

Jan OSTOJ*

INTELLECTUAL CAPITAL OF SOCIO-ECONOMIC REGION: MEASUREMENT AND STRUCTURE

part. I. Definition problems and value

Summary

This work is the first out of the series of three papers devoted to the estimation of value of intellectual capital of a given socio-economic area: voivodeship, municipality, country, region, etc. The concept of this estimation is based on the assumption that value of any socio-economic region, for its residents, is the amount of income that can be gained by locating their activities in the area they live. The layout of the presented method makes it possible to estimate all elements of intellectual capital, regardless of whether or not we are aware of their existence. In this paper, for the sake of estimation, definitional problems of the concept of intellectual capital are solved and the method which can estimate area value for its residents is proposed in order to derive a method for estimating intellectual capital of a given area as well as of each and every voivodship in Poland.

Key words: *intellectual capital, region, voivodeship, value estimation*

Introduction

In the presented series of papers a relatively simple method of evaluation of intellectual capital assigned to a given socio-economic region is presented. For this reason, it had been initially assumed that this research problem would be covered in one paper only. However, as the paper progressed, it turned out, somehow ‘by the way’, that a number of additional problems of theoretical nature had to be solved. This was, from the point of view of research workshop, a necessary condition for justifying substantive correctness of the proposed method. In a series of ‘additional problems’ the first one, which appeared just at the outset, was

* Professor Jan Ostoj, Bielsko-Biała School of Finance and Law, Department of Finance and Information Technologies, Chair of Banking and Finance.

the lack of a generally accepted definition that unambiguously exposes *an essence* of the definition of intellectual capital. Another barrier to overcome was connected with indicating a method which would allow to find, within an area taken into account (e.g. a region), a relevant equivalent showing the value of intellectual capital in an organization as an expression of *a gap between the market value and book value*, the presence of which caused that a phenomenon known as 'intellectual capital' was recognised. Finally, the results had to be illustrated. All these circumstances made the text grow beyond the expectations of the author. Therefore, the deliberations were divided into three parts which the author strongly recommends to the reader.

The main purpose of this three-part publication is to present a method, to be used in economic reality, which would allow to assess the value of intellectual capital of any socio-economic region: a country, region, province etc. The presented solution uses macroeconomic values and allows to perceive all elements which constitute potential of any area and to call it intellectual capital, regardless of whether or not all the components of its structure are fully recognised. Thanks to this, a *complete* value estimation of the researched phenomenon can be obtained, creating a base for further research into unknown aspects of intellectual capital and identifying actions to increase that potential.

Therefore, the author departed from the commonly used methods of assessing intellectual capital, based on evaluation of its partial elements, since there are some reservations not only about *completeness* of subjectively isolated partial phenomena included in the assessment, but also accepted measures of those phenomena and their aggregation into one global size. The uniqueness of the method, is its complex nature as it fully describes a substantive definition of the phenomenon of a gap between market value and accounting value identified with intellectual capital. On the other hand, most authors concerned with intellectual capital of any socio-economic region (often region or country), assume that substantive relevance of the studied phenomena to the content described by the term "intellectual capital" can be better or worse. The mentioned authors frequently present a list (often not fully closed) of "softly defined" main features of the phenomenon. Such a list can include, for example, "hidden values" of people, enterprises, institutions,

communities and regions¹. Intellectual capital assigned to socio-economic region (Poland in this case) is also seen as all intangible assets of people, enterprises, communities, regions and institutions, which may be sources of present and future well-being if properly used.² Others define intellectual capital assigned to a given area as a set of knowledge-based assets which significantly influence creation of its value.³ According to other authors intellectual capital of a region is not a resource, but feature, defined as "non-observable directly attributes of residents, enterprises, institutions, organizations, communities, and administration bodies that are current and potential sources of future social well-being improvement and economic growth".⁴

According to the assumption of *completeness*, introduced in this paper, the object of analysis, in terms of content, corresponds to the phenomenon of intellectual capital, in the form in which it was first noticed, it means, the difference between *a surrogate* of the market value of a given economic structure and the value of its net assets. In the process of the analysis, the triple complexity of intellectual capital of a region was identified. A valuation attempt was made to estimate the value of intellectual capital located in any voivodship in Poland. The findings show that there is an interesting relationship between intellectual capital, the number of inhabitants and the value of fixed assets situated in the regions they live.

