Smart City Development: Positioning Citizens in the Service Life Cycle (Citizens as Primary Customer)

Priyanka Singh[1][a], Fiona Lynch[2][b] and Markus Helfert[1][c]

[1]*School of Business, Maynooth University, Maynooth, Co. Kildare, Ireland*
[2]*School of Science & Computing, Waterford Institute of Technology (WIT), Waterford, Ireland*

Keywords: Smart City, Citizens, Service Lifecycle.

Abstract: There has been an enormous discussion around involving the citizens in smart city design and development. However most of the papers discussed citizen's involvement and their feedback at the initial level of the service design where they intend to support citizen's ideas with the help of methodologies, tools, templates, online platforms such e-participation, m-gov etc. Nevertheless, there are very few articles which discuss the impact of citizen's feedback after the deployment of the services. With this systematic literature review we highlight that for the successful smart city development, there is a requirement to obtain citizen's feedback not only during the initial stages of the service design and planning but also after the deployment of the services in order to recognize if their feedback really had any implication in the actual design process; and if the services are working as they were planned initially with the feedback of the citizens during the initial phases of the service design process.

1 INTRODUCTION

A smart sustainable city has been considered as an innovative city which utilizes information and communication technologies (ICTs) along with other resources in order to improve quality of life, proficiency of services and urban operations, while making sure that the present and future generation requirements are met effectively (Mohanty, Choppali, & Kougianos, 2016). Hollands, (2008) emphasise that to empower environmental, social, economic, and cultural development, smart cities should be beyond the practise of ICT. Existing literature seems to be biased towards solving the technical problems and ignoring the existence of non-technical ones which involve management, policies, citizens and creating a void in the field (Habibzadeh et al., 2019; Nam & Pardo, 2011). One of the non-technical problems is the negligence of citizen's requirement, at the price of strategic and technological development which has been considered as a critical element for developing a successful smart city (Heaton & Parlikad, 2019). Customer is commonly believed to be an essential component of successful smart services, however it has not gained enough attention in research of Information System literature (Dreyer et al., 2019). In order to bring any change in an organization for developing smart systems, it must be deliberated from a socio-technical viewpoint (Bednar & Welch, 2019). Therefore, when organizations undertake smart initiatives, a socio-technical perspective is desired in order to address new challenges for service providers and enterprises (Ekman, Röndell, & Yang, 2019; Bednar & Welch, 2019). Conversely, the impact of social factor has not been investigated enough in smart city projects, for instance in Northern Asia, Songdo, has been criticized for no or minimal public participation (Bouzguenda, Alalouch and Fava, 2019). Therefore, there is a requirement to consider urban issues beyond technological innovation (Yigitcanlar, Foth, Sabatini-marques, & Ioppolo, 2019). This study has selected ITIL framework for analysing the involvement of citizens in smart city development. Its phases are represented as strategy, design, transition, operational, and improvement which are applicable in the

[a] https://orcid.org/0000-0001-6182-6111
[b] https://orcid.org/0000-0001-6546-6408
[c] https://orcid.org/0000-0002-7558-5926

perspective of smart city development as well. Existing literature predominantly discuss the contribution of citizens in smart city services at initial level of the smart city projects, however this study argues that discussing their involvement only at the initial stages won't make the services successful until we have paid equal attention to all the phases of the services from the citizen's viewpoint. This research highlights that most of the studies have considered citizens during the design and planning phases of the services, whereas this study emphasises that the consideration of the citizens in smart city design and development should be beyond that and require approaches which can address the challenges from citizen's perceptive by considering their feedback after the deployment as well for providing effective services to the citizens. This remaining part of the paper is structured as follows: In section 2 we describe the methodology applied to perform the systematic literature review, Sect. 3 provides the detail of literature review by positioning the citizen's contribution in the service lifecycle of the ITIL framework. In Sect. 4, the consideration of citizens as primary customer has been discussed. Finally, Sect. 5 sum up the contributions of the paper and forthcoming work of the research.

