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SOCIAL INNOVATION POTENTIAL AND QUALITY OF LIFE: THE EXAMPLE OF HUNGARIAN SETTLEMENTS

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Abstract

As part of a major research task, our research group's previous research on social innovation examined the process, levels, stakeholders and relationship with technical and technological innovation, and analyzed the measurement of social innovation potential and its contribution to competitiveness. Our current study analyzes the complex picture created by social innovation potential and examines how social welfare can be realized in the idea of sustainable value creation, or its increase. The most important conclusion of the study is that in order to improve the quality of life, it is primarily necessary to improve the input indicators of the social innovation potential in general. Based on a novel analytical framework, the study summarizes the quantitative results on the contribution of social innovation potential to quality of life identified for the settlements in Hungary. Our study draws conclusions on how the results can be applied in the economic development decision-making process of settlements.

Keywords: social innovation, quality of life, Hungary, human potential of a settlement

INTRODUCTION

The present study relies on the authors' previous research results, which investigated the process, levels, stakeholders, and relationship of social innovation with technical and technological innovation, and analyzed the contribution of social innovation potential to competitiveness in a complex analysis (Varga et al., 2020, Varga & Tóth, 2021, Varga et al, 2023, Tóth & Varga, 2024, Tóth et al., 2024). To enrich the research area, we have initiated further studies analysing the relationship between the potential indicator for measuring social innovation and factors of quality of life.

The quantification of the contribution of social innovation potential to quality of life is a relevant challenge, and within the framework of the present study we undertake this analysis for the settlements of Hungary. Among the studies of the relationship between social innovation potential and the quality of life, there is not a study in which the contribution of social innovation to the quality of life has been quantified. In order to quantify the relationship between quality of life and social innovation in the context of settlements, we

attempt to investigate the potential of linking the indicator of social innovation potential and quality of life factors in settlements.

The national and international literature is paying increasing attention to the study of social innovation and its impacts. Among the investigated areas, the study will focus on issues of measurability and impact on quality of life. Conceptualizing social innovation, determining the logic and measurement levels of the social innovation process, and modelling based on empirical research are relevant challenges, but the literature on this subject take a different approach to these issues. The authors have been studying social innovation for almost 10 years, with a particular focus on the issue of measurability. As members of the social innovation research group, the authors present a new segment of research with their current study. While the logic of social innovation processes and the possible relationship of social innovation and quality of life have been systematically investigated in previous research (Varga et al., 2020, Varga & Tóth, 2021, Veresné Somosi et al., 2023, Tóth et al., 2024), the impact of social innovation potential on quality of life has not been examined in depth. In the current research framework, the focus is primarily put on the measurement of social innovation potential, which is the set of capabilities that facilitate the creation of social innovations (Kocziszky et al., 2015, Szendi, 2018, Kleverbeck et al., 2019, Nagy & Tóth, 2019, Tóth et al., 2024), distinct from the basic conditions for social innovation, which are necessary for the creation and implementation of innovations in a given region or organisation (Szendi, 2018, Nemes & Varga, 2015, Varga, 2017). In this research, the authors identify social innovation as a process in which, in addition to measures (outcomes) aimed at increasing quality of life, the emergence of novel structures, the promotion of social empowerment, and the process of promoting attitude change and participation are emphasized.

The study aims to answer the complex question of how social innovation potential influences changes in the quality of life and to what extent the input, output and impact indicators of social innovation potential contribute to the increase in the quality of life, and whether a specific pattern can be identified in Hungarian settlements that can be related to social innovation capacity. A research gap has been identified to investigate the relationship between social innovation potential and the quality of life, with a particular focus on the applicability of the HDI (Human Development Index) indicator. In our preliminary study (Tóth & Varga, 2024), we dealt with the predominantly economic approach, based on GDP per capita. Our experience has shown that the social innovation potential and its components have only a very weak relationship with the GDP per capita, so we wanted to analyze the

quality of life in a more complex way. That is why, we adapted the use of the HDI indicator applicable at the level of domestic settlements, the settlement human potential indicator in our work.

THEORETICAL BACKGROUND

Based on our previous studies (Veresné Somosi & Varga 2021, Varga & Tóth, 2021, Veresné Somosi et al., 2023, Tóth et al., 2024), we have summarized the main emphases and the focuses of each approach of social innovation. Social innovation offers new responses to social questions, while enhancing social interactions and improving the quality of life and well-being. In our opinion, it is worth exploring the links between social innovation and improving the well-being in more detail, which could also help policy-makers to develop policies that support the improvement of quality of life.

