricated metal products, shipbuilding.

Low-tech - food, beverages and tobacco, textiles, fur and leather, wood, paper printing, publishing, furniture, other manufacturing, n.e.c., recycling

Table 2 Description of Technological sector

Technological sector	2006			2008		
	Share of enterprises (in %)		Innovation intensity in enterprises with technological innovations in %	Share of enterprises (in %)		Innovation intensity in enterprises with technological innovations in %
	classified into the sector in the total number of enterprises	with innovation activity in the total number of enterprises of sectors		classified into the sector in the total number of enterprises	with innovation activity in the total number of enterprises of sectors	
Manufacturing sector	100	27,4	3,1	100	37,3	1,6
of which						
High-tech	4,6	43,7	1,2	2,9	60,7	3,46
Medium-high-tech	19,5	34,9	3,9	18,2	45,1	1,51
Medium-low-tech	30	25,1	2,7	38,2	38	1
Low-tech	45,9	24	3,8	40,7	31,4	3,17

Source: own processing based on documents of Statistical Office of the Slovak Republic

As we can see at the table 2 we can say that almost 70 % of enterprises are from medium-low-tech or low tech sector, but only 1 from 4 companies (in 2006), resp. 1 from 3 companies (in 2008) declare any kind of innovation activities. When we take a look at the data from high-tech sector we find out big difference between low-tech and high-tech as almost 61% from high-tech declared any kind of innovation activity in comparison with 31,4 % in low tech sector.

5 Incentives for innovation and gains from innovation

As we have already mentioned term innovation describes as both the act of invention and the activity required to bring the invention to the market. As a general statement, the incentive to innovate is the difference in profit that a firm can earn if it invests in R&D compared to what it would earn if it did not invest. These incentives depend on many factors, including: the characteristics of the invention, the strength of intellectual property protection, the extent of competition before and after innovation, barriers to entry in production and R&D, and the dynamics of R&D.

It is more difficult to make general statements about incentives for innovations because a firm's profit before and after innovation occurs depends on fixed costs, price competition and the mix of other products in its portfolio. Even without investment in R&D, firms may supply too many or too few products from the perspective of total economic welfare. For example in the case of a process innovation, a monopolist's incentive to invest in R&D for a new product is the difference in the monopoly profits with and without the new product.

The dynamics of the innovation process affect incentives to invest in R&D. A firm may be able to pre-empt competitors in R&D if a head start in the innovation process gives the firm a discrete advantage in securing an exclusive right to the innovation. If that is not the case, firms can simultaneously engage in R&D, each with a reasonable expectation that its R&D expenditures will generate a significant return. For example a homogenous good is sold at price p and produced at constant marginal cost, c. Demand is $q(p)$ with $dq(p)/dp < 0$. Given the production technology, total economic welfare reaches a maximum when price is equal to marginal cost. In the socially optimal allocation there are no profits and total welfare is equal to consumer surplus.

$$W(c) = \int_{c}^{\infty} q(x)dx$$

Note that $dW(c)/dc = -q(c)$. For an innovation that reduces the marginal production cost by a small amount, the welfare gain from the innovation is proportional to the amount consumed when the price is equal to the marginal production cost. This simple observation is key to understanding the value of innovation incentives under different market structures. The change in total welfare from a discrete investment in R&D that lowers the marginal cost of making the good to $c_1 < c_0$ is:

$$W(c1) - W(c0) \equiv \Delta W = \int_{c0}^{c1} \frac{dW(x)}{dx}dx = \int_{c1}^{c0} q(x)dx$$

This is the total achievable benefit from R&D that reduces marginal cost from c_0 to c_1. It is the area $c_1 c_0 bd$ in Figure 3.

