Empowering, transferring and downscaling: three steps towards implementing smart village strategies

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ABSTRACT

Rural areas face common challenges, but at the same time there are many opportunities based on its under-utilized assets and territorial capital. There is a growing recognition that empowering tools offered digital transformation in general and the EU Smart Village Concept in particular requires tailor-made solutions according to each rural community's unique needs and resources. However, relatively little attention has been paid to transferring and downscaling the elements of a supportive environment, as well as measurement methodologies that has proven successful in a case of smart city development. Relying on the main findings of the literature and the preliminary results and experiences of the Digital Success Programme launched in Hungary, with particular focus on the pre-conditions of the Digital (Smart) Village Programme, the paper seeks to address the basic steps towards implementing smart village strategies.

KEYWORDS

smart village, smart city, supportive environment, downscaling, measurement methodology

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1 INTRODUCTION

Covering 4,6% of the EU and home to 93.1 million people (20.8% of the total EU population), rural areas are different in terms of their scales, problems, potentials, socio-economic and demographic trends. However, they face common challenges as depopulation, ageing society, poor access to services, lack of proper infrastructure, low incomes coupled with high poverty, social exclusion risk, and a deepening digital divide (Martinez Juan-McEldowney 2021, 2). Much of the global challenges, as climate changes, pandemics, loss of biodiversity, growing world population, increasing demand for food and excessive use of resources also enhance the vulnerability rural areas. These circumstances often attract other problems leading to a domino effect that makes certain rural regions fall into the "rural development trap" or a "vicious circle driving rural decline. [9, 12]

The other side of the coin is that due to their existing rich and unique resources, rural areas have many opportunities to turn their territorial diversity into strength. This recognition has to be seen in relation to the place-based approach which is grounded on the territorial differences in the accessibility of specific resources, growth potential and vulnerability even within the same country. [1] In accordance with this paradigm, the European Union (EU) launched the Smart Village Concept (SVC) with an aim of empowering rural areas within the context of digital transformation and smart development in the second half of the 2010s. [3, 4] The SVC has also become part of the common agricultural policy and play an important role in achieving the goals set by the European Green Deal especially when it comes to access to fast broadband and economic growth that is socially and environmentally sustainable.

There is a growing recognition that empowering rural communities is hardly possible without transferring those smart solutions that have proven successful in large and medium-sized cities to small towns, rural communities and villages. In doing so, the development of smart services in villages should go hand in hand with the need of providing an overall supportive environment as well as a proper methodology for measuring and evaluating both spatial, social, infrastructural and service-related criteria as well as the level of digital maturity as a whole. Although there exist both promising initiatives for creating enabling structures and typologies for measuring performance of smart cities, the current efforts to launch and implement digital transformation in rural areas still lack standard indicator systems that can be used in relation to SVC. [2, 10, 14]

According to the above reasons the paper argues that the precondition of empowering rural communities and areas in the form of the implementation of SVC should build on three basic steps. Firstly, there is a need to set up an extended supportive framework based on the main elements of a place-based approach. Secondly, the transfer and adaptation of the experiences and good practices of smart city developments are also inevitable. Thirdly, the former steps could establish the ground for downscaling the concept of data-driven urban management to the level of settlements and villages. [8] It would consist of a comprehensive performance measurement framework as well, taking the specific socio-economic and geographical context of rural environment into account. Our hypothesis is that an integrated approach of different smart development strategies that includes the way of transferring and downscaling good practices results in exploiting potential synergies and promoting to develop tailor-made solutions.

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The aim of the paper is to establish the basis and directions for a forthcoming comprehensive research project in a case of Hungary with special regard to the conditions and tools of measurability of smart village development. In this initial phase, the methods used include the overview of the relevant literature, an analysis of SVC's institutional and regulatory environment, as well as its strategic documents. Based on this, the experiences of methodologies developed within the framework of the Public Administration and Public Service Development Operational Programme (2014-2020) in Hungary will be introduced through the lens of the emerging Smart Village Programme (2021-3027). As a consequence, the approach of the paper tends to be basically theoretical. but there are practical motivations behind the statements and remarks.

The paper is divided into three sections. Firstly, considering the main findings of the literature, we identify the key challenges and opportunities of rural areas by exploring the aim of the EU SVC as well as the key elements of a suggested supportive environment. In the second section, we introduce the pre-conditions and initial developments of SVC in Hungary. In the third section the practical applicability of a potential methodology will be addressed in order to learn and benefit from the usage of smart city indicators in measuring smart village development. Lastly, we make some conclusion in relation to the usage of empowering tools in a case of rural communities.

