

State of Development in Relation to Location in Hungary

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Abstract

In the course of describing regional aspects of social and economic state of development, and exploring its disparities, we can often formulate the question, what forms the spatial characteristics of these phenomena. When we look for the explanatory factors, we have to analyse a complex system according to the complex components of development, like economic and social aspects, political situation, etc. The state of development of an area can be determined by not only the local conditions mentioned above, but by the location as well. And its relations can be explained in wider range, for example: place, distance from the capital and other economic centres, neighbourhood conditions, etc.

Location as an independent variable can be defined by the potential model, which doesn't value the spatial phenomena themselves, but it takes them into a system, whose elements have their influence on one another; in this way the model has an important role in the investigation of spatial interactions.

Comparing personal per capita income data (which is a good measure to inquire about the developmental conditions) of Hungarian statistical subregions with income potentials, we can answer how location determines development. Besides, analysing the relationship between them, we can supply those aspects, which characterize several typical groups of subregions, and the characteristics of these types help to refine the image of state of development of the Hungarian subregions.

Key words: location, potential model, spatial interaction, spatial development

1 Introduction

Even if the elements of social space are located separately in designated places, they can't be regarded as individual, independent things that exist. Since the relations among the actors cleave the space, that make them together in a system. Thus the elements of the social and economic life depend on each other to a large extent, their characteristics (for example their development) is determined beyond local conditions by their location.

The central notion of this paper is location, and it makes an attempt to explain regional development differences through this idea. For establish this conception, it has to survey,

from what kind of possible aspects we can investigate the question of development. First of all does location factor indicate some new features of development? The interpretation of location raises many interesting questions. What is the content of the notion itself? And what are the elements of this factor, which deserve special attention from the point of view of describing development? It can be also brought up that how this dimension can be measured. In this paper the application of potential model is a test to find a possible measure of location. Using this function of the model seems to be right; however it has to be well established for doing that. Therefore in the paper it is investigated that what are the grounds of applying potential model in the concerning works, and how its concept is connected with the idea of location.

Following these aspects and trying to answer the questions raised up, the paper offers at the end a possible empirical testing of the concept written previously. Through the example of the Hungarian subregions two ways of characterizing come to presentation, which try to tell something new about the development conditions of the subregions with the help of location factor.

2 Complexity of regional development

The complex notion of social and economic development has an essential characteristic; in particular it has several dimensions. Development is multi-dimensional, because it has numerous factors, which each explore individually just one aspect of the notion, and they can't be compared. Although between these dimensions connections can be often observed [1]. When we want to understand the complex system of regional development we have to investigate its factors, not necessarily one by one, but by emphasizing the main elements of their functions.

The economic situation draws a good profile on an area's development conditions. Performance of economy, efficiency of production, competitiveness of enterprises and consumption habitudes and possibilities of population both give information on regional development and help to understand how the fundamental processes work in the mechanism of development structure. Social situation is another important dimension of development. The volume and quality of human capital not only describe the social conditions in themselves, but also determine how successful the economy can be. Besides another important element of social dimension can be the quality of life of people [2]. This concept disregards the absoluteness of economic factors of development and helps to explore those social aspects of living conditions, which are complexes in themselves.

The economic and social factors are generally well measurable. However there are such elements of regional development, which are much softer and usually have an indirect effect. These dimensions give the general background for economic and social conditions. Among these softer elements we can mention the political conditions. How stable is the political situation in a country? How well developed is the given political system; what does it insure for the inhabitants and the economic organisations? In this sense it deserves attention that how high is the degree of freedom, which establishes the possibilities of economic and social actors. Historical heritage has a similarly important role. Present conditions of development are determined in many respects by the events of past. Recent success is often rooted in that thing, how organic was the process of development and what were the elements, which possibly made a breaking in it.

Besides there are those factors (outer conditions) that on the one hand are partly independent of society, which on the other hand relates more and more back on them. Nature and environment are such elements, which in one respect limit the possibilities of people and the

ways of development, but they also offer those possibilities, which can indicate the breaking points for the economy and society. In addition that can also be a development factor how good are the conditions of the environment (shaped by human). May a given area is called highly developed, if its environment is in bad condition, it can question basically its position.

3 Location factor of development

The previously mentioned factors depend on the structure of a bigger system (e.g. a country) in a large way, nevertheless they rather affect like local elements resultant mainly from unique features. However we can mention that there is another dimension of development, which can demonstrate well the relation of an area to the whole system. That is location, which factor has a prominently important role in this investigation.

Location as a determinant dimension of development can be approached from many sides. In one respect it implies those local effects, which determine the unique features of an area and make the given region distinguishable from others in the respect of the conditions of economy, society, politics or environment.

Besides, position within a system has an important role from the point of view of location. That position can be on the one hand absolute, and on the other hand it can be relative as well. In the first case we can speak about the exact geographical localization. Namely, how a given area within the whole system is located in relation to all of the other elements of the system. For example, is a given region in the centre of a country? Or it is located on the periphery? That determines in many respects its relation to the other elements, and has a certain reaction on the developmental possibilities of it. That is because a remote and hardly accessible area is in many respects at a disadvantage compared with centrally located regions, which can profit from their far-reaching connections.

Whereas the actors of economic and social life aren't located uniformly but they settle down in special points of space, not just the absolute position deserves marked attention, but much rather the accessibility of these designated places. The economic and social centres of a system have an important role as inhabitants produce and spend their income there, and the greatest part of economic activity is concentrated in those places as well. Accessibility of the biggest cities and the capital is specifically important, as they have several functions that aren't available elsewhere, and distance from these centres can determine that how often the inhabitants can take advantage of these functions, or can they take advantage of them at all.

Besides, the factor of location implies that how can the direct surroundings of a given area be characterized, although just indirectly, through the neighbourhood effect. Neighbourhood conditions aren't negligible factors as the nearest or the most easily accessible places have the greatest effect on a given area. That is closely associated with the spatial interaction function, which describes decrease of interaction going along with increase of distance to the object or place whose neighbourhood one tries to define [3]. This approach is also connected to the idea of Tobler's First Law, which states, "everything is related to everything else, but near things are more related than distant things" [4].

