



Are UN SDGs useful for capturing multiple values of smart city?

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ABSTRACT

The concept of smart city has been studied in a variety of forms and contexts. While previous studies highlight the extensive use of indicators of smartness, another stream of literature advocates the role of citizens in city transformations. In this viewpoint, we call for an extension of this dichotomous understanding and highlight the cross-sectoral collaborative nature of smart city; we also draw attention to the potential of smart city to generate multiple values for a range of stakeholders. We reflect on the Sustainable Development Goals (SDGs) agenda and Key Performance Indicators (KPIs) for sustainable and smart cities developed by the United Nations (UN) as a possible measurement tool for these multiple values. Based on an analysis of the literature on smart cities and an overview of the UN documents, including a short illustration of the case of Moscow (Russia), we articulate concerns regarding the ability of these global tools to grasp the complex nature of smart city, as well as the contextual specifics of each case locally.

1. Introduction

Currently, the global trend of urbanization has considerable impact on economic, social and environmental conditions worldwide. Confronted with arising urban challenges, governments at many levels are attempting to find solutions to deal with the changing contexts in which they perform (Meijer et al., 2016). Being ‘smart’ for a city implies different characteristics, e.g., technological, inter-connected, sustainable, comfortable, safe. This variety of meanings assigned to ‘urban smartness’ produces diverse perspectives and, ultimately, results in fuzziness in understanding. Current debates in the literature focus on whether smart city should be studied through the lens of technology integration, through the role of citizens involved in urban transformations or as a holistic framework through which technological and human components are integrated. We propose to go beyond dichotomous understanding of smart city (Mora & Deakin, 2019), i.e., whether the central role in smart city development belongs to technology or people, and emphasize the need to involve multiple actors, e.g., government, business, civil society (Manville et al., 2014; Meijer & Bolívar, 2016), as an underexplored area. This short conceptual paper draws attention to the existing gaps related to the collaborative nature of smart city, measuring not only public value for citizens but multiple values

generated for several actors. We illustrate the SDGs agenda and the set of United Nation (UN) KPIs for sustainable and smart cities as a possible tool to capture these multiple values. Based on the analysis of the literature on smart cities, an overview of the UN documents, and a short illustration of the case of Moscow (Russia), we articulate concerns regarding the ability of these global tools to grasp the complex nature of smart city, as well as the contextual specifics of each case locally. We wonder whether this set of KPIs presents a comprehensive tool to measure urban smartness and sustainability, or if it is a tendency to package smart city discourses into the ‘one-size fits all’ (Kitchin, 2015) (Table 1).

2. Ambiguous concept of smart city

The concept of smart city has been investigated by scholars in a variety of disciplines through a wide range of approaches. While one part of the smart city literature highlights the importance of Information and communications technologies (ICTs) and their incorporation in a city’s complex digital system to collect data, i.e., tangible assets, another body of literature puts more emphasis on the role of human and organizational capital, i.e., intangible assets (Neirotti et al., 2014). Continuous debates have led to different interpretations of smart city, in

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Table 1
Brief case-illustration of Moscow (based on Smiciklas & Imran, 2018).

Elements	Moscow case
Governance	Centralized approach
Legitimization of smart city	Smart Moscow 2030 strategy
Main actors	IT Department and its sub-division Smart City Lab
Involvement of multiple actors	Developing smart city vision as a result of organized discussions of experts, business operators, local executives and engagement of citizens through the online platform.
The role of the UN KPIs	Support strategy implementation through benchmarking the use of ICTs and monitoring smart city processes and operations
Phases of the integration of the UN KPIs	Phase 1: Data collection from diverse city government departments and related authorities following the UN guidance on the use of KPIs (the IT Department's Smart City Lab as a coordinator). Phase 2: Verification of KPIs by the independent auditor. Phase 3: Preparation of case study aiming at reviewing suitability of KPIs for a city and estimating the current status of Moscow as a smart city, revealing weaknesses and areas for improvement.
Results	Excellent digitalization and inferior environmental component
Success factors	Governmental support and strong cross-sectoral collaboration

accordance with the technology-led vision, human-centric or holistic approaches (Mora & Deakin, 2019). While the technological dimension of smart city remains prevalent in the literature for understanding the concept (Meijer & Bolívar, 2016), and puts technologies in the first place in creating smart city projects, the human or citizen-centric approach draws more attention to the citizens (Paskaleva, 2011).