2 THE IMPORTANCE OF THE SMART VILLAGE CONCEPT FOR RURAL DEVELOPMENT

The Smart Village Concept (SVC) is a relatively new initiative reacting to the economic and territorial inequalities, the increasing risks of social exclusion, the gradual reduction of agricultural activities, as well as to the need of strong interaction of the EU cohesion and common agricultural policy. In general, smart villages are primarily about people from villages who intend to find practical solutions for local disadvantages relying at the same time on their assets and opportunities. Accordingly, the conceptual frameworks of smart villages are defined as follows: a village represents an ecosystem of a limited size as well as a community driven by specific mechanisms and dynamics that are a product and result of interaction between a large number of stakeholders. [16]

One of the most serious problems of rural areas is their depopulation, though this process is happening unevenly across the EU. Greece, Poland and Slovakia are the only Member States where, between 2006 and 2016 there has been an increase in the relative share of the rural population. Further, the rural population in the EU has a lower level of education. A lack of access to broadband Internet and poor digital skills are also important elements of the idital divide. It is underlined that less, then half the population of rural areas have basic digital skills, compared to 62% in cities. The ageing of the rural population is another problem. In 2018, more than 1/5 of the rural population was over 65 years. However, between 2015 and 2018 there was a slight increase in the proportion of the population living in rural regions to the total population (from 28% in 2015 to 29.1% in 2018), while urban populations will have grown by 46 million (from 553 million in 2018 to 599 million in 2050). [13] In addition, many global challenges, as climate change, pandemics, loss of biodiversity, growing world population, increasing demand for food and excessive use of resources have also an impact on rural areas.

Considering the experiences, challenges and the need for catching up, the EU launched the process of developing the SVC through a series of concrete actions ranging from the renewal of the Cork Declaration (Declaration 2.0) in 2016 through the Bled Declaration in 2018 to the planning process of the common agricultural policy beyond 2022. These approaches highlighted the need for an inclusive rural and agricultural policy that should be based on an innovative, inventive and smart solutions which form a key basis for economic growth, development and sustainability. This led to the development of a concept of "smart villages" and complemented the vision of rural development with new strategic objectives and guidelines that could help maintain, restore and develop rural communities by promoting social and digital transformation in the agricultural and food sectors throughout the EU. [5, 9]

In developing their strategic plans, one of the main tasks of the Member States is to create proper conditions for implementing their own SVCs and SV strategies. As each rural community has unique needs and resources, one-size-fits-all approaches would not work in this case. Further, the digital transformation of a rural area into a smart village requires bottom-up initiatives as well, which assumes the participation of proactive citizens. However, rural community consists of different groups, for example farmers on intensive farms, small farmers, residents receiving income outside agriculture, local commuters to cities, residents living in the countryside without strong connections to the day-to day rural world. Within this context, the given rural areas may show significant diversity in terms of accessibility to ICTs, adoption of ICTs, and also the way these technologies are used.

Experiences to date show that small towns, settlements and villages can benefit from the data driven city approach. Many solutions and practices of urban data management can be transferred to villages, taking the special conditions, habits and socio-economic characteristics of a given rural areas into account. In other words, the needs and opportunities of small towns and villages differ from the endowments of large cities to a large extent. However, in addition to the specificities relating to urban and rural areas, there are also many possible common sets of smart solutions as the development of smart lighting, public safety solutions or smart waste collection.

Consequently, a starting point for national governments and regional authorities is to create contact points between the needs and intentions of technology ('smart solutions') and key actors (urban governance, citizens and businesses) in the form of an extended supportive environment. [10] One of the most important preconditions of this is the creation of an enabling, dynamic supportive culture with stable regulatory, legal and policy frameworks that open up the possibility for everyone to develop differentiated digital skills and provide access to advanced technological tools. In practical terms, 'tailor-made' facilitating programmes, fair financing options, as well as 'bespoke' knowledge transfer mechanisms are required, because inhabitants of many small cities. towns and villages often lack the competencies and financial incentives to create the necessary institutional and administrative capacities. For example, knowledge transfer should to be provided in the form of training

programmes initiated by national and regional governments. It has to be included both the various forms of formal trainings providing explicit knowledge and the transfer of tacit knowledge which is of a key importance in the replication process.