The concept of social innovation began to develop and become a theory in the mid-18th century (Veresné Somosi & Varga, 2021). Questions of social innovation appeared in papal encyclicals, in the reflections of sociologists and philosophers, and later in the studies of academics, researchers, NGOs, governmental and intergovernmental bodies, and in the scientific journals of their peers. Based on ecclesiastical doctrine and sociology, the first phase of the evolution of the concept (18th-19th centuries) can be identified as a preliminary phase, i.e. concept definition phase. In the next phase (20th century), the theory of innovation and the separation of technical, economic and social innovations became more prominent. In the first decade of the 2000s, the focus was on solutions to meet society's needs, innovative ideas, and the phase of innovative cooperation continued. From 2010 onwards, the focus is on social problem-solving based on the involvement of the individual, and on the study of social processes that improve living standards, using a process-oriented approach. A prominent trend of social innovation theories emphasises the improvement of quality of life by solving social problems (Pol & Ville, 2009, Peyton Young, 2011).

Murray et al. (2010) identify the concept of social innovation as leading to social transformation and shaping, the development of new products, services and programmes, organisational change and the emergence of social enterprises, and as a new model of governance and community decision-making. Social initiatives are launched by members of society and are organised to meet specific needs. Following the transformation of social relations, new scenarios and solutions lead to an improvement in the quality of life, creating opportunities for community development (CRISES, 2012).

The basic purpose of social innovations is to increase the quality of life. The most important mission of social innovation is generating social values and enhancing quality of life and sustainable development (Howaldt et al. 2014, Phills et al. 2008). Social innovation can offer valuable opportunities among which a group of people can choose and thus improve their quality of life (Pol & Ville, 2009). An important question is how we want to measure this. Several possibilities emerge in the literature (Lipták, 2017, Veresné Somosi & Balaton, 2021), however, only few attempts have been made to quantify such a relationship. There is an approach which follows certain spatial adaptation of the GDP per capita and HDI indicators. The research uses spatial adaptation of the HDI, one of the most widely used social indicators. Social Development Reports, published regularly by the United Nations, are the HDI indicator to rank countries and make recommendations to policy-makers. The HDI is an indicator of people's living standards that is much more closely aligned in its complexity to the daily impact on the average person than GDP, which is of particular importance only to a small, wealthier section of society (Köpeczi-Bócz, 2011). However, most countries still use the GDP-based calculation. The primary reason for this is that the HDI is calculated in a multi-dimensional and multi-indicator system. Indeed, the HDI has three dimensional components:

- - long and healthy life,
- - education,
- - standard of living.

Based on the above, there is a very complex measurement system for HDI, based on at least four indicators as originally defined. The HDI indicator has been used regularly since 1990. It is one of several indicators which measure human well-being aiming to capture how human beings develop, and indeed measures quality of life. It is an indicator to replace GDP as a measure of social well-being because, as HDI developers argue, economic growth is a necessary but not sufficient condition for social well-being.

In scientific discourse, there has been an intense debate for decades about measuring the standard of living and quality of life, as well as examining well-being. It is agreed that GDP alone is unsuitable for measurement, but a consensus solution for a substitute has not yet been reached (György, 2024). The measurement criteria not captured by GDP can be divided into three parts: welfare, well-being and sustainability. Well-being can be interpreted more broadly including individual happiness, health and overall quality of life. In 2007, the European Commission held a wide-ranging conference which focused on presenting the most suitable indices for measuring development. One such index is the HDI, which was the first to attempt

to quantify a country's well-being within institutionalized frameworks through a simple indicator, incorporating elements beyond financial aspects, such as life expectancy at birth, literacy, and educational attainment. According to the HDI concept, besides economic performance, a long and healthy life and education are the other two dimensions that fundamentally determine individuals' choices. Thus, the HDI is a composite index that aggregates three dimensions. The main goal of composite indicators is to characterize the given problem as fully as possible with a single measure. In this sense, the HDI offers an alternative to GDP for measuring social well-being. Its value ranges between 0 and 1, where 1 represents the maximum level of development. The index is formed by averaging three indicators, which measure the following dimensions (HCSO, 2008): the goal of a “long and healthy life” is quantified by life expectancy at birth, “education” is represented by the adult literacy rate and the enrollment ratio in various levels of schooling, and “standard of living” is represented by the per capita gross domestic product adjusted for purchasing power parity. The variables included in the HDI indicator are objective, though the methodology is simplified, as it is based on a weighted arithmetic mean. Currently, the index examines 189 countries, categorizing them into four different groups: very high, high, medium, and low human development countries. Creating this index was a significant step towards measuring the well-being of the countries of the world, providing a simple and transparent indicator. However, it should be developed and improved. The UN has partially addressed this by creating the IHDI (Inequality-adjusted Human Development Index), which describes regional inequalities, and numerous scientific publications address regional issues. In the framework of this research, we use Lipták’s (2017) calculation method at the settlement level to examine the relationship between social innovation potential and the quality of life.