4 Measuring location: the potential model

After these, we can put the question how this complex dimension of location can be measured? All of the mentioned elements of location factor are closely associated with the idea of spatial interactions. According to that, location doesn't interpret spatial phenomena independently of others, but as they are the parts of a system, whose elements have their influence on one another. That is why models of spatial interaction, like potential model can

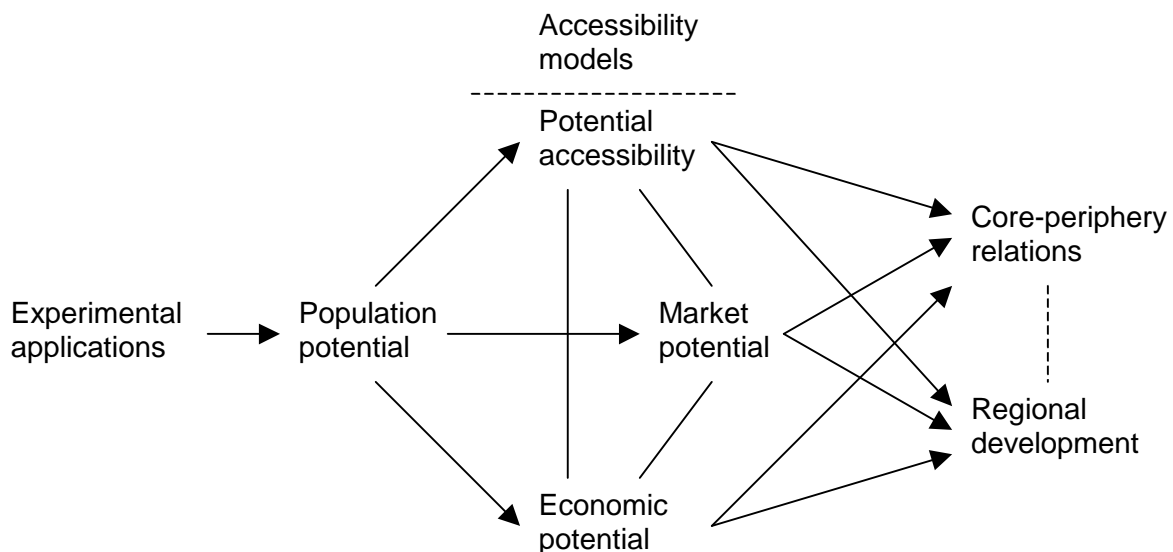
be an ideal tool for representing and measuring location. The typical and simplified potential formula can be described like the following one:

$$V_j = \sum_i m_i / d_{ij} .$$

Where V_j denotes the potential of a region j , m_i is the ‘mass’ of another area, and d is the distance between them. This structure of the model illustrates well how this measure can represent location. In light of the self-potential, which measures the own ‘mass’ of a region unique features can be built in to the model. Geographical localization is included in the distance function, as it shows the position of an area in relation to the other elements within the system. Special points and centres of economic and social life appear by their greater mass, as they have a greater effect on the elements of the system. Neighbourhood relations come across through that the neighbours are nearer to a given area, so they can exert a greater influence notwithstanding their mass can be smaller.

Many notions related to location can be found in the earliest applications of potential model. And with the development of these applications and the modification of the term ‘potential’ the idea of location became more and more one of the central notions of potential concept. It helps to understand the role of the idea of location in potential applications as it has taken form, if we look over the development and the system of these applications through following the changing conceptual emphasis as Figure 1. represents them.

Figure 1. Development and system of potential applications



The earliest versions of potential model can be regarded as experimental applications. These are related without exception to John Quincy Stewart, who has worked out the principles of his theory in his first concerning works by several examples, like the investigation of that phenomenon, how the number of undergraduates from a given state tends to be proportional to the state’s population divided by the distance in miles between the state and the given campus [5]. Or an other example for this: what kind of factors are determinants in the geographical distribution of the subscribers of a local paper which is well-known all over the country, or that of the visitors of a state fair considered by state of origin in the United States [6]. By means of the investigation of this phenomenon Stewart arrived at the conclusion that the number of the undergraduates, fair visitors or subscribers from a given place is in direct

ratio to the number of inhabitants of that place (in his examples one of the federal states), while it is inversely proportional to the distance between the given place and the destination (university, fair, head-quarters of a newspaper publishing house). Stewart identified the ratio of population and distance with population potential, which serves to denote the influence of a social mass at a distance [7][8][9]. With the help of this index number, the estimation of geographical distribution of social phenomena became possible.

Later works, which handle population potential as a central word, they used (use till now) this relation to model the geographical distribution of social masses. The potential maps, which characterize generally these investigations, appeared later on by summing up the single potential values [10][11]. This meant that not just the single impulses were underlined, but by putting it in a complex system (covering a given area as a whole), the spatial distributional relations of a given social phenomenon became knowable.

The original potential concept was transformed again and again with the growth of the various uses, and following this course the possibilities of applications have separated, although it wasn't a sharp differentiation. The influence-character of population potential was more or less pushed into the background – by that means that in the later investigations not the single potential values were taken into account, but the sum of them – and it became regarded as a measure of the proximity of people to a given point [12][13][14]. The proximity of a place and conversely, its relative isolation indicates the accessibility of people to the given system (for example a region, a country or a continent). Whereas the probability of the occurrence of social interactions is greater in the more accessible places, accessibility was originally interpreted as a measure of the intensity of possible contact or social intensity [15]. This idea found the way back to the force-nature of potential. With some modification it was that meaning, which infiltrated to the comprehensively explained accessibility concept by the term potential accessibility. Approaching the question of accessibility from that point of view should deserve special attention because it is determined by the items of society, the single person, and not just by the physical attributes of distance.

With the assistance of Stewart and Warntz a further version of population potential has developed, which is related to the former, and it resulted the appearance of another possibilities of application and the refinement and expansion of potential concept. In that case a little modification has come true compared with the base model. Number of inhabitants has no longer appeared as mass, it was replaced by per capita income weighted with population – namely the absolute value of income [16][17][18]. It is easy to see that this consideration has a great importance from that point of view that it emphasizes the role of population as 'income-producer' population, which is an emphatically relevant element for example in the accessibility conditions. When accessibility is treated not just as a general social question, but we keep in view that what is important the accessibility of upon economic considerations, then 'income producer' population can be regarded as market. The accessibility of markets in other words market potential has an essential effect on the elements of the market: on the relation of demand to supply or on the prices [19][20].