From the point of view of economic practice, it seems that the obtained findings are significant. It has been proven that there is a direct link between intellectual capital assigned to any socio-economic area and Gross Domestic Product in that area. So well-thought-out investments in intellectual capital (e.g. in a region) ensure growth of GDP generated in that region, and boost the well-being of its inhabitants.

¹Bontis, N., *National Intellectual Capital Index. a United Regions initiative for the Arab region*, Journal of Intellectual Capital, 2004 vol. 5, no. 1, pp. 13-39.

²Bochniarz, P., *Report on Polish Intellectual Capital*, Strategic Advisory Teams of the Prime Minister, Warsaw 10-07-2008, http://kramarz.pl/Raport_2008_Kapital_Intelektualny_Polski.pdf [access 29.03.2017].

³Schiama, G., Lerro, A., Carlucci, D., *The Knoware Tree and the Regional Intellectual Capital Index. An assessment within Italy*, Journal of Intellectual Capital, 2008vol. 9, no.2, pp. 283-300.

⁴Węziak-Białowolska, *The intellectual capital model of a region. Measurement concept and application*, Warsaw School of Economic Publishing House, Warszawa 2010, p. 24.

1. Definition problems

The definition of "intellectual capital" is a relatively new concept. It was formulated, for the first time in 1958 by observing records of small listed companies. Stock market analysts noticed differences between records of small listed IT companies and the book value of their assets. They called the phenomenon of too high listing of those companies "intellectual bonus", while claiming that "intellectual capital of such companies is probably the most important component".⁵

In the 1990s there was a widespread view (represented by Steven M. H. Wallman, SEC commissioner) due to which intellectual capital of a company consists of "assets having zero value in a balance sheet".⁶ According to this statement, it is possible to conclude that intellectual capital, like all other assets, has a structure composed of certain assets, a sum of which shows its value. This approach seems to be fully justified because the term "intellectual capital" suggests that it is a kind of resource, a potential, that can be used to achieve the goals of an enterprise.⁷ Therefore, placing intellectual capital, as *intellectual property*, on the asset side in a balance of "resource reflection" is fully justified.⁸ Resourceful reflection of intellectual capital also provides a systematic approach coherent with methods used so far. The analysis of the phenomenon which distinguishes differences between a value of available resources and a value gained after running those available resources. The same order applies to an analysis of standard assets: the book value of a firm depends on availability of assets (e.g. machines) but not on the degree of their activation in relation to other resources (effective machine hours) which affects a company's goodwill.⁹

⁵Stewart T.A., *The Wealth of Knowledge. Intellectual Capital and the Twenty-First Century Organisation*, Nicholas Brealey Publishing, London 2001, p. IV.

⁶M.S. Malone, An article in the Los Angeles Times in 1995. See: L. Edvisson, M.S. Malone, *Kapitał intelektualny*, PWN, Warszawa 2001, p. 11.

⁷See: Ostoj J., *Fundamentals of specific resource allocation in an enterprise*. Bielsko-Biała 2004, s. 9. ISBN 83-918417-3-1.

⁸See: Edvisson L., Malone M.S., *Intellectual capital*, PWN, Warszawa 2001, p. 40.

⁹It should be remembered that, according to the canon of microeconomics, market value of a resource has a significant connection on benefits of launching a resource. This is mentioned in the theory of the use of material capital according to which a buyer should not pay more for it (market value) than a sum of discounted planned revenue earned by a buyer thanks to its use. See eg Begg D., Fischer S., Dornbusch R. : *Microeconomics*. 383 et seq.

Similarly, the value of intellectual capital should depend on the potential represented by, for example, its client capital and its other components but not on the degree of their activation. Moreover, as well as a sum of asset value gives information about value of company's assets, also a sum of values of individual components of intellectual property should give information about the overall value of intellectual property (assets) which equals to a company's intellectual capital (liabilities). There is no doubt that with such an approach, on the liability side, where sources of funding of company's resources are recorded, those sources should have the nature of commitment with respect to intellectual capital. This situation is similar to deliveries with deferred payment e.g. raw materials. Components of intellectual capital are provided by various entities (and their groups) or are created in the process of a company's performance and must be given back (they are lost permanently) at the time of liquidation or a company breakup.