Smart solutions are often isolated and customized, so scaling up the results also becomes difficult if the innovation team is too far, removed from the location of the day-to day operation. In order to avoid or alleviate such and similar bottlenecks, the emerging smart city marketplaces (SCM) offer practical solutions. The general function of marketplace is to facilitate integrated planning and management as well as find comparable information on products, validated results of previous investments and peer reviews. As for vendors, they can offer their products and related smart solutions, bankable smart city proposals as well as showcase their previously successful innovations, focusing on types of towns and technologies. It helps to mobilise capital from different sources to finance projects at an early stage. The key function of the marketplace is therefore to facilitate, as well as simplify and accelerate the process of matching supply and demand, and to confirm and validate new technologies and the conditions for their application[1].

Marketplace-type planning instruments are already available in several countries, allowing for flexible adaptation to local needs and opportunities by taking into account the particular level and spatial distribution of digital maturity. The experiences of the initial phase of the so-called Digital Success Programme (DSP) in Hungary clearly indicates the need to create a multi-dimensional supportive environment. Having examined of its basic elements – legal and institutional frameworks, knowledge platforms and a sustainable SCM of the DSP – in the following sections the transferability of the "smart city toolbox" to the development of smart village projects will be explored. In this initial phase of the SV Programme in Hungary (2021-2027), the potential synergies between different strategies as well as the measurement practices will be considered in the light of the practical implications of an extended supportive environment.

3 SMART VILLAGE CONCEPTS IN THE MAKING: PREPARING EMPOWERING TOOLS IN HUNGARY

Rural areas cover 87 per cent of the territory and are inhabited by 47 per cent of the population in Hungary. [6] The country is characterized by a fragmented settlement structure, with 76 per cent of the 3 152 settlements having less than 2.000 inhabitants. The problems that the rural areas have faced are very similar to those of the other parts of the EU with special regard to the territorial inequalities between different level of digital maturity. It is clearly indicated by the latest Digital Economy and Society Index (DESI) in that Hungary was ranked 23rd with 41,2 score meanwhile the EU average also fell from 52,6 (2020) to 50,7 (2021). However, the whole picture is more complex. Hungary has recently made significant efforts to improve the digitalisation of society, economy and public services. As a result, its infrastructural development level rose significantly: in the 'Connectivity' dimension, Hungary is ranked 12th with a score which is above the EU average. 4G coverage is almost 100 percent and 81 percent of households have fixed broadband take-up. On the other hand, in the 'Digital public services' dimension Hungary is ranked 25th with score of 49,2 which is significantly below the EU score of 68,1. In the 'Digital public administration' dimension, the first indicator, the ratio of e-Government users, is timely comparable: it was 64 percent in 2020 and it rose to 70 percent in 2021, which exceeded the EU average (64 percent). The score of 'Digital public services for citizens' (on a 0-100 scale) is overall 54, meanwhile the EU average was 75 points in 2020. In case of the 'Digital public service for business' indicator smaller difference can be observed between Hungary (76) and the EU average (84).

Although a large number of indicators are available to express the extent of territorial dispersion of the usage, frequency and utilization of digital tools and smart solutions, yet the following indicator of the Hungarian Central Statistical Office can be treated appropriate and robust enough to summarize the level of digital maturity in relation to public administration and public services.

The idea of addressing these problems has already present in the series of strategic documents and programme prepared by the relevant line ministries of the Hungarian Government (Table 3).

The common denominator of these strategies is to make ICT-based developments and the benefits of digital transformation available to all regions, businesses and individuals in Hungary. In 2015, the government began a comprehensive digital development strategy with DSP 1.0. In the first phase, measures were introduced into the public administration system (for example free Wi-Fi in town centres and creation of a public data cadastre). [2] The second phase, which began in 2017 (DSP 2.0), defined the areas of development with an aim of ensuring that 'every citizen and business of Hungary and the Hungarian national economy becomes a winner of digitalisation' and argued in favour of extending the notion of 'smart' beyond cities to 'smart areas'. [3] In the last legislative period between 2018 and 2022 the implementation of the strategy has been managed by the Ministry of Innovation and Technology with interdepartmental competence[4]. The so-called DSP Points (1,500 in place at the end of 2021) assisted smart city projects throughout the country, though mainly in smaller settlements. They are designed to provide scope for digital literacy development and electronic administration.

In order to reach the scale and scope of the emerging supportive environment, Government Decree No. 252/2018 (XII. 17.) on the Establishment and Operation of Smart City Central Platform Services appointed the Lechner Knowledge Centre (LKC) as the provider of the centralised smart city central platform service in response to the local needs. In addition, the Lechner Knowledge Centre develops Smart City Methodologies containing proposals that may ensure the systemic implementation of certain smart city development models[5].