Social innovation and quality of life are two interrelated concepts that play crucial roles in the development and sustainability of communities. Social innovation refers to the development and implementation of new ideas, strategies, and projects that address social needs and challenges, while quality of life means the overall well-being of individuals and communities. According to our literature review, the sources of the topic explore the relationship between social innovation potential and quality of life, drawing on various theoretical frameworks and empirical studies. Social innovation potential is the capacity of a community or society to generate, adopt, and implement innovative solutions to social problems. Factors influencing social innovation potential include (EC, 2013, Schmitz et al., 2013):

- human capital: education, skills, and creativity of the population,

- economic resources: availability of financial resources to support innovation
- social capital: networks, trust, and collaborative relationships,
- social requirements: needs, demands, commitment and attitudes
- institutional framework: policies, governance, and supporting structures that facilitate innovation.

Quality of life refers to the overall well-being of individuals and communities, encompassing multiple dimensions (Szigeti, 2016):

- welfare: economic stability, income, and employment,
- well-being: individual's perception of happiness and life satisfaction,
- health: physical and mental health, access to healthcare services,
- education: access to quality education and lifelong learning opportunities,
- social relationships: family ties, community engagement, and social networks,
- environment: quality of the natural and built environment, housing,
- political framework: governance and public participation.

According to Lundvall (1992), innovation systems involve the interactions between various actors and institutions that contribute to the innovation process. A robust innovation system can enhance social innovation potential, leading to economic growth and improved quality of life. Putnam (2000) argues that social capital – networks, norms, and trust – facilitates coordination and cooperation for mutual benefit. High social capital can enhance social innovation potential, leading to improved quality of life through collective problem-solving and community resilience. Access to healthcare and overall population health are critical for sustaining social innovation activities. Healthier populations are more likely to engage in innovative practices, leading to improved quality of life (Mulgan et al., 2007).

Economic resources provide the necessary funding and infrastructure for social innovation projects. Research indicates that regions with higher economic stability and income levels tend to have greater social innovation potential and better quality of life (Hidalgo & Hausmann, 2009). Research comparing urban and rural areas shows that urban areas often have higher social innovation potential due to better access to resources and networks. However, innovative rural projects also significantly improve quality of life by addressing unique local needs (Murray et al., 2010). The relationship between social innovation potential and quality of life is complex and versatile. Theoretical perspectives and empirical evidence suggest that enhancing social innovation potential through education, economic stability, social capital, and supportive institutions can lead to significant improvements in quality of life. Policy-makers and stakeholders should focus on creating environments that foster

innovation and address social needs, ultimately contributing to the well-being and community development.

DATA AND METHODS

In order to measure social innovation potential, we compiled an indicator system based on the literature (Benedek et al., 2015) used for our previous studies. For a more transparent structure, the indicators of the complex social innovation potential are presented in a footnote, grouped into input, output and impact indicators1. The social innovation potential indicator was developed in 2019 by our research group, and the variables included in the study have

[1] The indicator system consists of 3 parts: input, output and impact indicators. In our previous study (Tóth et al., 2024), 8 indicators were included in each of the three groups. The indicators were compiled for the period until 2020 for the settlements of Hungary (a total of 3155 settlements). An exception is the indicators from the census (2011). When compiling the indicator system, it had to be taken into account that the indicators do not point in the same direction (e.g. the lower value for the unemployment rate means the positive, while in relation to the amount of tenders paid per inhabitant, the higher the value, the more positive the situation in terms of social innovation). In the case of indicators where low values represent a favorable situation, the reciprocal of the indicators is calculated. We normalized the indicators in each indicator group in order to make our data on different scales comparable with each other. We calculated the average of the normalized data in each indicator group. No weighting was done during the calculations (not highlighting any one factor to the detriment of others).