When we disregard the accessibility function of potential in dealing with potential concept, then income potential – or as it was called by Warntz 'gross economic population potential' [21] – can furnish additional information on the spatial structure of economy. Interpreting income potential in this way as economic potential the mechanisms of the two fundamental sides of economic life can become explained. For example: by calculating with the income of inhabitants the characteristics of the consumption side or the market can be explored, while by the investigation of economic potential considering on the basis of national income can explain certain specialities of the production side.

The previously mentioned things make it clear that the concepts of potential accessibility, market potential an economic potential touch each other in many points, and owing to the

expansion of their common surface of contact the courses of progress are very similar. These outlined potential model applications have certain elements, which deal with some problems of the economic life, which demand an approach from a practical point of view, for example the questions of the theories of settlement. The role of accessibility, the size and situation of markets, the state of economic development (in total, relative position) is such a factor, which can determine the respects of settling, in this way the application of potential model seems to be relevant in the concerning works.

The versions of potential model – by that mean they emphasize the role of location, or relative position – contribute a new way of looking to the interpretation of several questions of regional development. This thought is closely associated to such school of economics as New Economic Geography, established by Paul Krugman [22]. In explaining the inequalities of regional development by means of location, New Economic Geography attains one of the central notions of the theory, the core-periphery relation, which is an important factor of forming spatial structure [23][24].

Potential values representing location as an independent variable were considered in many early works mentioned above. But it had only generally a partial role in those sense. As many questions turn to regional development and its determinant factors, the question of location as one of independent variables became more and more important, especially in the works emphasizing the role of accessibility [25]. Since the further goal of this work is to answer how the level of development can be explained by location, it is useful for preparing for a regression analysis to investigate the role of location as an independent variable and the role of development as dependent variable, and make a preliminary characterisation of possible interrelations between them through a Hungarian example.

5 Income conditions and income potentials in Hungary

The dependent variable, which describes development, was determined as income condition. In this investigation it is measured by inhabitant income (per capita) on the level of subregions in the year of 2005. There are great disparities within the country as regards subregional incomes.

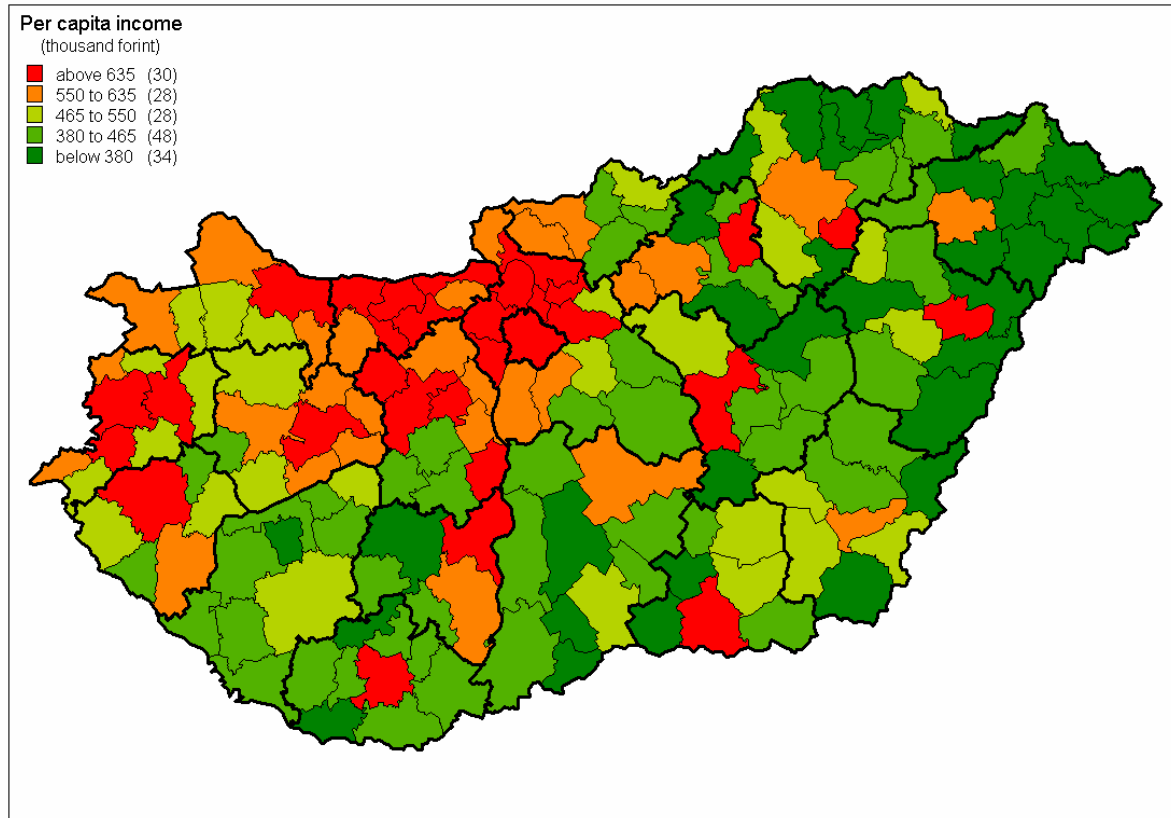
The main tendencies are the northwest-southeast difference and the inequalities between urban and rural areas [26]. The most developed subregions in this sense are the capital, Budapest, its surroundings and the northern part of Transdanubia. Other developed centres of the country are the county towns and the subregions connected with them, and those areas where some kind of industrial functions with high income producer capacity has been established (for example Dunaújváros, Tiszaújváros).

Nevertheless the block of the developed is not completely homogeneous. In some cases economic inner peripheries is enclosed by areas that reach a high income level. Things are like this in the cases of some subregions on the boundaries of Vas, Győr-Moson-Sopron and Veszprém counties, or in the southern area of the agglomeration of Budapest and Pest county, which are connected to the Hungarian Great Plain. However the county towns are not developed uniformly, by reason of the existing differences between them we can speak about regions with higher income level and underdeveloped areas as well. Moreover there are subregions whose income value is particularly low, and which are hardly able to rise above their surroundings (for example Kaposvár and Salgótarján).