Even though the initial phase of the digitalisation development policy was influenced dominantly by the smart city development

[1]The most obvious model is the Smart Cities Marketplace (SCM) lead and supported by the European Commission bringing together cities, industries, SMEs, investors, banks, researchers and other smart city actors. For details visit: https://eu-smartcities.eu/

[2]See: Government Decree 2012/2015 (XII.19.) DSP 1.0

[3]See: Government Decree 1456/2017 (VII.19.) DSP 2.0

[4]See: Government Decree 94/2018 (V.22.

[5]The Inventory of the Smart City Methodologies already contains 234 projects in Hungary, and 900 in the world in total. In Hungary, it monitors projects implementing smart city developments in roughly 66 settlements. See in detail: 'Smart City Methodologies'. Retrieved from http://okosvaros.lechnerkozpont.hu/hu. April 30, 2022.

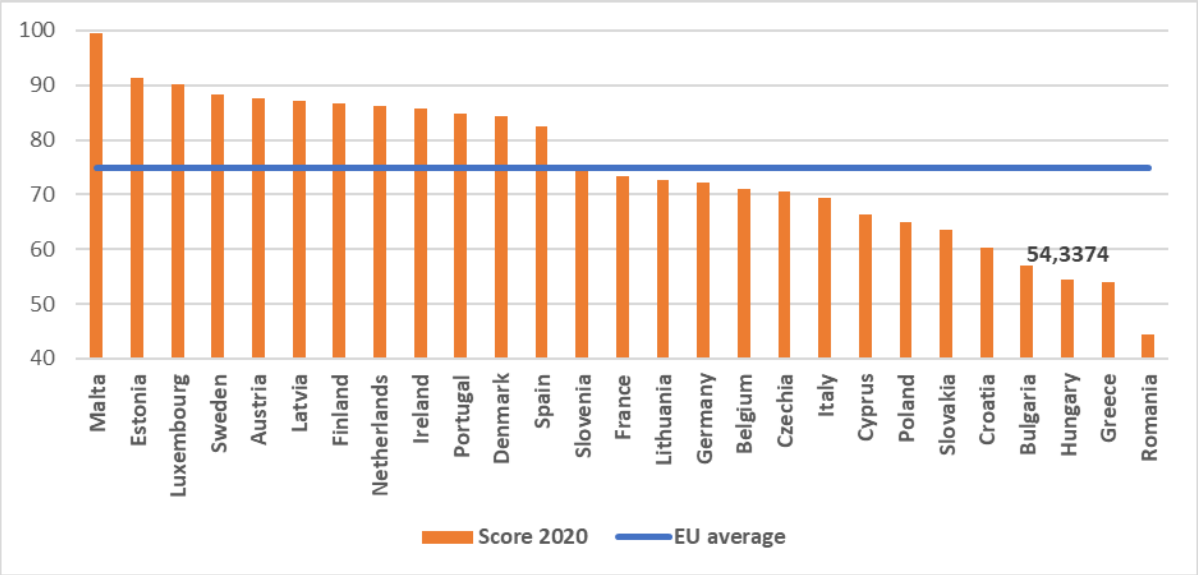

Figure 1: Digital services for citizens in the European Union member states in 2020, Source: compiled by the author based on https://digital-agenda-data.eu/charts/desi-components#chart=\{%22indicator%22:%22desi_dps_pscit%22,%22breakdown-group%22:%22total%22,%22unit-measure%22:%22egov_score%22,%22time-period%22:%222021%22), retrieved April 30, 2022.