The following indicators were included among the input indicators:

1. Number of NGOs per 10,000 inhabitants
2. Number of active enterprises per 1,000 inhabitants
3. Number of non-profit enterprises per 1,000 inhabitants
4. Child population as a percentage of the resident population
5. Number of elderly persons per 100 children
6. Age-dependency ratio (children (0-14 years) and elderly population (65 and up) as a percentage of the population aged 15-64)
7. Activity rate (taxpayers/population*100)
8. Average number of completed classes, 2011

The output indicators included the following indicators:

1. Amount paid per capita
2. Proportion of participants in public employment schemes in relation to the population aged 15-64
3. Number of participants in cultural events per 1 000 inhabits
4. Proportion of disadvantaged pupils
5. Number of people receiving social catering per 1 000 inhabitants
6. Number of people receiving home help per 1 000 inhabitants
7. Unemployment rate
8. Patient turnover per family doctor and family pediatrician

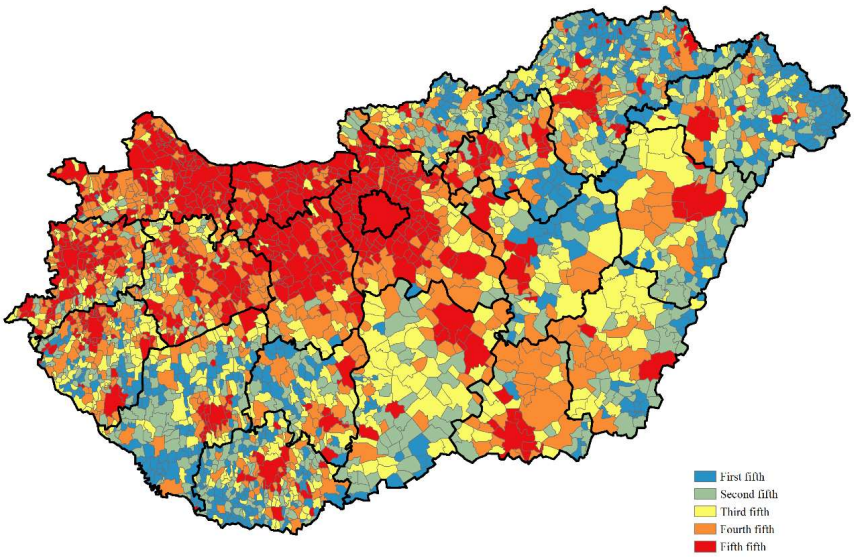
The following indicators were included among the impact indicators:

1. Income per capita (thousand HUF)
2. Proportion of the population aged 7 and over with primary education (including those who have not completed school)
3. Proportion of single person households
4. Proportion of families with three or more children
5. Number of registered crimes per 1 000 inhabitants
6. Number of places in permanent residential care facilities per 1 000 in-habitants
7. Percentage of taxpayers earning in the income bracket 0–1 million HUF
8. Proportion of public spaces regularly cleaned.

For more information: Tóth G, Varga K, Benkó KF, Dávid LD. (2024). Social innovation potential and economic power: The example of Hungarian districts. Journal of Infrastructure, Policy and Development. 8(3), 3042. https://doi.org/10.24294/jipd.v8i3.3042

been revised several times over the period. The quantification of the social innovation potential has been referred to in several publications or research report (Varga et al., 2020, Veresné Somosi & Varga, 2021, Varga & Tóth, 2021, Varga et al, 2023, Tóth & Varga, 2024, Tóth et al., 2024), but in order to fully understand the study, the methodology is described in the footnote of this chapter, too. The detailed calculation can be found in the study of Tóth et al. (2024) which presents a part of our research and serves as a precursor to the present study. The composite indicator measuring social innovation was calculated from the average of the three indicator groups (Figure 1). The magnitude of the complex indicator of the social innovation potential in the majority of the settlements was influenced to the greatest extent by the impact indicators. This study, using the values of the social innovation potential calculated for each settlement (Figure 1), aims to use the HDI indicator to formulate novel findings that clarify the relationship between certain indicators of social innovation potential and quality of life.

Figure 1: A composite indicator measuring the social innovation of Hungarian settlements

