THE REVIEW OF EVALUATION PRACTICES, FOCUSING ON CHALLENGES IN THE HUNGARIAN SMALL AND MEDIUM CITIES

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Abstract
There is an emphasized attention in the policies of the Hungarian Government on the smart city developments. Ten cities, including Tata, are selected as host settlements for smart city pilot developmental projects. The international evaluation systems can provide a good basis for comparative analysis however there is a need for a well-structured efficient local evaluation system on smart intervention. Smart governance needs to be put through for achieving the best available citizen-centred results. It is desired from the local and central governmental institutions to provide enabling environment which can function as an intermediate engine of digital developments for the social and smart interventions.

As a complex digitization developmental program focusing not just on the infrastructural development but also on the improvement of the human abilities, the Hungarian Government launched the comprehensive Digital Welfare Program. The monitoring of the executed programs and the reasonable, effective measurement of the impacts of the developmental programs are inadequate for policy and decision makers to evaluate the results and to disclose the basis of the required further interventions. We intend to reveal the relevant literature review of the international practices, the convenient possibilities of social and economic evaluation and reporting. We analyse these processes in detail in Hungarian context based on a case study about the Hungarian city of Tata, however these smart city strategies – programmes - projects are in the preparation phases or at the beginning of implementations. Following these, we formulate the possible future sequences of the research.

1. Introduction

In 1930, 30% of the world population lived in urban areas, nowadays it reaches 55% and according to the latest prognosis it will reach 68% by 2050[1]. This is the third phase of urbanisation, where knowledge orientation and cultural diversity are the key factors. The modern cities play an important role in economic growth nowadays[2]. Cities should cope with many serious, critical wicked issues for example global warming and instable economic environment.[3] As Giffinger [4] states " the development of a city strongly influenced by its ability to handle strong economic structural changes over time". This urbanisation trend causes also a lot of wicked issues which should be considered into the strategic planning practices of the city policy makers who have to deal

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with numerous negative effects, such as the urban traffic congestion, air quality, urban mobility, the aging of the population and the strengthening trends of inequalities and digital transformation.[5] The main goal of decision makers shall be the production and execution of sustainable and harmonious development programs which can improve the wellbeing of citizens. The applied interventions always must be considered rather as an integrated part of existing socio-economic circumstances than greenfield city investments. [3]

Against this background, the process of digital transition involving the concept of smart cities indicates the need of re-thinking governance, allocating resources for re-skilling, and adapting new technologies, as well as legislative and policy issues. Digital tools and solutions are reshaping public services and the mode of how city governments respond to citizen's need as their experiences are one of the key drivers of digital transition in addition to modernisation of the city's services, increase internal efficiency and transparency, facilitating the access to information, as well as expanding the coverage of existing services. Enhancing the capacities of cities to deliver digital services and tackling these challenges requires policy responses at all levels and by all actors, relying on the partnership between cities, citizens and business actors. New adaptable strategies and action plans are needed to carry out successfully these cooperation-based innovative, technology led developmental programs in urban areas.

On the basis of the emerging new tasks and challenges a bundle of definitions can be found in the scientific literature which try to catch the real characteristics of the future cities. One of them is smart city concept which is numerously approached and which can be traced back to the concept of digital cities.[6] The concept of smart city also embraces the wired, virtual, intelligent, information, digital, knowledge, learning, green, sustainable city and smart community.[7] Not only the information and communications technology should be considered but also the human / social and environmental dimensions. The city management system can profit from the integration of new technologies, a widespread collection, integration, analyzation. The optimization of date can improve the quality and velocity of decision making processes.[8]

According to the Hungarian governmental regulation [9], the smart city is such a settlement which prepares its integrated developmental strategy through the smart city methodology. The smart city methodology "improves its natural and built environment, digital infrastructure, quality of municipal services and economic efficiency through modern and innovative information technology applications in a sustainable manner, increasingly involving its population.