Despite differences in approaches, the common ground implies the presence of cross-sectoral collaboration — organizational arrangements at the crossroad of public, social and private areas of economic activity that bring together governmental, business, and non-profit domains as a key element of smart city governance (Meijer & Bolívar, 2016; Viale Pereira et al., 2017). Smart city projects presuppose the involvement of a range of participants; however, their roles and the degree and nature of participation can vary. Collaboration has been recognized as essential for smart city implementation (Manville et al., 2014), but it remains unclear how it should be organized taking into account the differences between stakeholders. The introduction of smart city initiatives implicitly means that the interests, needs, and values of the involved actors are taken into account.

3. Multiple values of smart city

The worldwide trend shows a shift in governments to being more open, accountable and responsive to citizens (Johnson et al., 2020). Considering the impact of the digital revolution on cities, especially in the realm of smart cities, organizing a complex interaction can bring both benefits and risks that can make collaboration difficult and ineffective (Page et al., 2015). Critical scholars point out the possible distortions in urban power that can be concentrated in the elites and cause the adoption of a profit-oriented approach, due to the greater involvement of private actors. It becomes important to accentuate the quality of the collaborative process, which is indicated by public value produced as a result (Page et al., 2015).

In the smart city context, although the key topics cover citizen involvement (Johnson et al., 2020), very limited attention has been dedicated to the public value produced as a result of urban transformations towards smartness (Meijer et al., 2016; Rodríguez Bolívar, 2018). Public value refers primarily to citizens, while smart city is based on intersectoral collaboration of a range of actors, e.g., local government, associations, non-profit organizations, communities and citizens, and private organizations. The question is how to capture these multiple

values – the outcome of urban smartness.

4. Can SDGs capture the multiple values of smart cities?

Modern cities today have become more calculable than before, as economic actors and multidimensional systems. Governments use performance measurement systems as tools to direct or reorient the development of smart cities, in order to reach desired goals, attempting to connect responsibility with calculation (Argento et al., 2020). Although, the area of realization of smart city initiatives lay at the local level, their dissemination is largely shaped by institutions that operate on a wider scale, including regional government, national states and supra-national states that perceive it as a path towards socio-economic development which facilitates cities to be more competitive and sustainable (Kitchin, 2015).

Specifically, in 2015, in the framework of the globally accepted agenda of Sustainable Development Goals (SDGs), the General Assembly of the United Nations dedicated one of them to urban development. The so-called Urban Sustainable Development Goal (USDG) aims at making 'cities and human settlements inclusive, safe, resilient and sustainable' (Klopp & Petretta, 2017). The set of SDGs was proposed as a global plan for the whole planet, which indicates directions for development and actions until 2030, covering 17 SDGs and 169 targets, in total (Rosati & Faria, 2019). The SDG 11 "Sustainable Cities and Communities" was presented as a new tool that allows access to resources for urban improvement within the goal and its 11 targets, which should not overwhelm already existing measurement systems in a city but, rather, complement them (Klopp & Petretta, 2017).

The goal and its targets were developed at the supranational level, while their actual use and implementation is supposed to take place in cities. Complex relationships between local and higher levels of governments, as well as inter-agency coordination among layers, make the whole process challenging for local adoption (Klopp & Petretta, 2017). Specifically for USDGs' integration at the local scale, the UN initiative on United for Smart Sustainable Cities (U4SSC) – provided a more precise tool that aims at evaluating cities in their development towards smartness, sustainability and SDGs (Smiciklas et al., 2017). Consisting of 91 indicators in total, KPIs allow an evaluation of three performance dimensions (economy, environment, society and culture) and reported all together that provides a holistic picture of the city's performance. While there is an observed growing interest in and active promotion of this tool, we call for more cautious optimism, raising the question of whether these KPIs can capture the complex collaborative nature of smart city and the multiple values generated as an outcome? And if so, how can this global standard entail the specifics of the local context?