Figure 3 Benefit from R&D
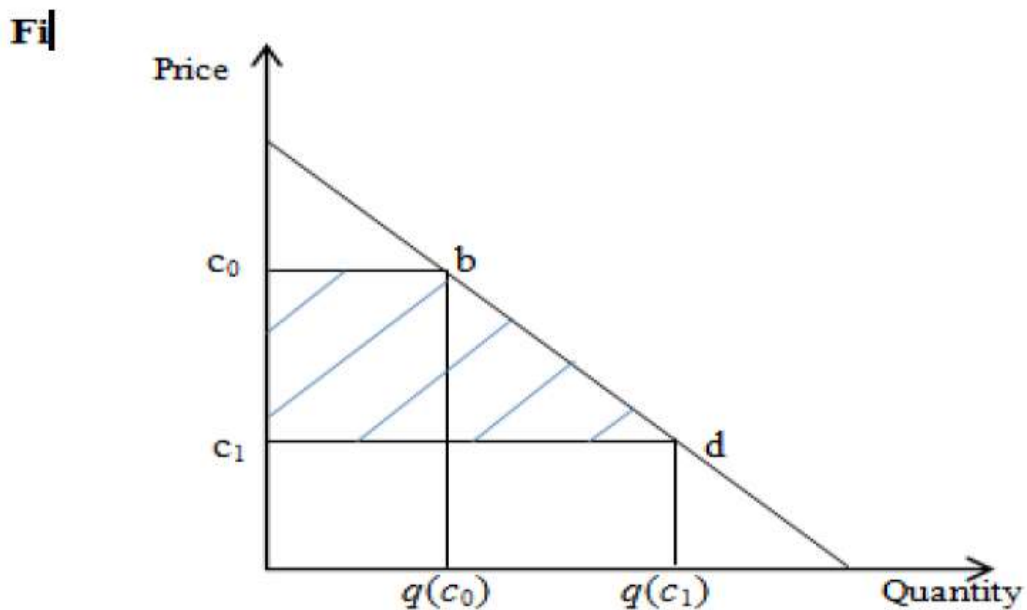
Source: Own processing, according Gilbert 2006

Conclusion

In this article we had described level of innovation activities in manufacturing sector in Slovakia during 2004 – 2008. Methodology of CIS has been little changed, mainly due to distinguishing technological and non-technological innovation. Probably this changes are resulting in little bit higher shares of enterprises with innovation activity in 2008 than period before. On the other hand innovation intensity has decreased in 2008 in comparison with 2006. Also we have mentioned some incentives for realizing innovation activities and gains from innovation.

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VÝBER DODÁVATEĽOV

SELECTION OF SUPPLIERS

Zoltán Šeben

Abstract

In the context of a business activity is important to pay a fundamental attention to the selection of suppliers and to creation the portfolio of them. The aim of the paper is on the one hand to concentrate on the existence of criteria, which influence the selection process and on the other hand to point out the possible application of scales in a quantitative determination of the results of the assessment of suppliers. The paper begins with a theoretical definition of the steps aiming to determine the suppliers with them the company wants to work together. It is followed by the exact description of the supplier evaluation model with concrete criteria and weights in the methodical part.

Key words

Supplier. Criteria. Decision making. Scales. Selection.

Abstrakt

V rámci podnikovej činnosti je dôležité venovať náležitú pozornosť výberu a tvorbe portfólia dodávateľov. Cieľom príspevku je sústrediť pozornosť na existenciu kritérií, ktoré ovplyvňujú výberový proces a poukázať na možnú aplikáciu váh pri kvantitatívnom stanovení výsledkov v hodnotiacom procese dodávateľov. Príspevok začína teoretickým vymedzením krokov spejúcich k určeniu dodávateľov, s ktorými podnik chce spolupracovať. Následne je v metodickej časti presne popísaný model hodnotenia dodávateľov s konkrétnymi kritériami aj so stanovením váh.

Kľúčové slová

Dodávateľ. Kritériá. Rozhodovanie. Váhy. Výber.