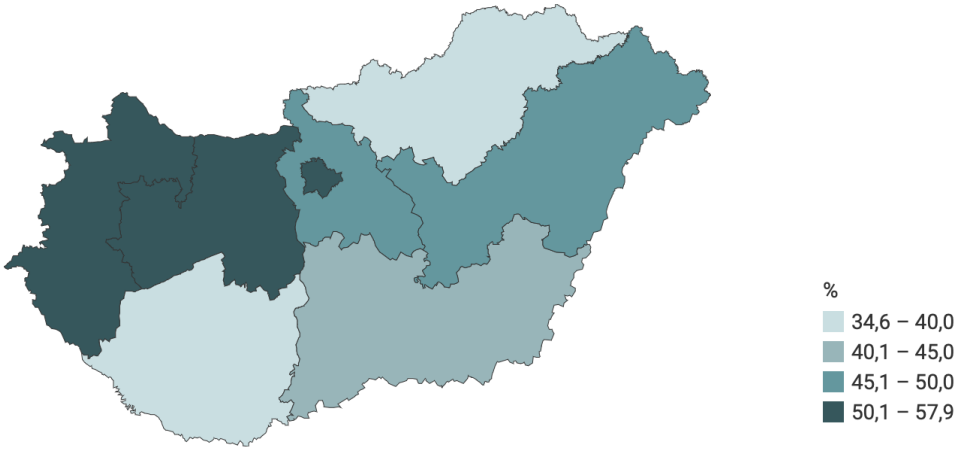

Figure 2: E-government activities of individuals via websites: submitting completed form by NUTS 2 regions in 2019, Source: Retrieved 30 April, 2022 from https://www.ksh.hu/docs/hun/xftp/idoszaki/ikt/2019/02/index.htm

agenda between the 2014-2018, and partly the 2018-2022 legislative periods, the government launched from central budget the Hungarian Village Programme (HVP) with an aim of contributing to the retention of the local population and to create attractive conditions for those who want to live in the countryside by improving the quality of life of citizens living in villages instead of cities.[6] HVP can be seen as a direct predecessor to the DVP by supporting small-scale projects to improve the quality of life through tenders, by establishing and managing a village road fund with an aim of improving the condition of the domestic side road network, by introducing the home purchase subsidy, first and foremost the so-called CSOK (Family Homebuilding Allowance,), as well as maintaining small shops in villages.

Based on the success of the HVP, the Digital Village Programme (DVP) was launched in November 2020, relaying on the principles of the SVC and the specific endowments of the Hungarian rural landscape. The DVP was set up within the framework of DSP and HVP supervised by the LKC. The embedding of the DVP in the DSP through the supervision of the LKC offered a good opportunity to

[6] 1669/2018 (XII. 10.) Government Decision on the implementation of measures related to certain programme elements under the Hungarian Village Programme and their necessary funding in 2019. The HVP started in 2019 with a budget of 150 billion forints, it grew to 2010 billion in 2020 and 250 billion in 2021 to improve rural living conditions.

Table 1: Overview of rural development related policy initiatives and organisations

Scheme of relevant policy initiatives	
EU level	National level
Digital Agenda for Europe	Digital Village Programme
Europe 2020	Digital Success Programme
Common Agricultural Policy	National Information and Communication Strategy
-	New Hungarian Rural Development Programme
	National Digitalisation Strategy
3-	
-	Hungarian Village Programme
Scheme of organisations	
European Innovation Partnership for Agriculture	Digital Success Programme Non-profit Ltd.
European Network for Rural Development	Digital Future Settlement Network
-	Lechner Knowledge Centre

Source: [15]

take over and downscale the main elements of the supportive environment created in relation to the smart city development projects. This kind of integrated approach allows potential synergies to be exploited between DSP, HVP and DSP strategies.

Due to the preparation process within the framework of DSP during 2021, the DVP covers the following elements: the so-called 'settlementprobe', a rural settlement and investment platform, rural procurement and sales community-digital marketplace, integrated waste management, rural energy community, career village-rural workforce module, settlement air quality measurement-detection and sanctioning, digital rural development rapporteur and expert training, personal and property protection, digital service and electronic payment ecosystem. Three elements of this broad portfolio are specifically designed to build an extended supportive environment that was launched in the preparatory phase of DVP.

The so-called 'settlementprobe' (which is in fact a representative settlement survey), based on the analysis of statistical data, existing planning documents and participative research (including in-depth interviews with key actors and local opinion makers), as well as the state of digitalisation and aspects of local ICT use serves as an analytical tool to set up a local 'problem map'. As a result of these coherent activities, a digital settlement development action plan will be drawn up, which will already include complex and practical 'road maps', and the related services. Based on this, proposals are made by the LKC concerning the use of special products and services from the smart city marketplace (SCM), that is also an important element of the DVP. There are already many digital solutions in Hungary that are not only considered high quality products at home, but also abroad. The DVP helps also to promote the portfolio of these products to a wide audience.

In order to support the implementation of the action plans, digital rural development rapporteur trainings are delivered with an aim of having at least one expert in smart development in every settlement and village. The rapporteurs and experts who join the so-called Alumni Network get a complex package of services for themselves and their settlements. This is also significant because it creates an institutionalized cooperation between the professional capacities of the DSP and the municipality concerned.