Recently, the Hungarian cities have the opportunity to execute such development programs which can improve the quality of life of citizens and make up in the last decades missed infrastructural investments. New forms and tools of governance, emphasizing collaboration and cooperation, can encourage these progresses. Its finance is partly covered by the cohesion funds of the European Union and by the Hungarian government. The Modern Cities Program was launched in 2015 representing "the bottom to the top" approach. It involves 23 cities with county rights. The acting Hungarian prime minister personally visited all of cities between March 2015 and May 2017. Its ex-ante calculated costs run into approximately 3400 billion HUF. The developments involve infrastructural, cultural, educational and scientific institutional and urban rehabilitative projects.[10] In the framework of the Digital Welfare Program, focusing specially on digitalization, several smart city pilot developments will be financed in a few chosen Hungarian cities (including city of Tata) providing best practises for further investments in other urban areas. This study argues that there is a strong need for efficient institutional design and capacity-building at the level of cities and the emerging functional urban areas. However, the results are indicative and insights are used as a

basis for discussion. It is clearly shown by the revival of research related to the complex measurement of digital capacities and capabilities.

The paper lays on three pillars: the first pillar reveals the international evaluation practices of smart cities, the second contextualizes the situation of Hungarian digital and smart city developments. The third pillar is the analysis of the selected case study of Tata. The projects of the developmental programs are still in the beginning phase therefore we are lack of concrete data however we are in a continuous follow up and eager to collect information from the relevant stakeholders and later formulate useful conclusions.

2. Smart cities in the international evaluation practices

A well-functioning public administration has to be able to apply effective strategies which rely on evidence, data and must pass the steps of preparation, implementation, monitoring, reporting and evaluation. [11] An increasing number of literature can be observed about the evaluation practices in smart (and intelligent) city developments. [5, 12, 13] Even one of the 17 goals of the United Nations 2030 Agenda for Development Goal is considered with urbanization. Goal 11 is to " make cities and human settlements inclusive, safe, resilient and sustainable. [14] The follow-up indicators reveals the problem of "poor availability of standardized, open and comparable data, the lack of strong data collection institutions at the city scale…and the context specific application of the goal by diverse actors in widely different cities". [15]

Horváthné Barsi [16] categorizes the smart city evaluations into three main categories:

1. usage of indicators – can be used in the preparation of investment decisions, formulation of strategic priorities and development programs.

2. clustering and self-organizing map – useful in the visualisation of complex information

3. models and modelling – processing simulation and gaining predictions

As Schönert [17] notes a ranking system can cause a huge publicity and can draw the attention to specific issue. It can also improve the debate process, can provide the possibility to reveal the studying effect. However, several disadvantages can be observed: the debate can be just about the place in the ranking, as a consequence of revealing the place of the city in the ranking can cause the re-discussion of the long-term strategies, it can even strengthen the spatial clichés. Not only the ranking's objective and dissemination, but also its methodology must be taken into consideration. A well-designed, specific ranking is applicable.[18]

The ranking of the European medium-sized smart citizens is identified according to six dimensions: smart economy, smart people, smart governance, smart mobility, smart environment and smart living.[19]

The holistic evaluation of 44 Chinese cities was executed in a framework of 5 dimensions (smart infrastructure, smart governance, smart economy, smart people and smart environment) consisting of 18 indicators selected by semi-structured interviews (5 researchers and 5 professionals) and weighted by the Entropy method. By the performance evaluation was applied the Technique for Order Preference by Similarity to Ideal Solution.[20]

The holistic and integrated CITY keys performance measurement framework, developed in order to help cities in project and city level assessments, contains 5 main categories, people, planet, prosperity, governance and propagation. It contains output and impact indicator as well. [21] Lombardi [22] proposes a model based on the modified form of the triple helix model (introducing civil society as a plus unifying factor) for evaluating the smart city performance. The interrelations between the components of smart city (smart governance, smart economy, smart living, smart environment, smart human capital) is analysed by using analytic network process.