Úvod

Výber dodávateľa je proces, ktorý je možné charakterizovať prostredníctvom viacerých na seba nadväzujúcich fáz. De Boer, Labro a Morlacchi (2001) rozoznávajú ako prvý prípravný krok spočívajúci vo formulovaní problému a jednotlivých rozhodovacích kritérií. Po tomto nasleduje podľa autorov hodnotenie spôsobilosti potenciálnych dodávateľov a ich finálny výber. Aissaoui, Haouari a Hassini (2007) rozpracúvajú vo svojom článku o výbere dodávateľov a objednávaní s veľkými kapacitami podrobnejšie jednotlivé kroky procesu výberu dodávateľa. Ako prvý krok uvádzajú *definovanie problému*. Skracovanie produktových životných cyklov si na jednej strane vyžaduje kontinuálne vyhľadávanie nových dodávateľov, na druhej strane nákupné prostredie s aplikáciou nástroja Just-In-Time zahŕňa vytváranie úzkych vzťahov s dodávateľmi vyúsťujúcich do partnerstiev, privilegovania dodávateľov, či vytvárania dlhodobých zmluvných vzťahov. V dôsledku toho čelia tvorcovia rozhodnutí rozličným situáciám spojených s nákupom, čo vedie k ich rozličným rozhodnutiam. Z hľadiska uskutočnenia správneho rozhodnutia by preto mal proces nákupu začať presným špecifikovaním toho čo mienime dosiahnuť výberom dodávateľa. Druhým krokom je *formulácia rozhodovacích kritérií*. V závislosti od situácie, ktorá podmieňuje nákup je výber správneho dodávateľa ovplyvnený množstvom faktorov. Počnúc

Dicksonovou štúdiou (Dickson, 1966) založenou na dotazníkovom prieskume v dotazovanej vzorke 273 nákupných agentov a manažérov zo Spojených štátov amerických a Kanady bolo identifikovaných 23 rozličných hodnotiacich kritérií aplikovateľných vo výberovom procese. Spomedzi nich boli cena, dodávka, kvalitatívne ciele nákupcu a schopnosť dodávateľov ich naplniť rozhodujúcimi determinantmi toho, koľko objedná podnik od dostupných dodávateľov. Výber relevantných kritérií podmieňuje celý proces hodnotenia dodávateľov. Vo svoje štúdii o analytických sieťových procesoch v rámci selekcie dodávateľov uvádzajú autori Gencer a Gürpinar (2007) celý súbor kritérií stanovených pre výber dodávateľov (bližšie v tabuľke 1).

Tabuľka 1. Hodnotiace kritériá pre výber dodávateľov

Kód kritéria	Názov kritéria
1.	*Podnikateľská štruktúra dodávateľa*
A.	**Podstatné informácie o dodávateľovi**
A1.	Lokalizácia dodávateľa
A2.	Počet rokov aktívneho pôsobenia dodávateľa v sektore
A3.	Referencie
A4.	Servisná kapacita/spôsobilosť dodávateľa
A5.	Komunikačná spôsobilosť dodávateľa
B.	**Organizačný profil dodávateľa**
B1.	Organizačná štruktúra
B2.	Počet zamestnancov
B3.	Kvalifikačná a vzdelanostná štruktúra zamestnancov
C.	**Finančný status dodávateľa**
C1.	Naposledy realizovaný profit
C2.	Exportná pozícia
C3.	Adekvátnosť materiálových cien k trhovým cenám
2.	*Výrobná spôsobilosť dodávateľa*
D.	**Vybavenostná úroveň dodávateľa**
D1.	Kapacita a použiteľnosť strojov
D2.	Výrobná technológia
E.	**Výrobná spôsobilosť dodávateľa**
E1.	Výrobná kapacity celého vybavenia
E2.	Technická spôsobilosť
E3.	Spôsobilosť vyrábať podľa plánu
E4.	Úroveň obsluhy, manipulácie a balenia
F.	**Spôsobilosť dodávateľa pre dodanie materiálu**
F1.	Primeranosť v kvantite
F2.	Vhodnosť dodacích termínov
F3.	Primeranosť ku štandardom balenia
F4.	Časová náročnosť obstarávania
3.	*Systém kvality dodávateľa*
G.	**Systém certifikácie kvality dodávateľa**
H.	**Dokumentácia systému kvality dodávateľa**
H1.	Príručka kvality
H2.	Kontrola dokumentácie
H3.	Archivácia záznamov kvality