All in all, the DVP is currently in a take-off period in Hungary by creating all the basic elements of an extended supportive environment, namely providing stable regulatory, and policy framework, initiating local development action plans, delivering training courses, establishing and operating smart city marketplace.

4 DOWNSCALING INDICATORS FROM SMART CITIES TO SMART VILLAGES

In accordance with the possibility of exploiting the synergies between different strategies, the process of "downscaling" smart solutions from larger to smaller communities can trigger an effective learning process, similar to initiatives that seek to use the theoretical background of smart cities and data-driven governance in creating specific development concepts for rural communities. As cities are typically said to be 'forerunners' in installing and operating smart devices, it is worth 'downscaling' smart solutions from big cities and towns to smaller settlements and villages by exploring the connections between them, as well as borrowing some useful experiences from cities to villages. Many solutions and practices of urban data management can be transferred to villages, taking the special conditions, habits and socio-economic characteristics of a given rural areas into account. Although the needs and opportunities of small towns and villages differ from the endowments of large cities to a large extent, there are yet many possible common sets of smart solutions as smart lighting, public safety solutions or smart waste collection [8].

Nevertheless, while there are advanced methods and standard indicators for measuring the 'smartness' of cities, this is unfortunately not the case for the rural areas. Even for smart cities, the available indicators are mostly large, robust, 'hard-to-move', benchmark indicators (named in this paper rather as 'main' indicators) measuring the given phenomena at national level (e.g. the share of advanced e-government service users in the Internet-using population). From the point of view of development activities, positive

Table 2: Examples of suggested indicators in relation to smart city and smart village dimensions

Smart cities dimensions	Main indicators	Smart villages dimensions	Main indicators
Smart economy	% of public expenditure on R&D, employment rate in high-tech and creative industries &culture and entertainment industry, No. of local units manufacturing high tech and ICT products	*Smart economy*	No. of local business development programme, No. of e-commerce transactions
Smart mobility	No. of measures on: motor travel and congestion reduction, No. of traffic management tools and services	*Smart mobility*	No. of long-distance public transport connections, No. of e-charging stations
Smart environment	Total $CO_{2,}$ emissions. in tonnes per head, % of total energy derived from renewable sources	*Smart environment*	% of total land area earmarked for development, share of public institutions and households using renewable energy sources
Smart governance	% of households with Internet access at home, e-Government availability (% of the 20 basic services that are fully available online)	*Smart governance*	No. of wifi hotspots, No. of online presence of villages
Smart living	% of people undertaking industry-based training, No. of enterprises adopting ISO 14000 standards	*Smart living*	Existence of camera system to support crime prevention, % of people aware of e-health services and registered in a village
Smart people	% of population aged 15-64 with higher education, share of participation in life-long learning	*Smart people*	No. of school aged children attending primary school, No. of online courses organised by local public institutions per year

Source: the author's compilation based on Lombardi et al [11]

changes in the value of indicators cannot be traced back solely to the effects of the results of separate interventions (project). On the contrary, indicators at the national level can be influenced by a number of other projects in a given time period as well as a wide range of demographic, social, economic, technological and political processes. Consequently, a given project can be successful on its own – at least it can have a positive impact on its target groups or on its wider environment – even if the value of the indicator at national level moves in a negative direction.

This leads to the question: how do local rural local communities create their own development through 'village-sensitive' microscale initiatives which at the same time contribute to the national level implementation of the SVC targets and priorities. Narrowing the scope of the problem to the field of performance measurement, we claim that by linking the national level ('main') indicators with the output and outcome indicators of the microscale (village) projects, a complex performance measurement framework can be established which is able to empirically indicate the interactive process between the strategic and operational levels. To put this notion into practice, we suggest to identify the 'main' smart city indicators and try to match them to similar, but place-sensitive smart village indicators. For the sake of an example, some pilot indicators have been selected, following the dimensions of the well-known smart city model set up by Giffinger et. al. [7]

Going further, we claim that in a case of any complex development strategy, the outputs of the relating projects can influence the move of the relevant main indicator in a positive direction. Based on this assumption, an overarching measurement methodology has been developed by the experts at the University of Public Service (UPS) in Hungary in the wake of the implementation of the Hungarian Public Administration and Public Service Development Strategy (PAPSDS) and Operational Programme (OP) 2014-2020.