The most of the subregions with low income is located in the southern and eastern part of Hungary. In these areas only the county towns stand out like islands, as it was mentioned above. Although in the spatial structure of the underdeveloped subregions there can be observed a mosaic-like settlement, and they don't form a unified area, the most fundamental trend is discernible in that way: an area is the more eastern located, it is the more

underdeveloped. It is marked by that the lowest income category is constituted by those subregions (apart from some exceptions), which are close to the northeastern or the eastern borderland of Hungary (Figure 2.).

Figure 2. Per capita income levels in the Hungarian subregions in 2005

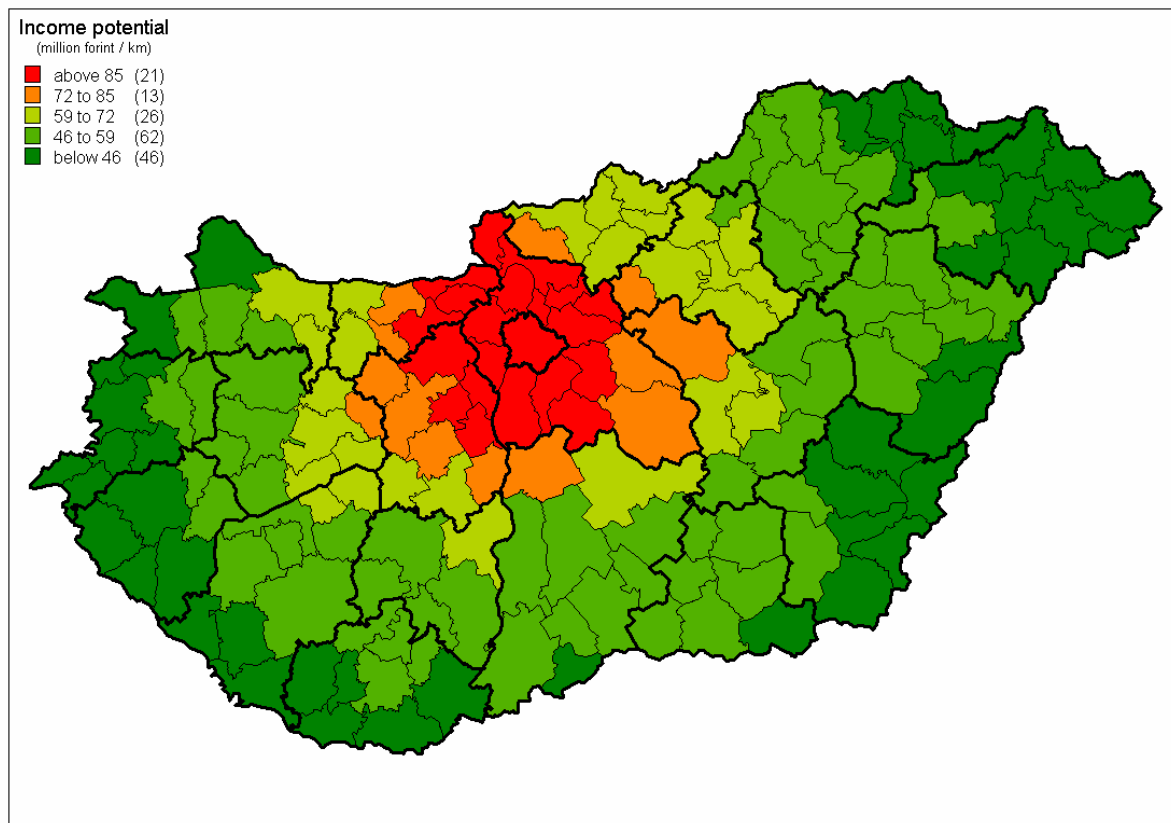


The independent variable of the investigation is income potential by analogy with income levels. The basis of income potential values is formed by the same income dataset like previously. The distance in air kilometres among the centres of subregions has determined distance factor. In the course of calculating potential values, the own ‘mass’ of the given regions has been taken into account through the determination of self-potentials.

Subregional values of the independent variable of location (income potentials) demonstrate well that the relative position of regions is determined beyond their own power by that how they are located in comparison with other areas (are they centrally located, or they have a peripheral, isolated position in relation to the other parts of the country?). Considering that, the central areas of Hungary have the best location conditions, where both the accessibility and income conditions are favourable. Moving away from these central regions, the values of income potentials are lower and lower, and even the developed subregions fade into the periphery, thus we can just suspect that there are local centres as well.

No exceptions can be observed in this structure, the enormous income ‘mass’ of Budapest dominates potential conditions. And as it is in very good geographical position, almost in the centre of Hungary, the image of location conditions is very similar to the geographical core-periphery relations within the country. However, in this sense cores are much rather cores and peripheries are much rather peripheries than they are those geographically: income potentials emphasize the existing differences (Figure 3.).

Figure 3. Income potential values of the Hungarian subregions in 2005



6 Development in relation to location

The two variables were plotted in a XY scatter chart, income potentials as independent variable on the horizontal X-axis, income levels as dependent variable on the vertical Y-axis. Both of them were denoted in percentile terms, for reduce them to a common denominator. One hundred percent represents the average values of both variables. There is no question about that in the case of income variable mean is calculated by the weighted (by population) values of personal income. This method can be also utilized in the case of calculation of an average income potential value [27][28], thus it is defined by this way.

For characterize the relationship between location and development it helps if we typify the subregions and classify them as categories from divers aspects on the basis of the given values of the two variables. The first of these classification possibilities is to assign the categories in relation to one of the representative values of the datasets. In both cases the average value of the dataset was assigned as threshold.