H4.	Využívanie hodnotných pokynov v záujme kvality
I.	**Aplikácia systému kvality u dodávateľa**
I1	Spôsobilosť pre kontrolu procesov
I2	Identifikácia produktu
I3	Prijímanie inšpekcií
I4	Kalibračná kontrola
I5	Systém regulovania nevyhovujúcich materiálov
I6	Systém nápravných a preventívnych činnosti
I7	Kontrolný mechanizmus/audit
I8	Školenia
Kód dodávateľa	**Názov dodávateľa**
J1	Prvý alternatívny dodávateľ
J2	Druhý alternatívny dodávateľ
J3	... alternatívny dodávateľ

Zdroj: autor na základe Gencer, Gürpinar: Analytic network process in supplier selection:
A case study in an electronic firm, 2007.

Pri stanovení kritérií môže predstavovať komplikáciu ich konfliktný charakter. Dodávateľ vyznačujúci sa najlepšou kvalitou môže mať resty v plnení dodávok na presný čas, ako aj najnižšia ponúknutá cena môže ísť na úkor kvality. Ak skúmame kritériá prostredníctvom kompenzačných modelov, je obvykle prípustné aby sa kritérium s nízkou mierou naplnenia zo strany dodávateľa kompenzovalo iným kritériom, v rámci ktorého je dodávateľ schopný excelentne plniť. Naproti tomu je v modeloch s nekompenzačným charakterom vyžadovaná minimálna akceptovateľná miera plnenia pre každý z určených kritérií.

Po formulovaní rozhodovacích kritérií nasleduje *predbežná selekcia potenciálnych dodávateľov*. Cieľom tohto procesu je vyškrtnúť neefektívnych kandidátov a vyselektovať tých dodávateľov, ktorý sa vyznačujú akceptovateľnými charakteristikami. K tomu je však potrebné presne stanoviť, akú eliminačnú techniku podnik využije. V odbornej literatúre sa stretávame s jednoduchšími, ale aj náročnejšími technikami. Hodnotenie môže prebiehať napríklad za pomoci stanovenia minimálnej hranice súvisiacej s daným kritériom, ktorá musí byť za každých okolností naplnená. V tomto prípade sa nepripúšťa kompenzácia ani len jedného kritéria. Inou aplikovanou technikou je, keď je najprv definované najpodstatnejšie kritérium a skúma sa, ktorí dodávatelia a do akej miery tomuto kritériu vyhovujú. Výberový súbor dodávateľov sa zoradí od najlepšieho až po najmenej vyhovujúci. Ak by sa umiestnili na najlepšej priečke dvaja alebo viacerí dodávatelia, definuje podnik druhé najpodstatnejšie kritérium a hodnotenie sa zopakuje už len pre týchto dodávateľov. Z hľadiska ďalších implementovateľných techník sa v odbornej literatúre stretávame aj s klasifikačnými algoritmami, klastrovou analýzou, alebo metódou DEA (data envelopment analysis=analýza dátových obalov) a ďalšími.

Záverečným krokom výberu dodávateľov je *finálna selekcia*, teda definitívne stanovenie dodávateľov, formálne nadviazanie spolupráce a rozdelenie objednávok zo strany podniku.

Materiál a metódy

Metodická časť príspevku sa venuje konkrétnemu modelu hodnotenia dodávateľov, ktorý vychádza z určenia determinujúcich kritérií a k nim počítaným váham. Postup hodnotenia dodávateľov je prezentovaný prostredníctvom tabuliek dva, tri, štyri a grafov jeden a dva.