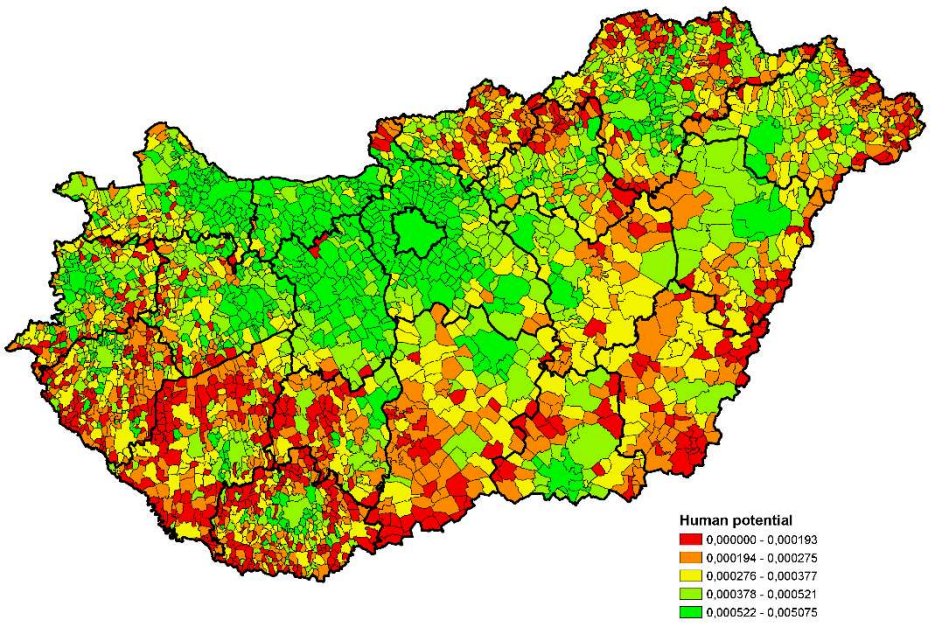


Source: own editing (based on HCSO data)

In terms of the spatial image of the social innovation potential, one can assume that the capital (Budapest), its agglomeration and the northern part of Transdanubia are in the most favorable position (fifth fifth), accompanied by the county seats and their catchment areas. We find disadvantaged settlements in the border and peripheral regions of North-East and South-West Hungary, as well as those located near the shared borders of Heves and Jász-Nagykun-Szolnok, Somogy and Tolna, and Borsod-Abaúj-Zemplén and Szabolcs-Szatmár-Bereg counties (in the first fifth).

In the new part of our present analysis, with the help of multiple linear regression, we first tried to investigate the extent to which the components of the social innovation potential we had created determine the quality of life for the settlements of Hungary (3155 settlements), which this time we attempted to quantify with the human potential of the settlement. According to Lipták (2017), when measuring the development of human capital at regional levels, we encounter challenges because indicators such as the HDI or human potential vary when calculated for smaller territorial units compared to national levels, necessitating the use of appropriate indicators available for the specific regional unit. In the current adoption of the human development index, we obtained it by using the aging index (2020), the average number of classes completed by 15-64-year-olds (2011), and the per capita income (2020). We calculated the indicators and then normalized the indicators in order to filter out scale differences. By multiplying the normalized indicators and calculating the cube root of the product, we obtained the human potential of the settlement. In practice, this meant that, after calculating each sub-index, the final values of the human potential of the settlement were calculated by using the geometric average, the product of the sub-indices, multiplied by the third root.

Figure 2. Human potential at settlement level, 2020



Source: own editing (based on HCSO data)

As Figure 2 shows, the agglomeration of Budapest, the northern part of the Transdanubian region, the county seats and their catchment areas are in the most favourable position in terms

of human development potential. Disadvantaged settlements are mainly located in the South Transdanubian region and in the Southern Great Plain. In general, the most disadvantaged peripheries are the outer peripheries along the national border and the inner peripheries along the border of the counties. According to our previous studies (Varga et al., 2023, Tóth et al., 2024), the social innovation potential and the current development situation of settlements move together, but social innovation can create a positive displacement potential in the medium term, in line with slowly changing territorial processes. Investing in social innovation potential has a fundamental impact on competitiveness and, according to our study, on improving quality of life.

RESULTS

The fit of the multiple linear regression model (OLS) is moderately strong (adjusted R2=0.487), and all three components of the social innovation potential (input, output, impact) were significant. We expected that the spatial dependence can be found in this estimate, and in such a case the geographical location has an influence on the actual relationships, and thus the traditional econometric estimates will be twisted. The Moran's I statistic was used to test for spatial dependence. Moran's I formula is as follows (Moran, 1948):

$$I = \frac{n}{2A} * \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\delta_{ij}(y_i-\bar{y})((y_j-\bar{y})}{\sum_{i=1}^{n}(y_i-\bar{y})^2} I = \frac{n}{2A} * \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\delta_{ij}(y_i-\bar{y})((y_j-\bar{y})}{\sum_{i=1}^{n}(y_i-\bar{y})^2}$$

where n is the number of settlements, yi is the human potential of the settlement in each settlement, $\bar{y}$ is the unweighted arithmetic mean of the human potential of the settlement, the number of neighborhood relations is denoted by A, and the value of the coefficient δij is 1 if i and j are adjacent, otherwise 0. (Dusek, 2004).