By reason of that, simplifying the question exaggeratedly, those subregions whose per capita income exceeded the country mean they are given 'developed' labelling. While those whose values, which don't get up to the mean they were identified as 'laggings'. Similarly in the case of income potentials, subregions were separated in relation to the mean to groups of centrally and peripherally located regions. Considering that the following types of subregions were assigned. Those regions, which can be ranked as above average in both respects, constitute the group of the 'developed-centrally located' subregions. Those regions, which exceed country mean in point of income level, but lag behind it in point of income potential they are classed into the 'developed' but 'peripheral' category. The centrally located subregions, which have lower values in per capita income, were identified as 'lagging-central'

areas. While the subregions, which are below the mean in point of the values of both variables, they are labelled as ‘lagging-peripheral’. Besides a fifth category was composed, which includes the ‘average’ labelled subregions whose values differ slightly from the average income level or the average income potential (Figure 4/A.).

In this comparison the majority of Hungary’s subregions can be identified as lagging peripheries. We can find the great mass in this category, because in point of both the incomes and the income potentials a certain group of subregions pull the country mean towards themselves, as they have high values in the variables and they are generally the most populated urban areas.

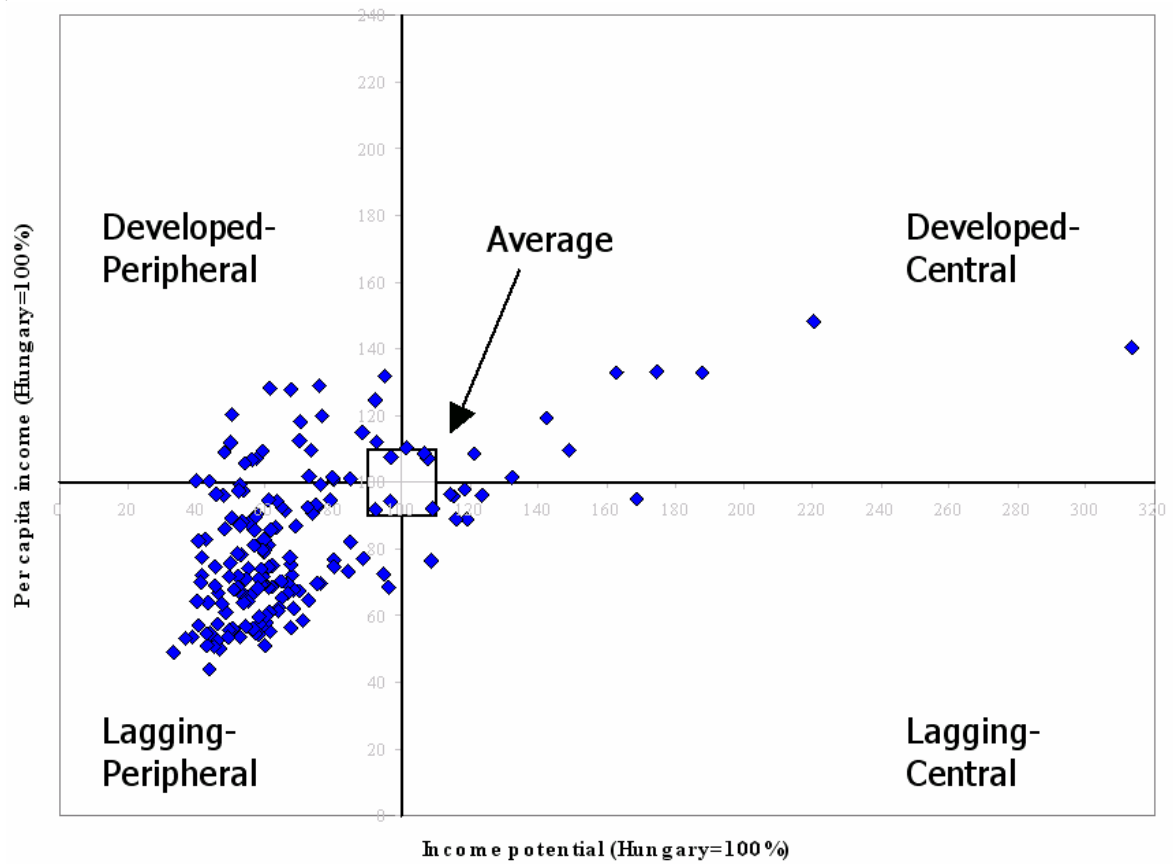
A relatively numerous group represents the category of ‘developed-peripheral’ subregions. It includes the greatest number of county towns except those regions, which are underdeveloped in general according to their income conditions, for example the surroundings of the county towns of Nógrád, Szabolcs-Szatmár-Bereg or Békés counties. The subregions located near to the western borders of Hungary can be also classed in this group in case they have besides high income, like many regions of Zala, Vas and Győr-Moson-Sopron counties. The subregions of Northern-Transdanubia, which are not too far from the capital, Budapest (like some regions of Veszprém, Fejér and Komárom-Esztergom counties) they are similarly the members of this category. Besides, some other subregions represent the category of developed peripheries. These are those areas where industrial functions with high income producer capacity have been established like metallurgy (Dunaújváros), atom energetics (Paks) and prospering chemical engineering (Tiszaújváros).

The low numbered group of average subregions is simply a certain kind of borderline between the less and more developed and between the centrally and peripherally located categories. The case of the centrally located areas, which have low income, deserves more attention. These subregions are not able to take advantage of their possibilities arising from their favoured location conditions, their income levels lag behind their potentials, because of several structural economic problems (for example: south-eastern part of the agglomeration of Budapest has those characteristics like the Hungarian Great Plain has, Dorog, the small mining district has less success in economic renewal).