Tabuľka 2. Čiastkové váhy a váhy kritérií

Hodnotenie dodávateľov		Váženie		
Kritériá		Čiastková váha	Váhy	%
Cena			9	37,5%
	Cenová úroveň	8	4,8	20,0%
	Zľavy	5	3	12,5%
	Platobné podmienky	2	1,2	5,0%
			0	0,0%
Kvalita			5	20,8%
	Parameter výrobku 1	3	1,4286	6,0%
	Parameter výrobku 2	5	2,381	9,9%
	Environmentálne normy	2	0,9524	4,0%
	Predpísané štandardy	0,5	0,2381	1,0%
			0	0,0%
Doprava			6	25,0%
	Hraničné termíny	1	2	8,3%
	Balenie	1	2	8,3%
	Súlad dodania s dohodnutými podmienkami	1	2	8,3%
			0	0,0%
Spoľahlivosť			3	12,5%
	Flexibilita	2	0,4615	1,9%
	Spolupráca	6	1,3846	5,8%
	Vrátenie tovaru a reklamácie	1	0,2308	1,0%
	Riešenie sťažností	4	0,9231	3,8%
			0	0,0%
Iné kritériá			1	4,2%
			1	0,5	2,1%
			1	0,5	2,1%
Súhrnná hodnota váh		max.	24	100,0%

V tabuľke č. 2 sú definované štyri kľúčové kritériá spolu s možnosťou doplniť iné kritériá, ktoré sú z hľadiska podniku relevantné. Medzi hlavné kritériá sú zaradené cena, kvalita, doprava a spoľahlivosť. Cena je charakterizovaná prostredníctvom cenovej úrovne, zliav a platobných podmienok. Kvalita je vnímaná z hľadiska naplnenia dvoch parametrov výrobku, environmentálnych noriem a vzťahujúcich sa predpísaných štandardov. Hraničné termíny, balenie a súlad dodania s dohodnutými podmienkami sú piliermi pre kritérium doprava. Spoľahlivosť je daná flexibilitou, spoluprácou, riešením sťažností, reklamácií a praktickou realizovateľnosťou vrátenia tovaru.

Ku každému kritériu je podnikom stanovená váha a čiastková váha. Ak porovnáme váhy štyroch hlavných a doplnkových kritérií (cena 9, doprava 6, kvalita 5, spoľahlivosť 3 a iné kritériá 1), je zrejmé, že pre podnik má najpodstatnejší charakter cena. Rovnako je možné pristupovať aj k zoradeniu kritérií určených čiastkovými váhami. V prípade kritéria spoľahlivosť je priradená najväčšia čiastková váha spolupráci určená hodnotou 6.

Určenie váh a čiastkových váh vytvára bázu pre stanovenie percentuálneho zastúpenia každého kritéria na celkovom hodnotení. K vypočítaniu percent predchádza stanovenie váh pre určujúce determinanty kritérií. V prípade ceny takto vypočítame váhy pre cenovú úroveň, zľavy a platobné podmienky. Váha pre cenovú úroveň sa určí nasledovne: $9*(8/(8+5+2))=4,8$. Pri váhe zliav sa výpočet mení nasledovne: $9*(5/(8+5+2))=3$ a váha platobných podmienok sa vypočíta ako: $9*(2/(8+5+2))=1,2$. Rovnako postupujeme pri stanovení váh pre určujúce determinanty kvality (napríklad pre environmentálne normy: $5*(2/(3+5+2+0,5))=0,9524$), dopravy, spoľahlivosti a iných kritérií. Súčet váh všetkých určujúcich determinantov udáva súhrnnú hodnotu váh rovnú dvadsiatimštyrom=((4,8+3+1,2)+(1,4286+2,381+0,9524+0,2381)+(2+2+2)+(0,4615+1,3846+ 0,2308+0,9231)+(0,5+0,5))=(9+5+6+3+1). Aby bolo jednoznačné, ktoré kritérium sa ako významne podieľa na celkovom hodnotení, je možné pomocou váh kritérií a ich podielu na súhrnnej hodnote (max.) určiť percentuálne zastúpenia. Napríklad pre cenové kritérium je percentuálnou charakteristikou 37,5%=9/24*100, alebo pre environmentálne normy vychádza hodnota 4%=0,9524/24*100. Súčet percentuálnych hodnôt určujúcich determinantov musí byť rovný 100%. V grafe č. 1 sú zobrazené všetky percentuálne zastúpenia určujúcich kritérií.