Comparing the sustainability and smart city indicator frameworks reveals that the majority of indicators can be connected to the economic and social sustainability meanwhile in the sustainability frameworks environmental and social indicators have the majority.[23] As Shi et al. state [5] "evaluation of the city can support investors as an important guide for the cities to judge their strengths and to define their strategies for future development." Akande et at. [24] analysed the smartness and sustainability of the capital cities of the European Union. They found that most of the cities of the bottom are located in Eastern-Europe and the wealthier cities show better performance. Nevertheless, there is a legitimate claim to monitor and evaluate not only the smart city performance [25], but also the results and impacts of these developmental program.

City evaluation approaches are mainly project focused with city-level evaluations. [26] The British Standards Institutions Smart City Framework was suspended when the Organization for Standardization (ISO) have published the 37106:2018 "Guidance on establishing smart city operating models for sustainable communities". It provides a guidance for decision-makers about the main steps of formulation an "open, collaborative, citizen-centric and digitally-enabled operating model" for city governance. The ISO: 37122 "Sustainable development in communities – indicators for Smart Cities" is under preparation.

According to another approach of the European Commission, focusing particularly on the creative cities, a framework is developed with three major facets (cultural vibrancy, creative economy, enabling environment) consisting of 29 indicators. [27]

The multidimensional performance model of current creative cities applying a holistic approach takes into consideration the network influence next to intelligence and sustainability in the city evaluation process.[28]

The potential smartness of Polish cities is analysed through 6 dimensions (smart transport and mobility, smart environment, smart living, smart governance, smart economy). Recently the investments are mainly connected to intelligent transport systems. [29] The implementation of smart city developments were evaluated based on a questionnaire in 57 Polish cities.[30]

To sum up, the experiences and practices of measuring national-level governmental performances show that the nature and quality of digital capacities becomes understandable and measurable when broken down into different dimensions. The one-dimensional measurement is suitable for examining the impact of a specific factor in relation to a similarly specific dimension of digital capacity, for example, what effect the degree of providing new services has on local economic growth. The disadvantage of the one-dimensional measurements is that they are inherently unable to give the "big picture" of digital capacities as a whole.

On the contrary, the multi-dimensional approach is not only "tailor-made", meaning that the measurements integrated into the nature of the given dimension provide suitable evidence, it also

has the advantage of allowing the dimensions to be broken down into further sub-areas in order to examine the relationship between the phenomenon that one wishes to measure and the appropriate indicator.

There is not even a common definition for the concept of smart city, smart intervention and what smartness does really mean. Through our research we hold to the definition of the Hungarian Government. As a consequence, several indexes are commonly used and cited by cities according to their common interest. These methods of evaluations provide the basis of comparative analysis. One of the problems with the previously cited systems is that they concern with large cities, at least from the average Hungarian city point of view. A framework connecting the national level with city level could proceed better informed policy making processes.

3. Smart city programs in Hungary

Hungary's performance is lagging behind the European Union in aspect of digitalisation according to the ranking of the overall composite Digital Economy and Society Index[3] (DESI). As a consequence of this and as a response to trends of digitalization in our world and challenges of the recent economic growth, the Hungarian Government decided to set up the Digital Welfare Program 1.0. As a part of achieving its objectives, a new, affordable, so called "basic package", internet subscription was introduced for the citizens and the rate of VAT on internet services was also significantly decreased in 2018. It was also stated that there must be built at least one free WIFI access point in the centre of every municipality and a public data cadastre must be formulated, filled with data. The aim of the Hungarian 5G Coalition (formed on 19 June 2017) is to gain a central leading position in the ongoing and future research. Hungary wants to become the centre of research and applications of 5G. The industrial application of 5G has a high level of reliability and can improve the efficiency and profitability of digital investments. It can promote the spread of IoT solutions and other sensor-based practices. Hungary (both the citizen and the business sphere) has to be prepared for the challenges of digitalization. The foundation of Artificial Intelligence Coalition is another core point of the ongoing developmental program.