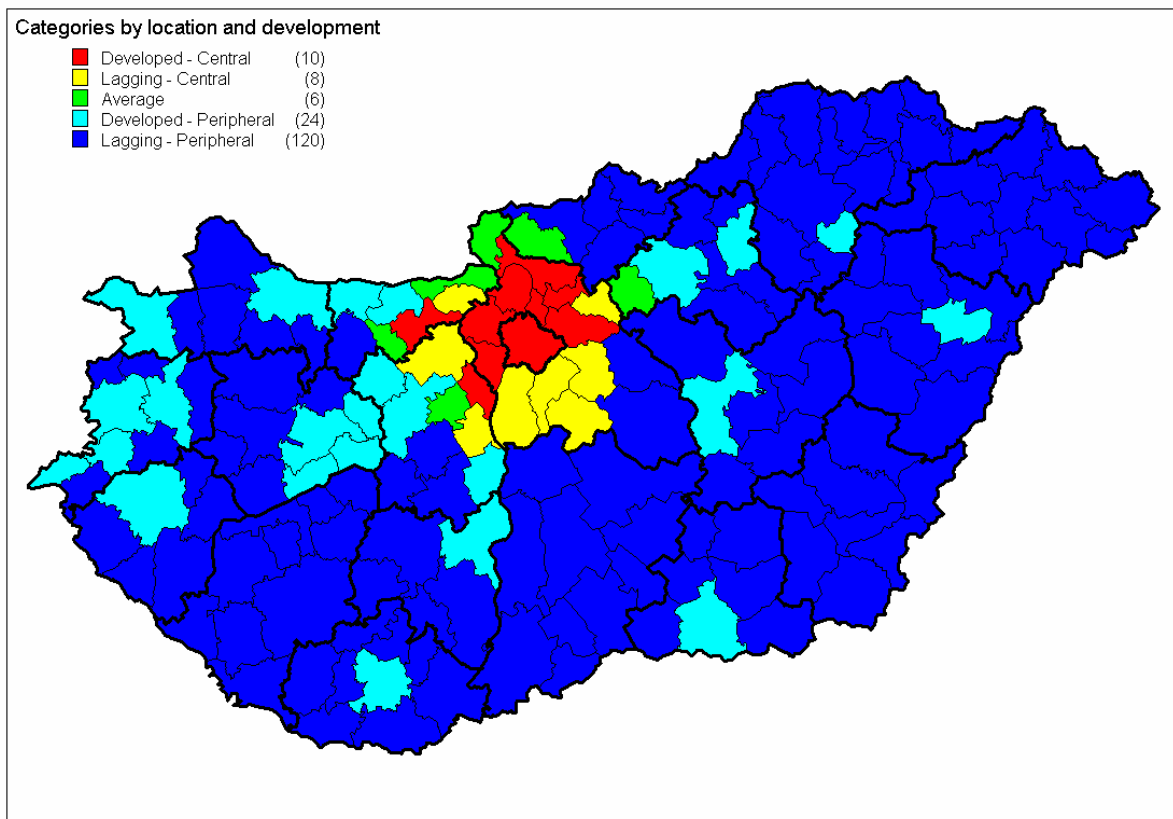
The most favoured conditions are in that group of subregions, which members rise above the other parts of the country both in view of their income levels and income potentials. These regions are Budapest, the capital itself, and some other subregions located in the northern and western part of the agglomeration of Budapest (for example the subregion of Gödöllő, Vác, Szentendre or Budaörs), or they are not too far from it, like Tatabánya. Generally they are in close daily economic relationship with Budapest, through the commuting work force and the several industrial and service functions, which have been established there just owing to the closeness of the capital (Figure 4/b.).

Figure 4. Region types on the basis of relation between location and development I.

A)



B)



This classification emphasizes those differences on the bases of income levels and location conditions, which are measurable through the absolute measures of the values of the two variables in the country. Conversely, if not the absolute values of incomes and income potentials form the basis of the classification, but we stress that what an income level reach the subregions relatively, in relation to their location conditions, then other characteristics of the connection of the two variables can be revealed.

This classification consists of five categories like in the previous case, with the following content. For those subregions, whose measure of per capita income lags far behind their income potential level, the designation 'low income in relation to location' was given. Those regions got into the next category whose income level is less favourable than their location condition (even it is just a little difference). A third category is also formed on the basis of the values of the two variables related to each other, in which those subregions took place, whose income level fits to their location. Where the levels of income potentials don't reach the per capita income level of a region, those subregions are overperformed. It is particularly true for the case of those areas, which have high incomes despite of their disadvantage arise from their location, namely, there can be found those breaking points which guarantee the possibility for rising above the periphery (Figure 5/A.).

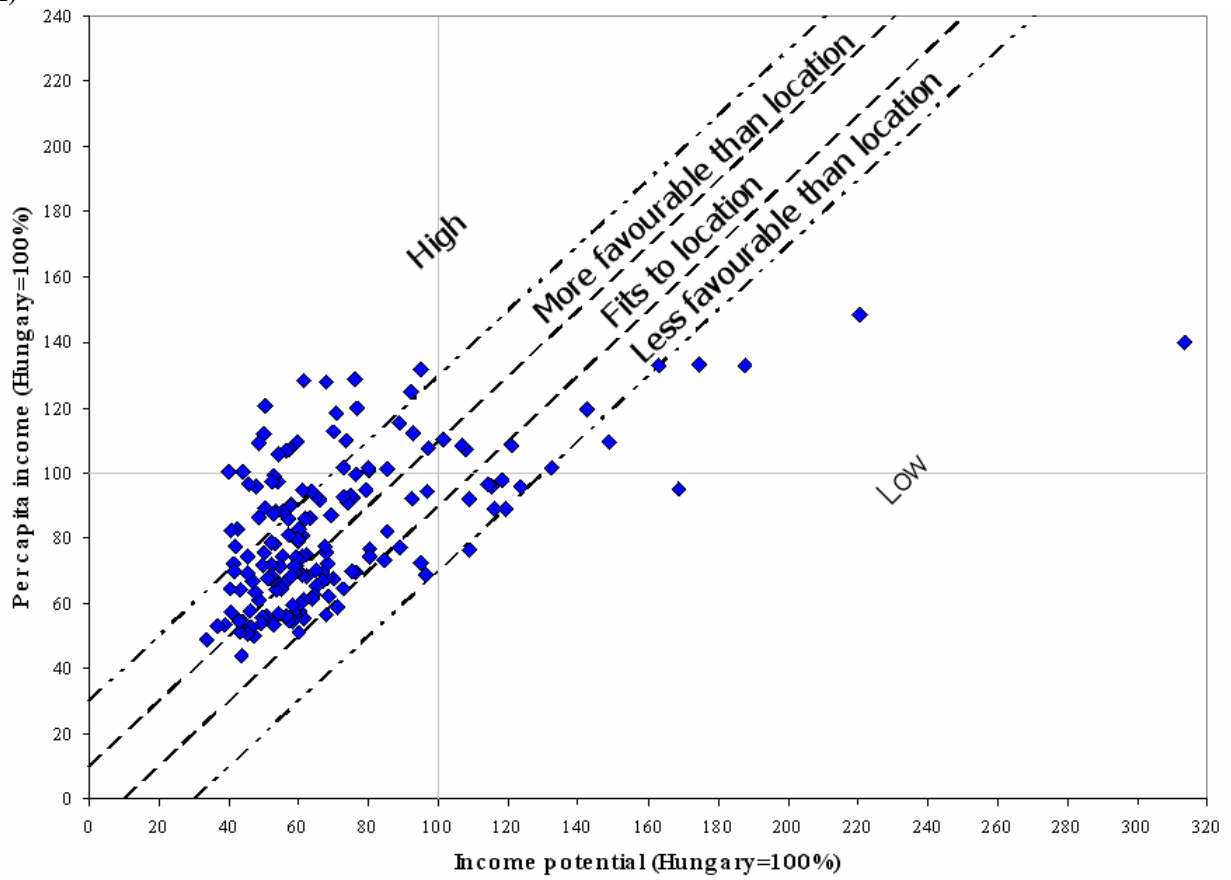
The biggest part of the Hungarian subregions reaches that income level, which fits to their location, or they are a little more developed than their location conditions would suggest. These regions are in peripheral position within Hungary considering in the case of this investigation, their income potential is generally low. However these subregions are not so behind in income levels to the more developed regions, so these lower values can also guarantee a relatively good position in contradiction to that which would be expected related to location.