Percentuálne zastúpenie kritérií

Kritérium	Hodnota
Cenová úroveň	20,0%
Zľavy	12,5%
Platobné podmienky	5,0%
Parameter výrobku 1	6,0%
Parameter výrobku 2	9,9%
Environmentálne normy	4,0%
Predpísané štandardy	1,0%
Hraničné termíny	8,3%
Balenie	8,3%
Súlad dodania s dohodnutými podmienkami	8,3%
Flexibilita	1,9%
Spolupráca	5,8%
Vrátenie tovaru a reklamácie	1,0%
Riešenie sťažností	3,8%
Iné kritériá	2,1%
	2,1%

Z grafu č. 1 jednoznačne vyplýva, že cenová úroveň je pre spoločnosť najpodstatnejším určujúcim determinantom, za ktorým sú na druhej rozhodujúcej priečke pozicionované zľavy. K tomu, aby sme v praxi vedeli hodnotiť dodávateľov spoločnosti je potrebné ďalej zamerať sa na skúmanie toho, ako jednotliví dodávatelia napĺňajú očakávania spoločnosti v rámci jednotlivých kritérií. Kým sa v tabuľke č. 2 váhy kritérií a určujúcich determinantov odvíjali od predstáv podniku, v tabuľke č. 3 a 4 už prichádza na rad skúmanie reálneho napĺňania kritérií štyrmi dodávateľmi.

Tabuľka 3. Body a hodnoty pre 2. dodávateľa a 3. dodávateľa

Hodnotenie dodávateľov		2.dodávateľ		3.dodávateľ	
Kritériá		Body	Hodnota	Body	Hodnota
Cena			45		9
	Cenová úroveň	5	24	1	4,8
	Zľavy	5	15	1	3
	Platobné podmienky	5	6	1	1,2
		5		1	
Kvalita			25		5
	Parameter výrobku 1	5	7,142857	1	1,428571
	Parameter výrobku 2	5	11,90476	1	2,380952
	Environmentálne normy	5	4,761905	1	0,952381
	Predpísané štandardy	5	1,190476	1	0,238095
		5		1	
Doprava			30		6
	Hraničné termíny	5	10	1	2
	Balenie	5	10	1	2
	Súlad dodania s dohodnutými podmienkami	5	10	1	2
		5		1	
Spoľahlivosť			15		3
	Flexibilita	5	2,307692	1	0,461538
	Spolupráca	5	6,923077	1	1,384615
	Vrátenie tovaru a reklamácie	5	1,153846	1	0,230769
	Riešenie sťažností	5	4,615385	1	0,923077
		5		1	
Iné kritériá			5		1
		5	2,5	1	0,5
		5	2,5	1	0,5
Súhrnná hodnota získaných bodov			120		24
Hodnota v percentách			100,0%		20,0%

Zdroj: www.controllingportal.hu, 2012, upravené autorom

Pri hodnotení dodávateľov budeme využívať hodnotiacu škálovú stupnicu od jedna až päť (1=zlé, 2=dostatočné, spĺňajúce minimálne kritériá, 3=priemer/né, 4=dobré, nadpriemerné, 5=vynikajúce). V tabuľke č. 3 sú načrtnuté dva extrémne prípady, kedy sú priradené k určujúcim determinantom buď len zlé hodnoty stupnice 1 (prípad 3. dodávateľa) alebo vynikajúce 5 (prípad 2. dodávateľa). Podnik teda vyhodnotil dodávateľov v každom z kritérií buď ako nevhodných, resp. ako vynikajúcich. Tieto dva prípady sú skôr hraničného charakteru a reálne hodnotenie sa realizuje medzi týmito dvoma mantinelmi.