By addressing the key priorities, the PAPSDS identified the need to introduce a comprehensive, multi-level system of indicators to improve the quality of public administration and public service delivery. To achieve this, a multi-level indicator system has been introduced involving the PAPSDS strategic indicators, the relevant project indicators, as well as the indicators of the so-called Good State and Governance Report (hereinafter: GSG Report) with its 150 main indicators which became central to the development of the above-mentioned performance measurement framework.[7] In addition, one of the thematic units of the GSG Report, the "Effective Public Administration" covered the scope and content of PAPSD OP to a large extent, which allowed to match the two sets of indicators.

As the GSG Report Indicators are positional by its nature, applied to large, national level sub-systems, they couldn't be directly linked to specific PAPSD OP projects and their results. Therefore, a complex, two-level measurement system had to be developed which was able to link the Good Governance indicators with the results of the given PAPSD OP projects. At the first level of the measurement system, the project owner organizations were obliged to select at least three Good State and Governance Indicators whose values

[7] See in detail: https://antk.uni-nke.hu/kutatas-tudomanyos-elet/jo-allam-kutatasok/angol-nyelvu-kiadvanyok-good-governance-publications. Retrieved April 30, 2022.

should be influenced by the results of their projects. After fixing the results they had to make a commitment to reach target values which progress will be measured during the whole implementation process. However, commitments to target values can only be made on the basis of a detailed measurement methodology prepared by the project owner organizations with the support and approval of UPS experts. In the end of the process, having a detailed description of the project outputs and a methodological justification of their measurability, the appropriate GGS indicators were selected.

The most important element in the development of the methodology was the completion of the so-called impact matrix, which resulted in the identification of project outputs. The project owner organizations had to plan what kind of impact mechanisms would have a direct or indirect effects on certain target groups (citizens, companies, public administration, own organization) or its subgroups. The overall impacts 'above the projects' have also been measured by the UPS experts in the form of representative surveys covering the whole country.

To sum up, even though the methodology was developed for measuring and evaluating public administration development projects, it could be also useful for future smart village projects.

5 CONCLUSION

Nowadays all forms of settlement experience the need to respond to rapid changes by adaptive and innovative solutions which are integral part of long-term strategies. The widely growing diffusion of digital tools, web services or applications continuously provide a large amount of data in daily interactions which offer new windows of opportunities for analysing social-spatial processes in cities and rural areas.

The launching of smart villages developments must take into account the geographical location, level of development, human resources, and basically the size of the given settlement, as in many respects the problems of large cities, small and medium-sized towns are different from those of rural settlements and villages. In order to avoid the potential bottlenecks of the one-size-fits all approach, a 'three steps-based" approach is suggested, which consists of multilayered, interlocking elements. The prerequisite of this is the creation of an enabling, dynamic supportive environment with stable regulatory, legal and policy frameworks that open up the possibility for everyone, from entrepreneurs through the working age population to the elderly and young people, to develop differentiated digital skills and to have access to advanced technological tools. It is followed by the transfer of good practices of smart city developments applying smart village indicators in surveying and evaluating the digital maturity of a village or rural area with regard to their institutional and administrative capacities for implementing their strategies. However, despite the significant efforts in order to establish smart villages there are still no developed standard indicators that can be applied in defining a real concept of smart village. So, as a third step it is worth exploring the opportunities of downscaling the relevant smart city indicators to the levels of settlements and villages.

The experiences of the initial phase of the implementation of the DSP programme in Hungary clearly indicates that the basic elements of an enabling and supportive environment are in place. However, the experiences of the methodology developed and applied by the UPS experts show that in order to provide the conditions of successful implementation there is a strong need to establish a proper performance measurement and management framework, both at the macro-level of managing authorities and within the sphere of the project owner organisations.

The main aim of the development of the measurement methodology was to translate abstract terms and strategic goals into the level of project implementation by linking project outputs to the expected mid-and long-term impacts. Regular consultations with the UPS experts proved to be crucial for defining the intended results by creating the opportunity to take the needs of the target groups and the expected economic, social and administrative impacts into account. In this co-creation process the application of Good State and Governance Indicators as reference points and compasses ensured that project activities, approaches and partnerships were able to reach valid social and administrative impacts. As a result, a specialised knowledge and measurement culture has been developed among project managers, which can be flexibly applied and extended to other projects.