2 LITERATURE REVIEW METHODOLOGY

This study has conducted a systematic literature review in order to investigate how can citizens contribute in design of services in smart cities? This study has adopted a methodology comprising a three-stage procedure as discussed by Yigitcanlar et al., (2019, p.352). First stage is: Planning stage which defines objectives and review procedure for a systematic review. Second stage is: Review stage comprising descriptive and organisational analysis. The third stage is: Reporting and dissemination stage containing analysis and synthesis of the results based on the established objectives. The research aim was to investigate the contribution of citizens in the design of services and to explore the state of art with the aim of identifying the studies which tried to provide methods and approaches for achieving this aim. The inclusion conditions were set as academic journal articles accessible online in full-text that are appropriate to address the research question. The search was conducted using the Scopus and Springerlink databases. Initially, total 145 articles were received. After assessing the abstracts against

the research aim, this number was taken down to 24 articles.

3 LITERATURE REVIEW

This section emphasises the importance of citizen's participation in design and development of smart city services based on the various phases of ITIL framework that has been adopted from (Dreyer et al., 2019). The Information Technology Infrastructure Library (ITIL) framework has been selected for the analysis as it has been recognised adequate for services which are quality based and use information technology (Dreyer et al., 2019). Also, the ITIL phases help in progressing from concept to improvement during the service life cycle phase. Thus, the focus of this research is to understand how the feedback from citizens can further result in the improvement of the services by analysing their role in the different phases of the service life cycle. Therefore, this framework is considered adequate to investigate citizen's involvement from the perspective of adopted framework and to classify the existing literature among those life cycle phases. The service lifecycle consists of five phases as defined in ("ITIL: Key Concepts and Summary," 2020). In the first phase, the process objective is defined based on the requirements of the customer, a Service Strategy (SS) is established, and the essential capabilities are defined. We selected those articles which emphasise the role of citizens in the strategy of the smart city services and how they should be considered. The second phase is Service Design (SD), which uses a prebuilt strategy for designing the services. This phase considers those articles that recommend an idea of involving citizens in the design of the services. In the Service Transition (ST) phase, the distribution of the designed services is enclosed, those papers have been considered which define the platforms and technology which could be used as a way to obtain citizen's input and implementing the services accordingly. The fourth phase is Service Operation (SO) phase containing failure management, maintenance, and the execution of processes and task. Those publications have been discussed which highlight how citizens can support in improving the services by proving the information on any type of service failure or maintenance related issues. The last phase of the lifecycle is Continual Service Improvement (CSI). Which is based on the learning from the successes and failures of the past which are key parameter to be considered in this phase, papers which considered citizen's inputs for further

Table 1: Positioning Citizen's Involvement in the Service Lifecycle Phases.

References	Service Lifecycle Phases				
	SS	SD	ST	SO	CSI
(Wolff et al., 2020)		x			
(Timeus, Vinaixa, & Pardo-Bosch, 2020)	x				
(Abella, Ortiz-De-Urbina-Criado, & De-Pablos-Heredero, 2019)		x			x
(Andreani et al., 2019)		x			
(Gupta, Chauhan, & Jaiswal, 2019)		x			
(Simonofski et al., 2019)	x				
(Johannes & Snoeck, 2019)	x	x	x		
(Rana et al., 2019)	x				
(Brandt et al., 2018)	x				
(Javed, Khan, & McClatchey, 2018)	x				
(Cabitza, Locoro, & Batini, 2018)			x		
(Abu-Tayeh, Neumann, & Stuermer, 2018)				x	
(Okwechime, Duncan, & Edgar, 2018)			x		
(Marrone & Hammerle, 2018)	x				
(Weerakkody et al., 2017)	x		x		
(Janssen et al., 2017)			x		
(Gagliardi et al., 2017)			X		
(Ludlow et al., 2017)	x				
(P. van Waart, Mulder, & de Bont, 2016)		x			
(Shareef et al., 2016)			x		
(Góngora & Bernal, 2015)	x				
(Ojala et al., 2015)		x			
(Solaimani, Bouwman, & Itälä, 2015)					X
(Van der Graaf & Veeckman, 2014)			x		
Number of Articles	9	7	8	1	2