5. Applying the UN KPIs in practice

The assembly of KPIs has been applied as a package of indicators in more than 100 cities worldwide. While common approach for sampling in smart city rankings mainly considers big cities (Giffinger et al., 2010), among selected territories there have been large metropolitan cities as well as cities of medium and small size. Indifferent to geographical location, number of population and territorial specificity, each city's path towards sustainability, smartness and SDGs was examined through the standardized measurement.

The case of Moscow can serve as an example of applying the UN SDG tool. Being established in 2018, the partnership with ITU (the United Nations specialized agency for information and communication technologies) (ICT) aimed to assist local government in measuring the city's progress towards Smart Moscow 2030 strategy and assessing the compliance with international KPIs. Previous experience of Moscow was highlighted by the UN experts and, thus, characterized the city as a fertile ground for testing the set of KPIs (Smiciklas & Imran, 2018).

The local government centralized the city's technical and digital development within one department, the Department of Information

Technology (IT) and in 2016 created Smart City Lab as an internal subdivision, which set a collaboration with partners from academia, public and private sectors. Initially all assembly of indicators was divided into basic and advanced types, so local authorities of Moscow reported on most advanced indicators, thereby illustrating success of the UN KPIs project after the first year of implementation. Later, Smart City Lab experts not only provided a feedback, but also proposed to include additional KPIs in the existing standards. The city of Moscow showed high performance in KPI sub-dimensions related to the ICTs demonstrated weakness in the environmental aspects. Importantly, strategic vision of Moscow was fervently supported by politicians at all levels which was indicated as a key success factor in smart and sustainable development. The prominent role was assigned to public and private partnerships in growing a number and efficacy of the ICT-solutions, so the city government maintained the interest to actively promote this cross-sectoral collaboration for further benefits.

Moscow became one of the pioneers in implementing the SDGs KPIs, hence, there was revealed a room for improvements afterwards. While for a city it was a way to refine the existing strategic vision, the UN used this experience to expose and address shortcomings for the future use. Moscow Smart City Lab suggested to add three additional KPIs to the current set, thereby enhancing the city profile obtained as a result of reporting the indicators. Detailed case study allowed experts to grasp the specificity in approach the local government undertook to develop and integrate strategic vision of smart city, its governance features, coordination process and success factors; whether these elements can be captured on a surface level where the indicators operate? And how the set of KPIs is able to encapsulate complex relationship which local government built with other actors, including the intricate centralized system of coordination?

6. Conclusions

The smart city concept remains complex and ambiguous in nature; thus, current literature demonstrates a variety of approaches in developing initiatives and actual projects in transforming cities into smart cities. Nevertheless, the core common element in existing perspectives is the collaboration of different actors. While public value was extensively studied in the public management literature, this area remains under-explored in the context of smart city. In this regard, considering the complex collaborative nature, smart city should have the potential not only to generate public value for citizens but also to produce multiple values for a range of actors. U4SSC provided a tool that aims to evaluate cities in term of smartness, sustainability and SDGs. And while many cities across different continents are actively applying these standards, we shed light on the issues that might be overlooked in this large-scale implementation. By presenting the experience of Moscow City in applying the UN KPIs based on the report by ITU, we highlighted the components which reflect the internal processes in developing smart city concept and contextual features of its implementation, thereby questioning the UN KPIs ability to capture the collaborative nature of smart city and divergence among cities, given universality of standardized indicators.

Moscow demonstrated advanced stage of development, however there was underlined a need for further improvement of the set of indicators and difficulties in the process of integration (Smiciklas & Imran, 2018). The detailed deep analysis enabled experts to encapsulate nuances in undertaking smart city initiative, however we raise doubts regarding the capability of KPIs framework to capture them due to operating on a more general surface level.

We share the view that smart city research is still at a relatively early stage, in terms of its conceptual development and empirical understanding. This short viewpoint paper contributes to extending in-depth

understanding of the complex nature of smart city and strengthening the link with the literature on public-private collaboration, considering urban smartness as a source for generating multiple values. We encourage both academics and practitioners towards more critical examination of the UN KPIs in applying them to the specific local context. We call for taking more careful look at this set of indicators perceiving as comprehensive tools from the international perspective.