Tabuľka 4. Body a hodnoty pre 1. dodávateľa a 4. dodávateľa

Hodnotenie dodávateľov		1.dodávateľ		4.dodávateľ	
Kritériá		Body	Hodnota	Body	Hodnota
Cena			23,4		18
	Cenová úroveň	3	14,4	2	9,6
	Zľavy	1	3	2	6
	Platobné podmienky	5	6	2	2,4
		1		2	
Kvalita			14,04762		10
	Parameter výrobku 1	2	2,857143	2	2,857143
	Parameter výrobku 2	3	7,142857	2	4,761905
	Environmentálne normy	4	3,809524	2	1,904762
	Predpísané štandardy	1	0,238095	2	0,47619
				2	
Doprava			24		12
	Hraničné termíny	2	4	2	4
	Balenie	5	10	2	4
	Súlad dodania s dohodnutými podmienkami	5	10	2	4
				2	
Spoľahlivosť			12,69231		6
	Flexibilita	5	2,307692	2	0,923077
	Spolupráca	4	5,538462	2	2,769231
	Vrátenie tovaru a reklamácie	5	1,153846	2	0,461538
	Riešenie sťažností	4	3,692308	2	1,846154
				2	
Iné kritériá			4,5		2
		5	2,5	2	1
		4	2	2	1
Súhrnná hodnota získaných bodov			78,63993		48
Hodnota v percentách			65,5%		40,0%

Zdroj: www.controllingportal.hu, 2012, upravené autorom

V tabuľke č. 4 je znázornená situácia kedy dodávateľ (4. dodávateľ) spĺňa v každom kritériu len minimálne požiadavky (dané stupnicou 2) a dodávateľ (1. dodávateľ) napĺňa jednotlivé kritériá rozdielnou mierou z hľadiska škály jedna až päť, čo je prípad, ktorý je