continual service improvement were categorized in this phase. This classification is represented in the Table 1 and it could be observed that the most of the articles discussed the citizen's involvement in service strategy, design and transition phases. Nevertheless, it is important to understand that for designing the better quality of the services, further improvement in the services based on the feedback provided has a significance role in it which could further guide in designing better quality of the services.

3.1 Service Strategy (SS)

Simonofski et al., (2019) described five context factors as the smart city consideration, the drivers for participation, the legal requirements and the citizens' characteristics, and the degree of centralization, which influence citizen participation strategies in smart city development. For achieving people-centric smart city transformations, it should consider diverse needs of its citizens, and should be approached from a transdisciplinary perspective (Brandt et al., 2018). Though the technological components of smart cities are included enough in the literature, the importance of citizen's role has often been abandoned (Johannes & Snoeck, 2019). In this paper authors present a framework for organising and evaluating citizen's participation, where it is highlighted that the citizens can be considered in the decision based activities, and can also learn to solve technical problems and could contribute in public interest (Johannes & Snoeck, 2019). It has been pointed out by Marrone and Hammerle, (2018) that citizens are not represented well in discussions on smart cities, and it has been recommended that future research should consider citizens along with the other stakeholders of the smart cities. Therefore, we argue that citizens should be considered as primary customer of the servcies, and it should be desgined as per their requirment. There are 31 barriers for the smart cities development discussed by Rana *et al.*, (2019), and they divided them into six categories. One of the categories belongs to Social (SOC) category of barriers and in that category lack of citizen's involvement is the top ranked. Furthermore, it has been emphasised by the authors that community engagement is an important aspect for forecasting and executing smart cities projects (Rana *et al.*, 2019). Likewise, policy makers and elected officials expect that the open data accessibility through online government portals will permit public engagement in policy making (Weerakkody et al., 2017). To that end, a research has been presented by Javed, Khan and McClatchey,(2018) and an architecture has been developed in the working of a provenance system for policy process tracking. Which will benefit policy-makers in terms of providing a system that can work

in an ad-hoc and political environment of the policy-making by considering citizen's active participation and multiple stakeholders' involvement in the system implementation. Moreover, another approach has been discussed by Timeus, et al., (2020) using a business model logic to design city business models which can be applied in the planning phase of an cohesive ICT city platform in order to evaluate the value City Councils offer to the citizens. However, it has been highlighted that it can only be used by city council managers and does not comprise any other kinds of stakeholders of the smart cities. Furthermore, there is a requirement for evolving new bottom-up tools with the aim of co-producing in engaging with citizens (Ludlow et al., 2017). A major challenge for governments is to design and implement innovative strategies for collaboration and communication with citizens, through technologies in order to achieve an effective and efficient services (Góngora & Bernal, 2015).

3.2 Service Design (SD)

Despite the fact that Smart City(SC) projects legitimise and improve the citizens 'lives, their role in SC development is ambiguous, and decisions on the selection, implementation and deployment of smart city services should be made according to the actual needs of local citizens (Gupta et al., 2019). Many times, smart cities do not meet their goals if the citizens are not engaged in their design (Johannes & Snoeck, 2019). One of the main objectives for smart services is to address citizens' concerns and their need (Pourzolfaghar & Helfert, 2017). It has been suggested by the authors that we should consider citizens need as client requirement in the design process of the services. Correspondingly, citizens should not be treated as passive customers as they are crucial stakeholders that can generate valuable ideas (Johannes & Snoeck, 2019). Nevertheless, an evolving problem is that there is a lack of suitable tools which can support citizens in many parts of co-design process (Wolff et al., 2020). To this end, a typology with a set of design templates have been discussed by the authors to enable citizens in converting their ideas into technology applications which can be utilised as an ideation implements during the design process. These types of methods and tools certainly assist in obtaining citizen's ideas and their inputs for designing the services, however there is a lack of understanding how their ideas have been implemented in actual design of services and if those ideas really had any impact in improving the quality of the services. On that note, a methodology