In this comparison the most successful subregions are those, which are located on the peripheries, in many cases they are border regions, but their income values are much more higher, than their location would indicate. Western-Transdanubia is almost a homogeneous block in this respect. Apart from some exception the subregions of Zala, Vas and Győr-Moson-Sopron counties belong to this category. This indicates the favourable situation of the western borderland, which is observable despite their worse accessibility related to the other parts of the country. Accessibility in the case of these areas can be investigated in many ways: may these regions are far from Budapest and many other subregions of Hungary, but they are neighbouring to those Austrian and Slovenian areas, whose economic situation is much better than that of Hungary. Similarly the subregions of country towns have a much higher income level, than it would be expected in relation to their location. In this comparison their rising above their surroundings is very spectacular, particularly in those cases, where the development level of the neighbouring regions fits to the location conditions. The subregions, which have high income producer capacity like Dunaújváros, Paks and Tiszaújváros belong to this category.

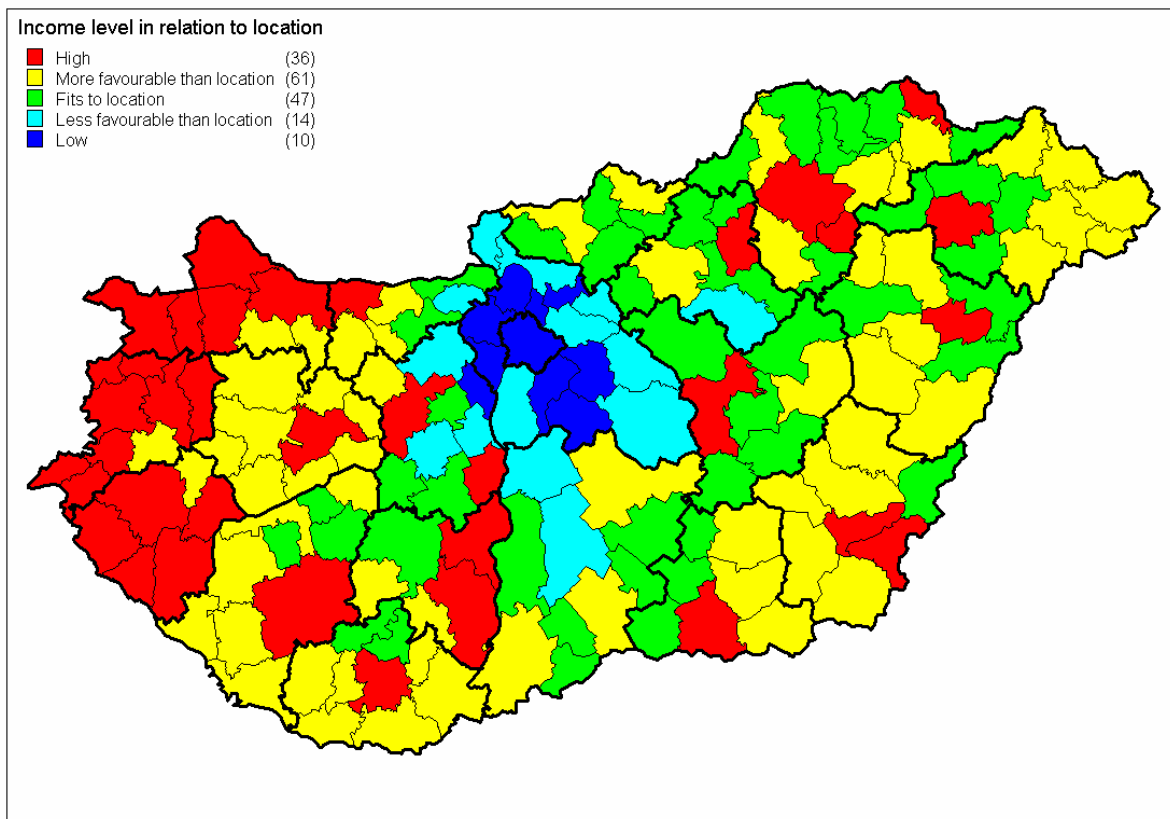
Those regions, where income level is lower than the level of income potential, they are not able to utilise their favoured location conditions, as they should be. As a matter of course they are located in the central part of Hungary, the entirety of Pest county and some other subregions of the neighbouring counties represent this group. We can't designate all of these regions as centrally located areas (for example the subregions of Heves, Cegléd, Kunszentmiklós or Kiskőrös), thus there not the good location factor causes the underperformance, but in many cases the responsible of that is the low income level (Figure 5/B.).

Figure 5. Region types on the basis of relation between location and development II.