H. Saint-Ogne has a different point of view on "resourcefulness". In his opinion the value of an enterprise is not derived directly from any single element of intellectual capital but it is a result of relations between all components, elements and categories. The bigger the interaction, the bigger value of an enterprise.¹⁰

From the point of view of contemporary science, the results of research, carried out in the company Skandia, turned out to be a giant step in revealing *the essential nature* of the term "intellectual capital". The team, led by L. Edvinson came up with three conclusions¹¹:

- Information on intellectual capital is additional, complementary but not subordinate information to financial information.
- Intellectual capital is non-financial capital, reflecting a hidden gap between market and accounting value.
- Intellectual capital is a commitment, not assets (assets). "

According to authors, the third conclusion, widely cited and thought to be fundamental in the mentioned book, should be particularly focused on. It means that intellectual capital, defined in such a way, should be perceived as a capital, similar to others in a company, borrowed from

¹⁰See: S. Kasiewicz, W. Rogowski, M. Kicińska, *Intellectual Capital in Stakeholders' Perspective*, Kraków 2006, Economic Offices, p. 87. ISBN 83-7484-022-6.

¹¹L. Edvinson, M.S. Malone, *Intellectual capital*, PWN, Warszawa 2001, p. 39. ISBN 83-01-13509-3.

company's stakeholders: customers, employees, suppliers, etc., what was already mentioned above.¹²

By analyzing the definition of intellectual capital quoted in literature, it is worth pointing out that its authors aimed at describing only a part of the content of the phenomenon called intellectual capital, its "essential character", as they explained. However, if it is assumed that a hidden gap between the market value and accounting value of a company appears because of intellectual capital (proposal 2), it may raise a lot of doubts whether the term 'intellectual capital' is adequate to the substantive content of a phenomenon being researched.

Assuming that a company is a subject of a transaction/market valuation as an organized whole, it is possible to formulate the following question: "which company will be more expensive on the market?":

- a company with educated workforce who is in very good physical and health condition,
- a company similar to the first one in terms of assets and workforce, except for its physical and health condition, which is worse.

The answer is obvious - it will be the first one.¹³ Since the accounting value of both companies is the same (physical and health condition is not recorded), the difference between market value and book value, in case of the first company will be higher than the second one, because of higher value of intellectual capital.

Similarly, we can verify substantive content of a hidden gap between the market value and accounting value which refers to intellectual capital of identical companies that differ in another chosen dimension. This dimension may, for example, be a filling level of an internal landfill site with worthless, hazardous, non-recyclable and non-disposable waste. It is known that such waste does not submit to register because it does not have valuation. Utilisation records of its disposal do not exist because such activities are impossible. In this situation, waste becomes a problem only at the moment of a company's breakup. It may turn out, that in a traditional valuation process, the book value of both companies will be the same. However, it is known that a company with an empty waste landfill site will have a higher price. For this company, a hidden gap between market value and accounting value referring to intellectual

¹²L. Edvisson, M.S. Malone, *Intellectual capital*, PWN, Warszawa 2001, p. 39.

¹³It is to be expected that capital market estimates higher prices of shares of the first company.

capital, will be higher. But, what does non-valuable hazardous waste have common with intellect?

Another aspect of this verification process refers to the issue of identical companies which differ in the level of quality of the same fixed assets used in the main manufacturing process¹⁴, assets which are leased for the same period and under the same organizational and financial conditions. It is known that market value of an A company, renting better equipment, will be higher considering the same book value of both companies. This means that company A has bigger intellectual capital. In this case, the direct source of a company's value is bigger expected potential of available services (use) of an excavator with less failure during rental time. It is worth pointing out that a service is provided by a non-hidden asset, which is not an intangible asset, but in this example, it is an excavator which, in addition, has a market valuation and is subject to record. A specific asset component, that is not subject to record, is a company's potential, at disposal, of available additional services of an asset which is expected to be failure-free.

In presenting real life situations, a phenomenon of negative value of a company cannot be overlooked. It occurs when a cost of acquiring a company, as an organized entity, is less than its book value. This phenomenon had been noticed so often that appropriate regulations were introduced into the Accounting Act.¹⁵ In literature, "negative intellectual capital" is not mentioned, although, there are frequent signals that negative components of intellectual capital can appear and lead to a situation in which an owner wants to get rid of a company at a lower price than its book value or to pay for a negative component of intellectual property to disappear (e.g. bad opinion of some potential buyers' about a company).

During research on intellectual capital, it was also noted that *real* value of intellectual capital may be bigger or smaller than the difference between market value and book value. According to K. Standfield (1998), the creator of the IAMV (investor assigned market value) model, "such a situation can depend on market fluctuations and expectations of

¹⁴For example, the same excavators were hired, but in the case of a second company, it is known that possible failure of the rented excavator is higher.