spomedzi štyroch dodávateľov najbližšie k realite. Po pridelení bodov k jednotlivým určujúcim determinantom je možné stanoviť hodnotu získaných bodov a to prenásobením pridelených bodov zo stupnice jeden až päť a prislúchajúcich váh z tabuľky č. 2. V prípade cenovej úrovne pre 1. dodávateľa je výsledok 14,4 potom určený ako 3 (priemer zo škály)*4,8 (váha), alebo pre zľavy je hodnota 3=1*3, ako pre hodnotu platobných podmienok 6=5*1,2. Súhrnnú hodnotu získaných bodov stanovíme ako súčet násobkov škálových bodov a váh pre všetky určujúce determinanty. V prípade 1. dodávateľa teda ako: ((14,4+3+6)+(2,857143+7,142857+3,809524+0,238095)+(4+10+10)+(2,307692+5,538462+1,153846+3,692308)+(2,5+2))=(23,4+14,04762+24+12,69231+4,5)=78,63993. Z tabuľky č. 3 už vieme, že maximálna dosiahnuteľná súhrnná hodnota získaných bodov je 120, kedy by dodávateľ získal v rámci hodnotenia škálovou stupnicou len vynikajúce (=5) výsledky. Ak porovnáme súhrnnú hodnotu získaných bodov prvého a štvrtého dodávateľa s maximom ((78,63993/120)*100 a (48/120)*100), získame hodnotu v percentách 65,5% (pre 1. dodávateľa) a 40,0% (pre 4 dodávateľa). Je zrejmé, že výsledok 40% je priamo determinovaný spĺňaním len minimálnych kritérií.
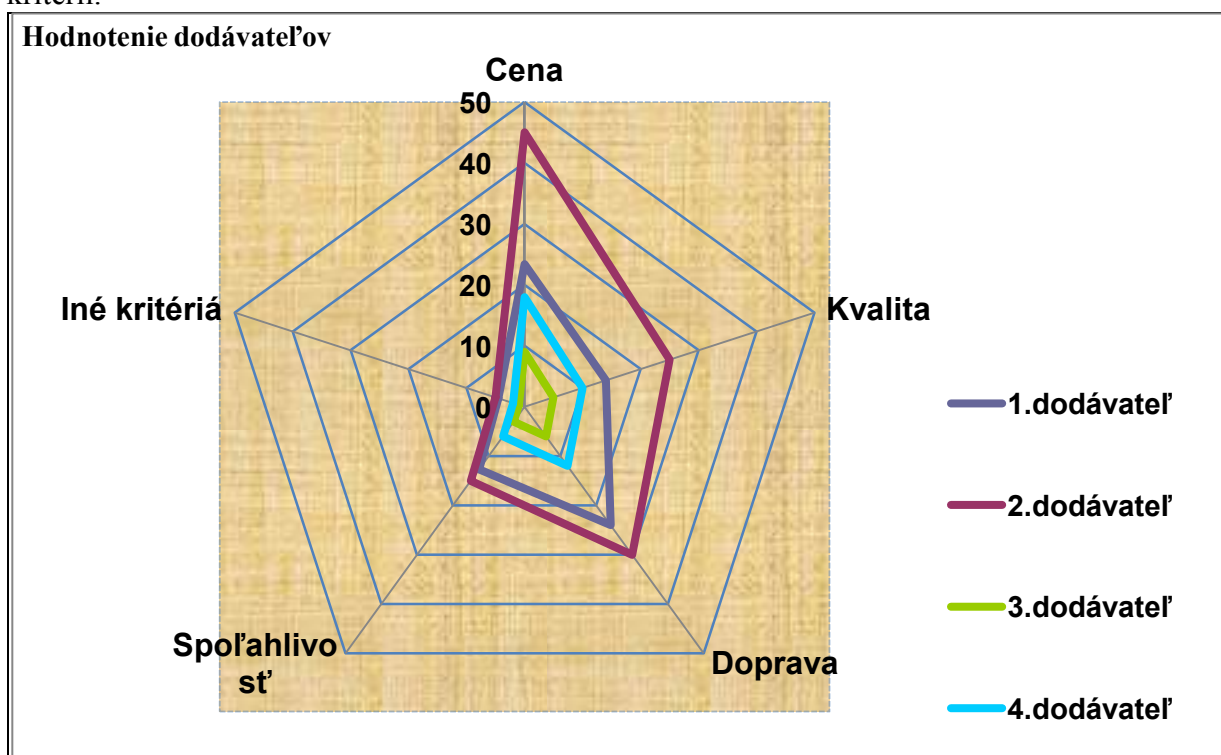
Graf 2. Hodnoty získaných bodov
Zdroj: autor na základe tabuľky č. 3 a 4

Graf č. 2 sumarizuje prostredníctvom radarového typu grafu hodnoty získaných bodov u jednotlivých dodávateľov, ktoré v tabuľkách 3 a 4 prislúchajú ku kritériám cena, kvalita, doprava, spoľahlivosť a iným.

Záver

Hodnotenie dodávateľov je zložitý proces. Okrem objektívnych kritérií sa hodnotitelia môžu opierať aj o subjektívne kritériá. Voľba relevantných kritérií si však vyžaduje erudovanosť hodnotiteľov, pričom jednotlivé kritériá je vhodné vážiť a tak k nim priradiť mieru relevantnosti v procese hodnotenia. Poznáme viaceré metódy, ktoré sú v odbornej literatúre charakterizované ako použiteľné pri výbere dodávateľov. Pre podnik je podstatné, aby si potenciálnych dodávateľov dokázal kvalitatívne aj kvantitatívne porovnať a existujúcich dodávateľov systematicky monitorovať.

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