The global autocorrelation of the human potential of the settlement for all settlements in Hungary: Moran I: 0.424.

When interpreting the data, it is important to note that the calculated indicator should be interpreted in the following ranges and ways:

I > -1/N-1, positive spatial autocorrelation,
I = -1/N-1, no spatial autocorrelation,
I < -1/N-1, negative spatial autocorrelation

0.424> -0.00032 (-1/3155-1) → positive spatial autocorrelation

In the present case, this means positive spatial autocorrelation, i.e. the spatial concentration of similar values is higher than would be expected as a result of natural processes. There are settlements with high human potential next to settlements with high potential, and settlements with low human potential are situated next to settlements with low potential. Our null hypothesis, i.e. there is no spatial dependence, can therefore be rejected.

The size of the human potential of the settlement can be characterized by spatial separation or spatial clusters. We therefore felt it necessary to further investigate the spatial dependence. This was also confirmed by the results of the normality and heteroscedasticity tests, which are significant. In other words, our indicators show spatial dependence, so we can state that it is necessary to create a spatial model that pays attention to such characteristics (Varga, 2002, Anselin & Rey, 2014, Váry, 2017).

We found that the spatial dependence can be estimated, so we decided to use a spatial model. The concept of lags (LAG) is applied when performing spatial analyses. The general model of spatial lags can be described as follows:

$$y = \rho Wy + \beta X + \varepsilon$$

where y is the vector of values of the outcome variable, ρ is the coefficient of the spatially lagged outcome variable (i.e. the spatial autoregression parameter), W is the row-standardized weight matrix, β is the parameter vector of exogenous explanatory variables, X is the matrix of exogenous explanatory variables, ε is the vector of values of the error term (Varga, 2002, Anselin & Rey, 2014, Váry, 2017).

Another common form of spatial econometric modelling is the application of the spatial error autocorrelation model (ERROR). The general formula of this model is illustrated in the equations below:

$$y=\beta X+\varepsilon$$
and
$$\varepsilon=\lambda W\_\varepsilon+\xi$$

where ε is the vector of autoregressive error terms, λ is the spatially lagged parameter coefficient of the autoregressive error terms, and ξ is the vector of independent, identically distributed error terms with zero expected value (Varga, 2002). Spatial dependence can be indicated if λ is significant, since in this case interactions between nearby spatial units are reflected in the error term values.

There is also a combination of the two spatial econometric models presented above, in which both spatial lags and spatial error autocorrelation appear in the combined model.

We performed our calculations using the GeoDaSpace software applying queen neighborhood. Several types of neighbourhood matrices have been modelled (e.g. rook and second or third degree queen neighbourhood, etc.) but the model fit is always degraded. Regarding heteroscedasticity, we applied White's standard error. The multicollinearity of our model is 25.7, which meets expectations. The Lagrange Multiplier tests were significant for both spatial delay and spatial error models. Since the coefficient values were higher in the case of the spatial delay model, we continued our analysis with it afterwards. This section presents the results of two regression models – Ordinary Least Squares (OLS) and Spatial Lag – applied to assess the relationship between social innovation indicators and quality of life at settlement level. The results include the constant, coefficients for input, output, and impact indicators, the spatial lagged coefficient, and the Pseudo R2 values.

Table 1 Results of the applied models

Denomination	OLS	SPATIAL LAG
Constant	-0.001365***	-0.001203***
Input indicators	0.007953***	0.006952***
Output indicators	0.003366***	0.002083***
Impact indicators	0.001068***	0.000502***
Spatial lagged coefficient	–	0.420581***
Pseudo R^2	0.487	0.572

*** p<0,001, ** p< 0,01, * p<0,1
Source: own calculation

The constant term in both models is significantly negative, indicating a baseline value when all indicators are zero. For the OLS model, it is -0.001365, while for the Spatial Lag model, it is -0.001203. The triple asterisks (***) denote statistical significance at the 0,1% level, indicating high confidence in these estimates.

The coefficients for input indicators are positive and significant, showing a strong positive relationship between the input indicators of social innovation and the quality of life. The OLS model shows a coefficient of 0.007953, while the Spatial Lag model shows a slightly lower coefficient of 0.006952. This suggests that as input indicators improve, the quality of life increases.

The coefficients for output indicators are also positive and significant. The OLS model has a coefficient of 0.003366, and the Spatial Lag model has a coefficient of 0.002083. This

indicates that better output indicators are associated with improved quality of life, although the relationship is weaker compared to input indicators.

The impact indicators have positive and significant coefficients in both models, with the OLS model showing 0.001068 and the Spatial Lag model showing 0.000502. This indicates a positive but relatively weaker relationship between impact indicators and quality of life compared to input and output indicators.