¹⁵Act 4 art. 31 Accounting Act states: "If the cost of acquisition of an entity or an organized portion is less than fair value of net assets acquired, the difference is negative value of s company." See: Act of 29 September 1994 on Accounting, Journal of Laws 1994 No. 121, item. 591 along with later. d.

investors that determine market value."¹⁶ Thus, the discovered discrepancies between a merit of a gap between market and book values and a merit of "intellectual capital" resulted from reasons which affect a share price of a valuated company, so other reasons than those mentioned above. Nevertheless, their presence influenced further development of the research.

Some researchers, while constructing methods of assessing intellectual capital of a particular economic structure, try to take into account, mainly, those elements which substantively relate to a content of this concept. Others refer, in their studies, to a phenomenon that allows to describe, what is now called, intellectual capital assuming a gap between market value and book value of a phenomenon as a criterion. This fracture is also described by L. Edvisson and M.S. Malone in his work: intellectual capital reflects a gap between market value and accounting value¹⁷, and the definition of intellectual capital given below, says that: "Intellectual capital means knowledge, experience, organizational technology, customer relationships and professional skills that give Skandia company a competitive advantage in the marketplace."¹⁸ This means that physical condition of human capital is excluded from the definition of intellectual capital, although, it affects a gap between market value and accounting value of a company, and although, the term "human capital" includes physical (vitality) and health condition of employees within its definition.¹⁹

In conclusion, it can be pointed out that the content of a gap between market value and accounting value of a company does not substantially match the concept of intellectual capital. The impact of the physical condition of human capital on the value of an enterprise can be an example. Nevertheless, an approach that identifies these concepts has become widespread in literature. It is justified in some way, because, at first a gap between market value and book value of a company was noticed, and only then its existence was explained by identifying the importance of knowledge and skills of a human factor. For IT companies and dynamically developing companies such a situation was not

¹⁶See: S. Kasiewicz, W. Rogowski, M. Kicińska, *Intellectual Capital in Stakeholders' Perspective*, Kraków 2006, Oficyna Ekonomiczna, p. 132. ISBN 83-7484-022-6.

¹⁷L. Edvisson, M.S. Malone, *Intellectual capital*, PWN, Warszawa 2001, p. 39.

¹⁸L. Edvisson, M.S. Malone, *Intellectual capital*, PWN, Warszawa 2001, p. 40.

¹⁹See e.g.: Domański S. R., *Human capital and economic growth*. PWN Warszawa 1993, p. 19 and next.

surprising. Analyzing intellectual capital of any socio-economic region, we can react appropriately to the phenomenon whose historical presence enabled us to see that capital. The size of intellectual capital of any economic structure depends on the difference between its value as an organized whole and accounting value, and everything that affects the volume of that difference. On the other hand, it is irrelevant whether the phenomena affecting the mentioned difference, substantially are the content of the term "intellectual capital" resulting from its name or not.

2. Economic structure value as an organised whole

Applying the above-mentioned criterion for definition of intellectual capital of a company, one should become familiar with its market value as a whole. This knowledge is relatively easy to gain with reference to listed companies²⁰. The situation is different in case of companies not listed, which even for their entire existence at the request of the owner are not subject to a purchase/sale transaction. Therefore, how to estimate the value of a company, which shall never be a subject of a market turnover? Is there a method of which at least theoretically, beyond argument, allows an estimation of the market value of this company? Is it possible that this method is applicable to an estimation of a region's value as a certain organised whole, despite the fact that the region, by definition, cannot be subject to a market turnover?²¹

Currently, with reference to intellectual capital of a company, two main types of approach may be distinguished:

- based directly or indirectly on the criterion of a difference between the market value and the value of particular components of the company's assets as an unorganised whole;
- based on a disclosure of particular components of intellectual capital, their pricing (or appraisal), and aggregation to the same level.

When it comes to the first group, it involves methods based on Tobin's "Q", the market value to the book value MV/BV, and methods based on the return on assets (ROA) – the method EVATM, CIV

²⁰This knowledge is approximate, due to the currency fluctuation, which the cited above K. Standfield referred to.

²¹It should not be assumed that something that cannot be subject to a purchase-sale transaction (the market turnover) is not subject to a pricing. There are many examples of such a pricing in case of a property loss, losses due to natural disasters, etc.