has been designed in order to improve smart city services by recognising citizen's expectations and experiences, and utilising their feedback (Abella et al., 2019). However, it has been highlighted by the authors that methodology needs to be customized for each service. Correspondingly, for the active engagement of stakeholders in the ideation process has been discussed by Andreani *et al.*, (2019), where authors presented a threefold design research model which leads to the co-creation of proposals by sharing a common design path among public authorities, associations at different levels, private citizens, and research centres. On the similar note, a participatory approach has been discussed for prototyping future cities that holds practice-oriented design research accomplishments and aims for real-world impact (Peter van Waart, Mulder, & de Bont, 2016). However, it has been pointed that the main concerning area in creating future smart city will be scaling up of those practices and make them self-sustaining. A design based research has been discussed with the experience-driven approach utilizing playful experience (PLEX) cards to create concept ideas for smart city services which support citizen's idea generation (Ojala et al., 2015). This is another approach suggested in the literature for utilising and supporting citizen's ideas for designing the services based on user's experience.

3.3 Service Transition (ST)

Public sector organizations have started to discover ways to employ big data to provide smarter solutions for cities, and trying to install and integrate this new emerging technology big data to another fast pace and comparatively new concept smart city (Okwechime et al., 2018). The findings reveal that organizations have the capability to practise big data to rectify the problems that cities are facing. Furthermore, with open data, citizens and other stakeholders would be able to contribute in the decision making process that would enable the development of new solutions for undertaking the urban issues. Nevertheless, a noteworthy amount of the citizens are quiet not behaviourally, technologically, psychologically, and professionally ready and capable, and not even prepared, to compact with the technologically focused eGov system, which can be alleviated to some extent through launching mobile-government (mGov) systems (Shareef et al., 2016). However, it has been stressed by the authors that there is a discontinuation between prospective and real impact of data resources on public, and according to its current form, citizens are not able to use it for any

significant purpose. Data-driven innovation can impact the transformation of public sector systems and can create societal benefits including reduced pollution, less traffic jams, better energy efficiency, novel applications to improve citizen experience interacting online with government (Janssen et al., 2017). Moreover, the incorporation of ICT in a city can offer a new range of opportunities and can transform the city with the assistance of citizen's participation by utilising the capability of infrastructure and the open data (Johannes & Snoeck, 2019). Conversely, it is vital to note that the formats of the open data, presentation and contents indicates that most of the output does not consider the impending positive impact that sharing huge amounts of information would have for individual decision making, citizens' lives, and social welfare (Cabitza et al., 2018). And to overcome this limitation authors presented a methodology to analyse, excerpt and assess features of possible value from the available datasets in order to personalize suitable information services according to the profiles and preferences of citizens and taxpayers. Nonetheless, merely open data cannot offer sufficient reasons for the engagement of citizens which is crucial to establish a collaborative and open governance system, and therefore it should be elaborated appropriately, used and communicated (Gagliardi et al., 2017). On this point, authors proposed an integration of open data along with basic explanations and imagining for local government to form new and open services for communities and citizens. Similarly, if custom-made tools are provided, everyone in a society can play a significance role in the development of the smart cities where citizen's life can probably be benefited (Van der Graaf & Veeckman, 2014). In this paper, authors provided the toolkit template which offers the collaboration amongst numerous stakeholders, and enables modalities of civic engagement guided by design space and design capabilities.