The formulation of digital wellbeing lays on following three pillars in the DWP: digital competences, digital economy and digital state. Their roots originate from the digital infrastructure. The emerging challenges can be handled by the coalitions of various actors such the corporations, the local and central government, the non-governmental organizations, research and higher educational institutes etc.) An effective digital state should be able to efficiently implement the new results of the scientific world e.g. the use of network research in case of the healthcare system. Next to the development of e-governmental interfaces in the state-state, state-citizen relations, the improvement of robotization (partly through the techniques (e.g. deep learning) of artificial intelligence. One of key factors of the central and local governance to be able to handle successfully the social – economic – environmental challenges of the future is the implementation of high-tech digital infrastructure. The well-educated and capable public servants and the digitally- trained also contribute to the adaption of digital services. The codification of terms connected to digitalisation

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[3] Hungary was placed 21th in 2015, and 23rd in 2018 in the ranking. Its performance was significantly under the average of the European Union. The DESI covers 5 dimension of digitalization: connectivity, human capital, use of internet, integration of digital technology and digital public services The detailed data are available at: https://digital-agenda-data.eu/charts/desi-composite#chart={"indicator":"DESI_SLIDERS","breakdown":{"DESI_1_CONN":5,"DESI_2_HC":5,"DESI_3_UI":3,"DESI_4_IDT":4,"DESI_5_DPS":3},"unit-measure":"pc_DESI_SLIDERS","time-period": "2018"}

and smart cities are carried out parallelly with the formulation of developmental strategies and programs.

One of the first study was carried out in 2011 to analyse the preparedness of cities to these digital challenges. The assessment of 9 Hungarian cities (including Debrecen, Győr, Kőszeg, Miskolc, Pécs, Szeged, Székesfehérvár, Tatabánya and Veszprém) [31] contains 79 indicators in 7 dimensions (people, business sphere, transportation, urban services, energy, water and communication). The recent problems of the Hungarian cities can be handled not only with infrastructural investments but also with the application of information and communication techniques. The integrated whole of government program, the Digital Welfare Program (DWP) 2.0 [32] was launched in order to continue and expand the Digital Welfare Program 1.0 horizontally cover the measures of digitalization in Hungary. The smart city developments appear in it as a horizontal theme.

As a pre-condition of accessing the European research, development and innovation financial resources, the Hungarian Government accepted the Hungarian Smart Specialisation Strategy S3 in 2014 in connection with Europe 2020 strategy, which promotes smart, sustainable and inclusive growth. [33] The scientific idea of smart specialisation was discovered and used by decision-makers in practice within in a relatively short time as a response to the negative effects of the financial crises.[34]

4. Strategy development and capacity-building in flux: a case of the Hungarian town Tata

In developing a digital strategy, it is crucial to clarify what digital city means in a concrete case? Another important issue is what the citizens want to achieve? On the contrary, the city leadership and management should explore how to map and involve stakeholders?

A Hungarian town Tata (23.000 inhabitants) is one of the cities chosen to implement smart city pilot projects in Hungary financially supported by the Digital Welfare Program in order to be able to construct their own smart city development vision. The town seeks to play a role of a "strategic enabler" in order to develop a new business model between the public and private actor. The solutions to successful digitalisation are delivered at different levels and require multi-level governance arrangements as well as effective collaborations between the public and private sectors. As a result, ICT as an enabling technology will provide access for everyone.

Similarly to many cities, Tata is currently at the stage of designing and planning their visions and strategies. In doing so, direct participation, engagement and collaboration between public, private and civil society stakeholders have a key importance for the creation of "collaborative digital ecosystem". It also includes the need for building regional and international networks, which is dependent to a great extent on establishing common communication strategies and new narratives as an important instrument of city promotion. As a first step, Tata has been a member of the Alliance of Pannon Cities, which wants to increase the integration (including regional development) between the participants and other stakeholders.

In the process of testing and demonstrating innovative solutions there is a strong need to link digitalisation to other policy sectors of the local economy which means mainly tourism, transport and logistics in the case of Tata. As one of the beginning steps on the road of becoming a

sustainable and smart city, Tata has already implemented several projects (e.g. public lighting, intermodal public transport terminal) increasing energy and public transportation efficiency.