(Calculated Intangible Value), KCE (Knowledge Capital Earnings) and others. The second group consists of methods of direct pricing of the intellectual capital components: IAV (Intangible Assets Valuation), TVC (Total Value Creation), IVM (Inclusive Valuation Methodology), and also score-based assessment methods – e.g. BSC- Balanced Scorecard.²²

Nevertheless, despite the eventual and complete content of “intellectual capital”, according to the original separability criterion, in terms of the value and the substantive side, it fills the gap between the market pricing of the company’s value as an organised whole and the sum of the values subject to a separate pricing of the particular components of the company’s assets reduced by its liabilities.

In practice, with reference to both non-listed companies and the region, there are no applicable terms such as stock exchange listings, stock rate, net income per share, etc. Therefore, neither of the mentioned-above evaluation methods of the market value cannot be adapted to a method of evaluation of the region value, or any other social-economic area. Moreover, contrary to the company, the region as an organised whole cannot be subject to a market transaction. Therefore, it also cannot be subject to pricing by the market mechanism. However, it does not mean that the region does not have any value and cannot be subject to a pricing at all.

When determining the value of the company, there often arise questions on what value of the company as an organised whole it is to the owner, considered in terms of the right to a definite income, properly spread over time, at a certain risk level of its loss. On this assumption the income method of the evaluation of the company’s value is based.

In case of the region the same steps can be taken – by asking what value the region represents, e.g. for *the whole group of residents active within the region* in terms of their income, due to activity localization in this area. It makes the income method of the evaluation of the company’s value useful in terms of the purpose of this paper, provided it can be proved that at least the evaluation theoretically obtained through this method is close to the market value. The proof is presented below. Therefore, in case of application of the income method, the company’s value W_d for the owner is defined by the formula (1):

²²See: Strojny M., *Metody i narzędzia pomiaru kapitału intelektualnego w organizacji* [in:] Dobija D: *Pomiar i rozwój kapitału ludzkiego przedsiębiorstwa*, PFPK, Warszawa 2003, p. 105-106 ISBN 83-912602-4-0

$$W_d = \sum_{i=1}^n \frac{D_i}{(1+(r_n+r_r))^i}$$

Where:

D_i – the annual income of the company's owner in terms of the funds that the owner can withdraw from the company for n years in the i -th year without an infringement of the multiannual scenario of the company's operation;

r_n – the risk-free return on assets;

r_r – the risk premium r expressed by an additional return on assets required by the investor.

The application of formula (1) for the evaluation of the company's value is possible, provided that the acquisition of the company as an organised whole is considered as the acquisition of the right to a definite income D_i spread over time, at a certain risk level r . The income D_i is understood as all non-repayable and free of charge net profits, expressed in money terms²³ that can be obtained by the company owner in the i -th year, with the assumed unchangeable operation and development plan. As a standard, in the i -th year D_i includes (with a plus sign): the net profit, a part of the sales revenue covering the costs of amortisation, the funds obtained from the planned liquidation of the fixed assets and – from the assumed reduction of the current assets, and with a minus sign – the expenditures on physical investments, overhauls and the increase of operating funds.

In line with this approach, the minimum price W_{cmin} which the owner of the company as an organised whole should require from the potential buyer, without any loss, shall be equal to the value of W_d to the defined income D_i equal to the sum of discounted income D_i and is expressed by the formula (2):

$$W_{cmin} = W_d = \sum_{i=1}^n \frac{D_i}{(1+(r_n+r_r))^i}$$

Where:

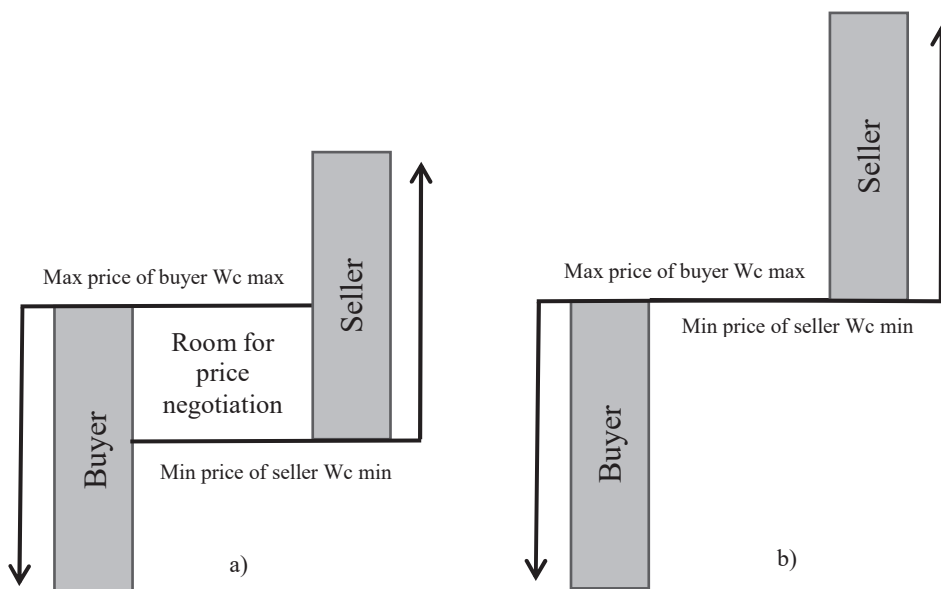
Designations as above.

²³I.e. reduced by the expenditures made by the owner in i -th year on investments, overhauls, necessary for the maintenance of the assumed plan for the company's operation.

According to the above, it is a standard formula for the income value of the company. Obviously, it should be assumed that the seller accepts each price higher than the minimum selling price.

The buyer does not have to be familiar with the minimum selling price. They may assume a different operation and development plan of the company, which in consequence is corresponding with a different income sequence - D_i^* and a risk level r_r . As a result – from the buyer’s perspective the maximum price Wc_{max} , which they are ready to pay for the company concerned may be higher than the seller’s minimum price. Then, there arises the price negotiation space – see Fig. 1 (a).

Fig. 1. Models of the market transaction



Source: Ostoj J., *Rynek wartości negatywnych*, Wyd. UŚ, Katowice 1996, p. 78.

Therefore, it may be stated that depending on the negotiation skills of the parties, the market price should be located between the seller’s minimum price and the buyer’s maximum price, because only then mutual profits of the transaction parties are guaranteed.

However, if the buyer and the seller do not have any other profitable idea for the company’s development, and as a result, they provide the same scenario of its development, then the prices accepted by them shall be equal (Fig. 1 – b). Therefore, the transaction price under the market conditions is the market price estimated according to the formula (1).

Then, $P_{\max \text{ buyer}}$ shall be equal to $P_{\min \text{ seller}}$ with no mutual profits and theoretically, it shall be **the only possible price of the market transaction**²⁴. Thus, in this case the market price is equal to **the evaluation of the income value for the option that assumes the best possible management of the resources in terms of the owner's business/manager of the given economic structure.**

Summing up, the important fact is that when valuing their company by income method, the company owner defines the minimum price which should be acceptable for them when offering the company as an organised whole for sale. If potential buyers do not have a reason to think that because of any change to the operation plan of the company, its value may be increased – their pricing, with the same risk ratio as its owner's, shall be the same. It means that **in this situation the evaluation by income method conducted from the owner's perspective is the market price.**

At this stage of the analysis, the question is how the conclusions relate to the value of a given social-economic area – a region, for example. For whom is a region valuable if it does not have the owner and is not subject to the market turnover? First, it should be noticed that the company owner obtains certain profits through the access to the company's resources at their disposal, which are not necessarily their property. It is worth mentioning that the key resource that the company owner cannot acquire are the employees. They were not acquired but they only voluntarily obliged themselves to work based on an employment agreement or other civil law agreements.

Properly understood *per analogiam*, in case of a region it may be stated that its residents obtain certain income through the access to the resources located in a given area, whereas the resources are not necessarily their property²⁵. Nevertheless, the condition of the access to the resources is the location of the business exactly in this region. Therefore, as the company to the owner, the region constitutes a value to all its residents (the whole community), no matter if these are

²⁴The transaction may be conducted, provided that the mutual profits are determined by other factors – e.g. age of the owner that does not allow the continuation of the business, or a high risk taking of the buyer. The high risk taking is reflected in a lower level of a risk premium required by the buyer in this case, which causes an overvaluation of the accepted maximum price of the company $W_c \max$.

²⁵E.g. a possibility of employment in accordance with the learned profession, an access to the infrastructure, natural environment, education possibilities, etc.

households, companies or landowners. For example, businessmen obtain the access to a certain quality of workforce, road infrastructure, natural resources, outlets, and the employees – the access to a better or worse employment conditions, education, a possibility of keeping a proper physical and health condition, and the property owners and landowners – the access to better or worse conditions of their property management.