3.4 Service Operation (SO)

In this phase of the framework those papers have been discussed which highlight how citizens can support in improving the services by proving the information on any type of service failure or maintenance related issues. There was only one article found which emphasized how citizens assisted in identifying the operational issue related to the infrastructure of the city by using an online application. To that end, Abu-Tayeh, et al., (2018) examined the stronger drivers of citizen reporting engagement. For which the authors observed sample of users from the mobile application

''Zurich as good as new'' in Switzerland, that enables citizens to report damages and other issues related with the city's infrastructure. The findings suggest that the self-concern and other-orientation stimulate citizens to voluntary support government, yet self-concern is a slightly stronger driver. With this example, it can be observed that how citizens could assist in further improving the services at infrastructure level, therefore the focus should also be given to capture their inputs at the operational level as well in order to rectify the issues quickly and provide solutions accordingly.

3.5 Continual Service Improvement (CSI)

Continual service improvement is an important part of the framework which focus on further improving the services based on past successes and failures. It would be vital to consider this aspect for smart cities as well in order to provide better quality of the services. In this phase, those papers have been discussed which considered citizen's/end user's inputs for continual service improvement. The Independent Living Project (ILP) and Home-based senior care (HSC) smart living services are specifically designed for elderly with the goal of improving independent living in Finland and China (Solaimani et al., 2015); and it is indicated that with the integration of an information flow amid various service providers and customers, a rich quality of user behaviour data can be generated, which can be used to further improve the services. Likewise, it has been highlighted by Sofiyabadi, Kolahi, & Valmohammadi, (2016) that the dissatisfactory services can endure having outstanding KPIs but many aggravated users. Once actions are implemented, monitoring has to be carried out to determine if the actual impact varies from the anticipated impact in the servcies from the user's perespective (Abella et al., 2019). In order to achieve it, authors offers a methodology that provides an approach to comprehend the interaction among citizens and services in order to improve the design of smart cities by conisdering their feedback for continual improvement.

4 CITIZENS AS PRIMARY CUSTOMER

Smart cities practices should be surrounded in all aspects of city governance which also needs smart

citizens (Janssen et al. 2015). It was even found that the impact of ICT on quality of citizen's life and urban development is unclear (Nicolas, Kim, & Chi, 2020). Smart sustainable city need to bridge the gaps among sustainability, social sustainability, digital public participation, and community engagement (Bouzguenda, Alalouch, & Fava, 2019). Researchers argued that rather than just being focused on technology or infrastructure, it is important for SC planners to underline more on the requirements of people as their necessities mostly influence and shape the environment (de Lange and de Waal 2013; Schaffers et al., 2011; Komninos, Pallot, & Schaffers, 2013 cited in Gupta, Chauhan, & Jaiswal, 2019). For achieving people-centric smart city transformations, it should consider diverse needs of its citizens, and should be approached from a transdisciplinary perspective (Brandt, 2018). Citizens' participation in the planning and decision process can augment the abilities and functionalities of the government for development of the sustainable cities (Kumar, Singh, Gupta, & Madaan, 2018). Correspondingly, it has been pointed out by Marrone and Hammerle, (2018) that citizens did not get enough importance in discussions of smart cities and they should be included along with the other stakeholders of the city. Therefore, this research argues that citizens should be considered as a primary customer of the servcies, and services should be desgined as per their requirment and the feedback for desiging effective services which should not be restricted to only intial stages of the smart city devlopment.