In order to establish a proper professional supporting environment, an internationally accepted urban and regional developmental professional centre is going to be established. Tata, XVIIth District of Budapest, Moholy-Nagy University of Art and Design Budapest and Edutus University formed a cooperation for the better local implementation of smart city projects. As a new collaborative partner, the National University of Public Service organises courses about smart cities for public servants working in Hungarian municipalities and in the neighbouring countries. It provides the possibility to improve skills in the field of software, technologies, social media which is inevitable to be able to accomplish the best smart city projects improving the wellbeing of citizens.

The city is committed to spread the municipal e-governmental services, Tata joined to the ASP[4] which is a centrally developed system providing e-services to the joined cities and villages. Tata is joining among others to the system of treatment of documents, inheritance system, municipal tax system, industrial and commercial system, and the immovable property cadastre and the electronic administration portal including electronically filling forms.

The examination of the development of the strategy will be followed by personal interviews at the formulating professional centre of smart cities arising from the Civitas Sapiens Workshop.

Even the digital capacities of humans should be improved in Hungary, including Tata. As a response to this challenge, two digital points are functioning in the city with the aim of improving the basic digital skills of the citizens. There is not a common evaluation framework focusing on the local /urban and national performances. A common system is developed for evaluation and follow-up the national performances in Hungary through the Good State and Governance Report [35] however there is a lack of its deep regional and urban ties. The previously mentioned indicator system can function as lightening towers and their concrete building stones could be the projects with their project-level monitoring and reporting tools and finally it would be wishful to build up an intermediate body, functioning as a place-based planning institution (in terms of North [36]) as the construction plans.

The importance of involving citizen in fostering citizen-centric services are out of question. Their concrete forms can evolve within the spread of smart governance (which term is still also a subject of a scientific dialogue.) By the continuous follow of the improvements of Tata we hope that we are going to be able to describe a good Hungarian practise, serving as a good and efficient example for other Hungarian cities. The smart city development are resource intensives therefore an efficient institution (in terms of North [36]) with feedback mechanisms is out of question. The new databases emerging form the implemented developments provide new possibilities for the municipal leaders which is worth of examining their effects and applications.

5. Conclusions

In a broader perspective there is a growing importance of city-level digital strategy and leadership in delivering user-centric eGovernment to improve the delivery of services through engagement in

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[4] Application Service Provider (ASP) is a central framework which provides central hardware and software infrastructure to municipalities.

networks and partnerships. In order to establish a "digital ecosystem" there is a need to create a digital strategy which should be relied on a strong leadership with proper institutional and administrative capacities. Designating a digital leader to oversee the implementation of the digital strategy is also a critical success factor. Finally, current experiences indicate that towns and smaller cities should participate more actively in European and international networks to promote peer learning and the development of digital skills within their service teams.

Against the background of the above, digital capacity is a multi-level, multi-dimension integrated concept that means more than the sum of its parts. This is due to the interactive effect that results if the quantifiable ratios change between the given dimensions of capacity. In other words, a higher value found for some dimension does not necessarily lead to an improvement in the aggregate result.

Consequently, the value of the net result of the aggregate city capacity can decline despite the fact that the value of one or another dimension shows significant improvement. This entails a major potential pitfall that can only be avoided with measurements that take into account the various dimensions and unique city-specific characteristics as well as the and quality and quantity of the data collection.

It can be seen that the academic sphere has started to put more emphasize on the analyses of the different forms of smart city evaluations. However, the observer can face with the fact that there is not a homogenous definition for the concept of smart city. Notwithstanding, its developments are commonly accepted and supported. Nevertheless, being aware of the importance of accountability and transparency, more analyses are necessary for the monitoring, reporting and evaluating processes of the developments both at project and regional/city level. Further techniques need to be accomplished in the research.

In order to localise services, a multi-level approach needed which at the same time requires the harmonising of public and user goals, existing toolkits, data flows, common standards. The initiatives and efforts of towns and small cities - as we have seen in the case of Tata - will fulfil the role of building blocks for bridging the gap between different approaches, cultures and languages in the near future.

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