Each of those entities provides services, which are used in the manufacturing process and rewarded with the proper primary income. Lands services are rewarded with a rent, capital goods services – the profit increased by the revenue from the sales for covering the amortisation costs, and the work is rewarded with a salary. Therefore, knowing the income, it is possible to define the income value of the region for their residents, adequate to the income value of the market.

In terms of self-government, all residents of a given economic area are its co-managers. Self-government territorial units, the authorities of which are elected in democratic elections and therefore representing the interest of the manager - the residents of the area, are responsible for this area. The operation and development plans are consulted with the representatives of this community, such as councilpersons, and their realisation is financed from the public resources. The allocation of the remaining resources is conducted through the market. On this basis it can be stated that from the perspective of the co-managers of a given social-economic area there is realised **the best-known and possible management of the regional resources**. Therefore, the income method of the evaluation of the value is applicable and – in the light of the conclusions from the analysis conducted with reference to the company, the obtained result constitutes a surrogate close to the market value, established “in the absence of a better idea” for the use of the available resources.

Hence, formally it may be stated that the income value of the region $W_{d\ reg}$ may be evaluated on the basis of the formula:

$$W_{d \text{ reg}} = \sum_{i=1}^{\infty} \frac{D_i}{(1+(r_n+r_r))^i} = \sum_{i=1}^{\infty} \frac{Z_i+Am_i+Pl_i+Cz_i}{(1+(r_n+r_r))^i}$$

Where:

$W_{d \text{ reg}}$ – the income value of the region

D_i – the income obtained in the region

Z_i – the aggregate profit obtained in the i -th year by the companies located in the region

Am_i – the aggregate cover of the amortisation costs with the income in the i -th year in all the companies located in the region

Pl_i – the aggregate salaries obtained by the residents in the i -th year – the employees locating their business in a given region

Cz_i – the aggregate rents obtained by the residents in the i -th year – the owners of the properties locating their business in a given region

r_n – the risk-free return on assets

r_r – the risk premium r expressed by an additional return on assets required by the investor.

Due to the fact that the sum of all the primary incomes obtained in a given area within the i -th year expressed by the sum ($Z_i + Am_i + Pl_i + Cz_i$) - is the rate of GDP made in the i -th year in this area, it may be noted down²⁶:

$$W_{d \text{ reg}} = \sum_{i=1}^{\infty} \frac{D_i}{(1+(r_n+r_r))^i} = \sum_{i=1}^{\infty} \frac{Z_i+Am_i+Pl_i+Cz_i}{(1+(r_n+r_r))^i} = \sum_{i=1}^{\infty} \frac{PKB_i}{(1+(r_n+r_r))^i}$$

Where:

PKB_i – Gross Domestic Product in the i -th year by residents in a given region

The other designations - as in the formula (3).

Conclusion

Summing up and simplifying the conclusion, it may be stated that from the perspective of the residents, the region is worth as much to them as the primary income obtained in this region – now and in the future. It

²⁶Apart from the state activity and the international exchange. See: Begg D., Fischer S., Dornbusch R.: *Makroekonomia*, PWE, Warszawa 2007, p. 27-41.

is equivalent to the sum of discounted rates of GDP made in the following years within a given social-economic area. However, there arises a question if the discount count should be continued – the activity of the residents is limited in time – by the lifespan, for example. Several different solutions may be accepted. According to the author of the paper, the intellectual capital of the region is timeless value, which may be used not only by the contemporary residents (businesspersons, employees and other members of the households), but also the future generations. It justifies the assumption of the Infinite primary income sequence.

Moreover, it should be noted that in terms of the income value (including the company), the net primary income (after taxation) is included, and in GDP - the gross income. There also appears the matter of the investments spread over time, in the analysed social-economic area, necessary for the maintenance of the assumed income sequence of the residents, which reduce at the same time this income as for the income value. The next paper refers to the solutions of the problems mentioned above, which is titled: *The intellectual capital of the social-economic area: the measurement and structure*, subtitled part II: *The intellectual capital of the company and the value of the intellectual capital of the social-economic area*. The author invites the readers to become familiar with this publication.

Legal acts

- [1.] The Polish Accounting Act of 29 September 1994, Journal of Laws 1994 No 121, item 591 as amended.

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