The Spatial Lag model includes a spatial lagged coefficient of 0.420581, which is highly significant. This indicates the presence of spatial dependence, suggesting that the quality of life in one district is influenced by the social innovation activities in neighboring districts. This coefficient captures the spillover effects, emphasizing the importance of considering spatial relationships in the analysis.

The Pseudo R^2 values indicate the goodness-of-fit for the models. The OLS model has a Pseudo R^2 of 0.487, while the Spatial Lag model has a higher Pseudo R^2 of 0.572. This suggests that the Spatial Lag model explains a greater proportion of the variance in the quality of life, highlighting the relevance of spatial dependencies.

The explanatory power of spatial models improved compared to traditional OLS, Pseudo $R^2 = 0.572$.

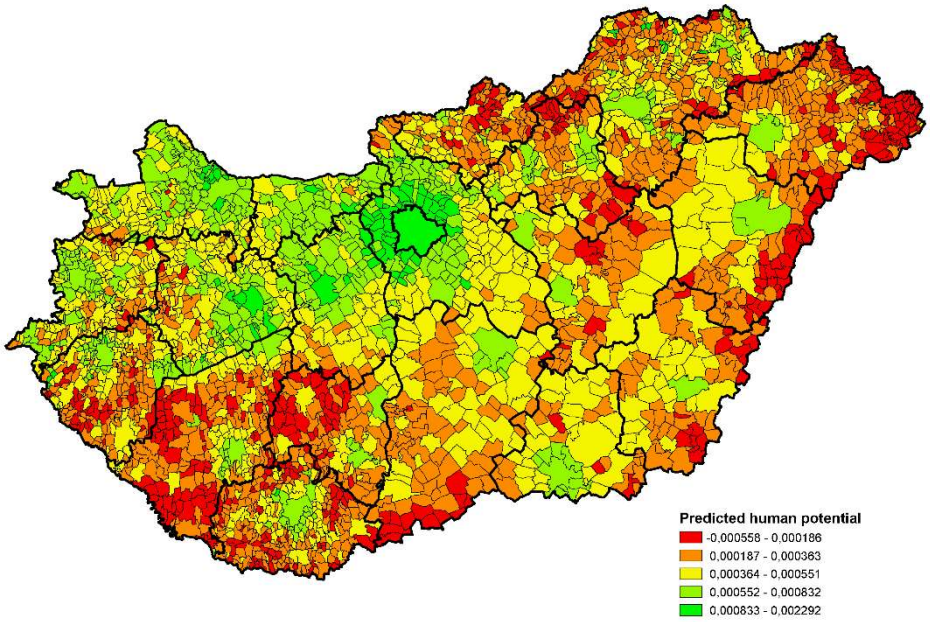
The spatially lagged explanatory variable has the greatest effect. This means that there are hotspots in the country where the human potential of the settlement is higher, and it is more likely that if the human potential of the settlement is high in the given settlement, it is also high in the surrounding settlements.

The input indicators have the greatest impact on the human potential of the settlement, followed by the output and then the impact indicators.

The Anselin-Kelejian test dealing with the spatiality of the error terms is not significant, i.e. no spatial structure is visible in the error terms. Therefore, there is no need to use a combined model that handles the spatiality of the error terms as well.

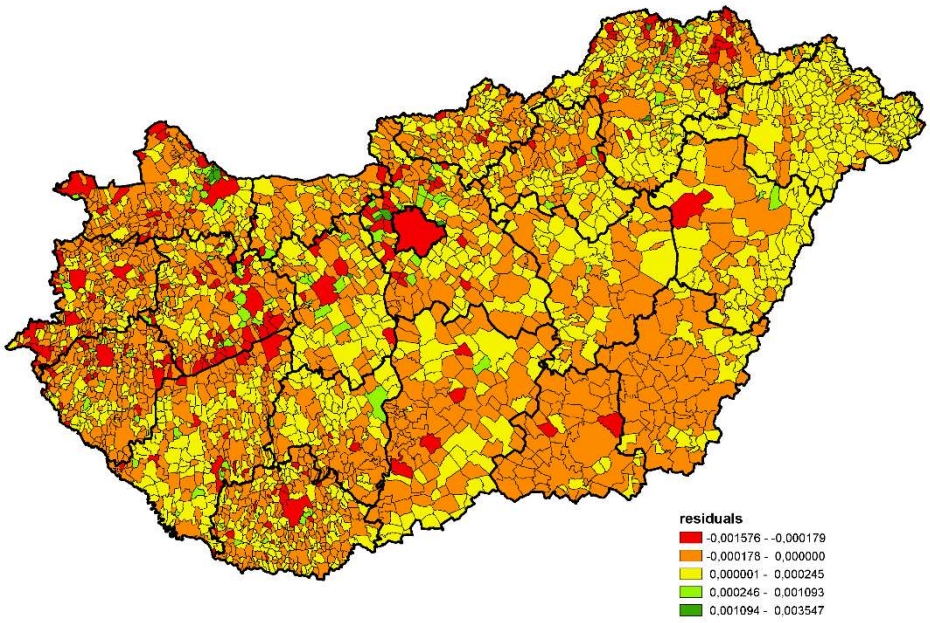
The results (Figure 3) and residuals (Figure 4) of the spatial delay are presented below. In terms of social innovation potential, the agglomeration of Budapest, the northern part of Transdanubia, the county seats and their catchment areas are in the most favorable position. Disadvantaged settlements are primarily found in Southern Transdanubia and the Southern Great Plain. In general, the outer peripheries along the national border and the inner peripheries along the county border are in the most unfavorable situation. In its basic structure, the spatial delay model also supports this pattern.