Declaration of competing interest

We declare no conflicts of interest.

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References

- Argento, D., Grossi, G., Jääskeläinen, A., Servalli, S., & Suomala, P. (2020). Governmentality and performance for the smart city? *Accounting, Auditing and Accountability Journal*, 33(1), 204–232.
- Giffinger, R., Haindlmaier, G., & Kramar, H. (2010). The role of rankings in growing city competition. *Urban Research and Practice*, 3(3), 299–312.
- Johnson, P. A., Acedo, A., & Robinson, P. J. (2020). Canadian smart cities: Are we wiring new citizen-local government interactions? *Canadian Geographer*, 64(3), 402–415.
- Kitchin, R. (2015). Making sense of smart cities: Addressing present shortcomings. *Cambridge Journal of Regions, Economy and Society*, 8(1), 131–136.
- Klopp, J. M., & Petretta, D. L. (2017). The urban sustainable development goal: Indicators, complexity and the politics of measuring cities. *Cities*, 63, 92–97.
- Manville, C., Cochrane, G., Cave, J., Millard, J., Pederson, J. K., Thaarup, R. K., ... Kotterink, B. (2014). Mapping smart cities in the EU. Retrieved from http://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOL-ITRE_ET%282014%29507480_EN.pdf.
- Meijer, A., & Bolívar, M. P. R. (2016). Governing the smart city: A review of the literature on smart urban governance. *International Review of Administrative Sciences*, 82(2), 392–408.
- Meijer, A. J., Gil-Garcia, J. R., & Bolívar, M. P. R. (2016). Smart city research: Contextual conditions, governance models, and public value assessment. *Social Science Computer Review*, 34(6), 647–656.
- Mora, L., & Deakin, M. (2019). *Untangling smart cities: From utopian dreams to innovation systems for a technology-enabled urban sustainability* (1st ed.). Elsevier.
- Neirotti, P., De Marco, A., Cagliano, A. C., Mangano, G., & Scorrano, F. (2014). Current trends in smart city initiatives: Some stylised facts. *Cities*, 38, 25–36.
- Page, S. B., Stone, M. M., Bryson, J. M., & Crosby, B. C. (2015). Public value creation by cross-sector collaborations: A framework and challenges of assessment. *Public Administration*, 93(3), 715–732.
- Paskaleva, K. A. (2011). The smart city: A nexus for open innovation? *Intelligent Buildings International*, 3(3), 153–171.
- Rodríguez Bolívar, M. P. (2018). Governance models and outcomes to foster public value creation in smart cities. *Scienze Regionali*, 17(1), 57–80.
- Rosati, F., & Faria, L. G. D. (2019). Addressing the SDGs in sustainability reports: The relationship with institutional factors. *Journal of Cleaner Production*, 215, 1312–1326.
- Smiciklas, J., & Imran, S. (2018). Implementing ITU-T international standards to shape smart sustainable cities: The case of Moscow. Retrieved from [http://www.itu.int/en/ITU-T/ssc/AboutU4SSCinitiativehttps://www.itu.int/en/ITU-T/ssc/united/](http://www.itu.int/en/ITU-T/ssc/AboutU4SSCinitiativehttps://www.itu.int/en/ITU-T/ssc/united/en/ITU-T/ssc/AboutU4SSCinitiativehttps://www.itu.int/en/ITU-T/ssc/united/).
- Smiciklas, J., Prokop, G., Stano, P., & Sang, Z. (2017). Collection methodology for key performance indicators for smart sustainable cities. Retrieved from <https://www.unecce.org/fileadmin/DAM/hlm/documents/Publications/U4SSC-CollectionMethodologyforKPIfoSSC-2017.pdf>.
- Viale Pereira, G., Cunha, M. A., Lampoltshammer, T. J., Parycek, P., & Testa, M. G. (2017). Increasing collaboration and participation in smart city governance: A cross-case analysis of smart city initiatives. *Information Technology for Development*, 23(3), 526–553.
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