A)



B)



The lowest are the income values related to income potentials in the real centres of the country, like the capital, Budapest and its surroundings, notwithstanding that generally the highest income levels can be measured there. This phenomenon is very interesting in the respect of investigation of the relationship of development and location, since it describes the subregions the most successful in many ways, as they would be the worst. Income level of these regions is not able to increase to any highs despite their good conditions, while the value of their income potential includes the effects strengthening each other (as they are highly developed areas close to each other), which results supremely high potential values.

That casts light upon the fact that between the two variables it can't be measured linear correspondence, however it shows indirectly that development state can be explained in many cases through the location of the subregion, consequently there can be observed a relationship in some degree between them.

7 Conclusion

In the investigation of regional development with the help of location factor, a new sort of approach can be revealed, because this dimension has many elements (absolute and relative position, neighbourhood effect) that assist in the comprehensive, complex characterisation of development conditions.

The notion of location has become more and more the part of the conception of potential model through the evolution of potential applications (it can be caught in the act most of all in the case of modelling accessibility). Thus this measure can be a right tool for the quantification of location factor.

Spatial structure described with the help of location confirms the well-known formation of regional differences in Hungary; conversely it also carries many new elements. On the one hand, this method emphasizes the advantages of the western part of the country that they can reach despite of their peripheral location within Hungary. Similarly the investigation underline the role of the urban regions (county towns) that they fill as designated places of the system, and it shows their great differences in contrast to their surroundings.

On the other hand, location function in the investigations of development indicates that there are those areas, which can't be able to utilize the advantages gained from their favoured location conditions. All this casts light upon that the judgement of the situation of subregions is not definite on the basis of these aspects. In many cases location conditions of a given area (within the frame of this investigation) fit to their income level, conversely there are overdeveloped peripheries, and regions classified as lagging core areas.

This demonstrates also the limits of the approach and the method, because it doesn't describe directly the relation between location and development, which has probably a non-linear character. Because of this, for giving a true picture of the nature of that connection, additional investigations are required with taking notice of other determinant elements of development.

References

1. Nemes-Nagy, J. (ed.)(2005) *Regionális elemzési módszerek (Methods of Regional Analysis)*. Eötvös Loránd University, Department of Regional Geography – MTA-ELTE Regional Science Research Group, Budapest.
2. Schürmann, C. (1999) *Quality of Life in European Regions: A Multi-Criteria Analysis*. – *IRPUD Working Arbeitspapier*. 26, Dortmund
3. Johnston, R. J. (ed.)(1997) *The Dictionary of Human Geography*. Blackwell, Oxford.

4. Tobler, W. (1970) A Computer Movie Simulating Urban Growth in the Detroit Region. – *Economic Geography*. 46/2, pp. 234-240.
5. Stewart, J. Q. (1942) A Measure of the Influence of a Population at a Distance. – *Sociometry*. 5, pp. 63-71.
6. Stewart, J. Q. (1941) An Inverse Distance Variation for Certain Social Influences. – *Science*. 93, pp. 89-90.
7. Stewart, J. Q. (1942)
8. Warntz, W. (1964) A New Map of the Surface of Population Potentials for the United States, 1960. – *Geographical Review*. 54, pp. 170-184.
9. Nemes-Nagy, J. (1998) A földrajzi helyzet szerepe a regionális tagoltságban (The Role of Geographical Position in Regional Structure). – In Fazekas, K. (ed.) *Munkaerőpiac és Regionálisitás (Labour Market and Regionality)*. MTA KK KI, Budapest, pp. 147-165.
10. Stewart, J. Q. (1947) Empirical Mathematical Rules Concerning the Distributions and Equilibrium of Population. – *Geographical Review*. 37, pp. 461-485.
11. Stewart, J. Q. (1948) Demographic Gravitation: Evidence and Application. – *Sociometry*. 11, pp. 31-58.
12. Stewart, J. Q. (1948)
13. Warntz, W. (1955) A Methodological Consideration of Some Geographic Aspects of the 1955 Newfoundland Confederation with Canada, 1949. – *The Canadian Geographer*. 6, pp. 39-49.
14. Stewart, J. Q. – Warntz, W. (1958) Macrogeography and Social Science. – *Geographical Review*. 48, pp. 167-184.
15. Pooler, J. (1987) Measuring Geographical Accessibility: A Review of Current Approaches and Problems in the Use of Population Potentials. – *Geoforum*. 18, pp. 269-289.
16. Warntz, W. (1956) Measuring Spatial Association with Special Reference to the Case of Market Orientation of Production. – *Journal of the American Statistical Association*. 51, pp. 597-604.
17. Warntz, W. (1959) Geography at Mid-Twentieth Century. – *World Politics*. 11, pp. 442-454.
18. Stewart, J. Q. – Warntz, W. (1958)
19. Harris, Ch. D. (1954) The Market as a Factor in the Localization of Industry in the United States. – *Annals of the Association of American Geographers*. 44, pp. 315-348.
20. Warntz, W. (1956)
21. Warntz, W. (1956)
22. Krugman, P. (1991) Increasing Returns and Economic Geography. – *Journal of Political Economy*. 99, pp. 483-499.
23. Niebuhr, A. (2004) Market access and regional disparities. – New economic geography in Europe. – *HWWA Discussion Papers*.
24. Fingleton, B. (2005) *Testing the 'New Economic Geography': A Comparative Analysis Based on EU Regional Data*. Kiel Summer Workshop on Trade and Location.
25. Spiekermann, K. – Wegener, M. (2004) Accessibility and Regional Economic Performance. – In *ESPON Project 1.2.1 Transport Services and Networks: Territorial Trends and Basic Supply Infrastructure of Territorial Cohesion*. (Project Report) pp. 396-402.
26. Nemes-Nagy, J. (2004) Elements of Regional Disparities in the New Regional Pattern. – In Enyedi, Gy. – Tózsá, I. (eds.) *The Region. Regional Development Policy, Administration and E-government*. Akadémiai Kiadó, Budapest, pp. 62-79.
27. Spiekermann, K. – Wegener, M. (2004)

28. Schürmann, C. – Talaat, A. (2000) Towards a European Peripherality Index. – *Berichte aus dem Institut für Raumplanung*. 53., Institut für Raumplanung, Universität Dortmund, Fakultät Raumplanung.