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REFERENCES

[1] Barca, Fabrizio.2009. An Agenda for a Reformed Cohesion Policy. 2009. A place-based approach to meeting European Union challenges and expectations. Independent report prepared at the request of Danuta Hübner, Commissioner for Regional Policy. (April, 2009) Retrieved April 30, 2022 from https://www.europarl.europa.eu/meetdocs/2009_2014/documents/regi/dv/barca_report_/barca_report_en.pdf

[2] Dudzevičiūtė, Gitana, Šimelytė, Agnė, Liučvaitienė, Aušra. 2017. The Application of Smart Cities Concept for Citizens of Lithuania and Sweden: Comparative Analysis. Independent Journal of Management&Production (IJM&P), Vol. 8., No.4 (October-December 2017), 1434-1450. DOI: 10.14807/ijmp.v8i4.659

[3] European Commission. 2017. EU Action for Smart Villages. 2017. Retrieved April 30, 2022 from https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/key_policies/documents/rur-dev-small-villages_en.pdf

[4] European Commission: Declaration. A smart and sustainable future for European agriculture and rural areas. 2019. Retrieved April 30, 2022 from file:///C:/Users/User/Downloads/dd3_declaration_on_agriculture_and_rural_areas_-_signed_814353DA-CD3A-B43F-4CA377E38D959439_58563-1.pdf

[5] European Commission: A long-term Vision for the EU's Rural Areas-Towards stronger, connected, resilient and prosperous rural areas by 2040. 2021. Brussels, 30.6. 2021 COM (2021) 345 final. Retrieved April 30, 2022 from https://ec.europa.eu/info/sites/default/files/strategy/strategy_documents/documents/ltvra-c2021-345_en.pdf

[6] Eurostat: Statistics on Rural Areas in the EU.2018. Retrieved April 30, 2022 from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Statistics_on_rural_areas_in_the_EU&oldid=391832

[7] Giffinger, Rudolf, Fertner, Christian, Kramer, Hans, Kalasek, Robert. 2007. Smart Cities-Ranking of European medium-sized cities. Final report. (October 2007). Retrieved April 30, 2022 from https://www.researchgate.net/profile/Christian-Fertner-2/publication/261367640_Smart_cities_-_Ranking_of_European_medium-sized_cities/links/0c960535ae2e4cc479000000/Smart-cities-Ranking-of-European-medium-sized-cities.pdf?origin=publication_detail

[8] Jakobi, Ákos: Conclusions from data driven cities to indicators of smartness in villages. In Berki, Márton and Szabó, Pál (eds). 2021.: Smart opportunities for rural communities in 2021-2027. Paper Proceedings. Published by ELTE Eötvös Loránd University. Institute of Geography and Earth Sciences. Centre of Geography. 2021. 85-95. ISBN 978-963-489-428-5, 86.

[9] Jezic, Zoran Górecka, Aleksandra, Kardum, Benjamin. 2021. Smart villages and rural development. Acta Scientiarum Polonorum Oeconomia. 20 (2), 39-46., p. 41. DOI: 10.22630/ASPE.2021.20.2.14

[10] Kaiser, Tamás: Extended Framework for Smart City Development: Complementary Elements of a Supportive Environment. 2021. PRO PUBLICO BONO-Public Administration, Vol. 9. (2021) No. 1. DOI: 10.32575/ppb.2021.1.5.
[11] Lombardi, Patrizia, Giordano, Silvia, Farouh, Hend & Yousef, Wael. 2012. Modelling the smart city performance. Innovation: The European Journal of Social Science Research. Vol. 25, No. 2. 137-149.
[12] Martinez, Juan, McEldowney, Ana. 2022. Smart villages. Concept, issues and prospects for EU rural areas. European Parliament Briefing, European Parliamentary Research Service, (March 20 2021), Retrieved April 30, 2022 from https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2021)689349
[13] Panciszko, Barbara. 2021. The reasons of the implementation of the concept of smart villages in the European Union. Przegląd Politologiczny (Political Science Review), Vol. 4. 37-48., p. 40-41.
[14] Pontsho, William Maja, Meyer, Johan, von Solms. von Solms, Suné. 2020. Development of smart rural village indicators in line with industry 4.0. IEEE Access, 8., 152017-152033.
[15] Szalai, Ádám, Varró, Krisztina and Fabula, Szabolcs. 2021. Towards a multiscalar perspective on the prospects of the 'actually existing smart village – a view from Hungary. Hungarian Geographical Bulletin, Vol. 70. No. 2. 97-112. 103. DOI:10.15201/hungeobull.70.2.1.
[16] Visvizi, Anna, Lytras, Miltiades D., Mudri, György. 2019. Smart Villages: Relevance, Approaches, Policymaking, Implications. In Visvizi, Anna, Lytras, Miltiades D., Mudri, György (eds). 2019. *Smart Villages in the EU and beyond.* Emerald Publishing Limited. 1-13. p. 5.