Figure 3. Results of a spatial model for estimating human potential at settlement level (LAG)



Source: own editing

Figure 4. Residuals of a spatial model estimating human potential at settlement level (LAG)



Source: own editing

The residuals show that Budapest, the settlements on the shore of Lake Balaton and some county seats (such as Pécs, Győr, Szombathely, Zalaegerszeg) are overvalued, while the value of the settlements in the catchment areas of the metropolitan centers is mainly underestimated.

We also performed the calculations by counties. The explanatory power of the spatial models ranges quite widely. Pseudo R2 shows values of 0.33-0.78. The more variables are not significant or only significant at a low level, the lower the explanatory power of the model is.

With the exception of 3 counties, the spatially lagged variable also has a significant effect on the settlement's human potential. The input indicators are significant for all counties. When examined separately for each county, the output and impact indicators are only significant in a very small number of cases.

CONCLUSION AND DISCUSSION

The research focused on the mesauring of social innovation potential and quality of life at settlement level. Social innovation and improving quality of life are closely related concepts (Cajaiba-Santana, 2014, Pol & Ville, 2008, Veresné Somosi & Varga, 2021, Borzaga & Bodini, 2014), however, few attempts have been made to quantify their relationship.

Based on our examination, we can state that by using the social innovation potential, it is basically possible to give a good spatial estimate of the quality of life, which we have quantified in our present work with the spatial human potential. To improve the quality of life, it is primarily necessary to improve the input indicators, followed by the output and impact indicators.

In order to improve the quality of life, it is also necessary to continue and strengthen family and employment policy measures (of which the activity rate and the child population ratio are the most prominent) based on our results, which are closely related to the implemented social innovation projects or good practices.

The results of both the OLS and Spatial Lag models demonstrate significant positive relationships between social innovation indicators (input, output, and impact) and the quality of life. The Spatial Lag model, with a higher Pseudo R2 and a significant spatial lagged coefficient, provides a more comprehensive understanding by accounting for spatial dependencies. These findings underscore the importance of considering both direct and spatial effects of social innovation activities when assessing their impact on the quality of life.

The majority of settlements with the highest human development scores are located in Central Hungary and the Western Transdanubia region. The lowest human development scores are mostly found in the settlements of Northern Hungary, Southern Transdanubia and Northern Great Plain. The values also show that the differences in human resource development between the centre and the periphery are significant.

From the generalisability's point of view, a further task is to define the general relationship between the different levels of measurement and to relate their measurement methods. On the other hand, the development of a database of good practices is another research task, since a so-called good practice repository could provide practical advice to decision-makers and participants in the social innovation process. Further exploration of the above lines of research could lead to the discovery of important correlations that could complement the research carried out in this study.

SUMMARY

As part of a major research task, our research group's previous research on social innovation examined the process, levels, stakeholders and their relationship with technical and technological innovation, and analyzed the measurement of social innovation potential and its contribution to competitiveness. Our current study analyses the complex picture created by social innovation potential and examines how social welfare can be realized in the idea of sustainable value creation, or its increase. The most important conclusion of the study is that to improve the quality of life, it is primarily necessary to improve the input indicators of the social innovation potential in general. Based on a novel analytical framework, the study summarizes the quantitative results on the contribution of social innovation potential to the quality of life, considering all settlements in Hungary. Our study draws conclusions on how the results can be applied in the economic development decision-making process of settlements.

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