5 CONCLUSION AND FUTURE WORK

Systems should be assessed through citizens' past experience and their level of expectations, and therefore there is a requirement for a constant evaluation approach for enhancing the values from information and services in e-Government systems (Alruwaie, El-Haddadeh, & Weerakkody, 2020). However, with this study it has been highlighted that there are very limited studies which provide guidance for designing and evaluating the systems based on the citizen's feedback during the later stages of the design process in order to offer better experience to the citizens. The research aim was to identify the role of citizens in the design of services and to position their involvement in the service life cycle of the ITIL framework. The intension behind positioning them in the service life was to classify the existing literature which discussed the role of citizens in smart city development and to understand at which level the existing literature is discussing their involvement. The results highlight that the existing literature is more inclined towards the initial stages of smart city development where they intend to support the citizen's ideas in planning and design phases of the services. However, with this research it has been emphasised that for successful smart city development it is vital to consider their feedback not only during the initial stages of service design, but at the same time after the deployment of the services. Which would eventually assist in evaluating the quality and performance of the services from the citizen's viewpoint. There are platforms which support their feedback in smart city development, though it is not well understood from the literature how those feedbacks are utilised in order to make any improvement to the service. Therefore, with this study it has been underlined that the focus should also be given to validate the effectiveness of the services in terms of quality from the perspective of citizen's feedback and their experiences which could be obtained via various online or offline platforms as discussed in the literature during the later stages of the service design process. In addition to the research question elevated in this paper, our perspective research will focus on how to utilise the citizen's feedback after the deployment of the services in order to provide effective services to the citizens which meet the citizen's concerns and the quality factors.

ACKNOWLEDGEMENTS

REFERENCES

Abella, A., Ortiz-De-Urbina-Criado, M., & De-Pablos-Heredero, C. (2019). A methodology to design and redesign services in smart cities based on the citizen experience. *Information Polity*, *24*(2), 183–197. https://doi.org/10.3233/IP-180116

Abu-Tayeh, G., Neumann, O., & Stuermer, M. (2018). Exploring the Motives of Citizen Reporting Engagement: Self-Concern and Other-Orientation.

Business and Information Systems Engineering, *60*(3), 215–226. https://doi.org/10.1007/s12599-018-0530-8

Alruwaie, M., El-Haddadeh, R., & Weerakkody, V. (2020). Citizens' continuous use of eGovernment services: The role of self-efficacy, outcome expectations and satisfaction. *Government Information Quarterly*, *37*(3), 101485. https://doi.org/10.1016/j.giq.2020.101485

Andreani, S., Kalchschmidt, M., Pinto, R., & Sayegh, A. (2019). Reframing technologically enhanced urban scenarios: A design research model towards human centered smart cities. *Technological Forecasting and Social Change*, *142*(September 2018), 15–25. https://doi.org/10.1016/j.techfore.2018.09.028

Bednar, P. M., & Welch, C. (2019). Socio-Technical Perspectives on Smart Working: Creating Meaningful and Sustainable Systems. *Information Systems Frontiers*. https://doi.org/10.1007/s10796-019-09921-1

Bouzguenda, I., Alalouch, C., & Fava, N. (2019). Towards smart sustainable cities: A review of the role digital citizen participation could play in advancing social sustainability. *Sustainable Cities and Society*, *50*(November 2018), 101627. https://doi.org/10.1016/j.scs.2019.101627

Brandt, T. (2018). Interview with David Prendergast on "Mediating Between Technology and People in Smart City Transformations." *Business and Information Systems Engineering*, *60*(3), 265–267. https://doi.org/10.1007/s12599-018-0531-7

Brandt, T., Ketter, W., Kolbe, L. M., Neumann, D., & Watson, R. T. (2018). Smart Cities and Digitized Urban Management. *Business and Information Systems Engineering*, *60*(3), 193–195. https://doi.org/10.1007/s12599-018-0537-1

Cabitza, F., Locoro, A., & Batini, C. (2018). Making Open Data more Personal Through a Social Value Perspective: a Methodological Approach. *Information Systems Frontiers*, 1–18. https://doi.org/10.1007/s10796-018-9854-7

De Lange, M., & De Waal, M. (2013). Owning the city: New media and citizen engagement in urban design. First Monday.

Dreyer, S., Olivotti, D., Lebek, B., & Breitner, M. H. (2019). Focusing the customer through smart services: a literature review. *Electronic Markets*, *29*(1), 55–78. https://doi.org/10.1007/s12525-019-00328-z

Ekman, P., Röndell, J., & Yang, Y. (2019). Exploring smart cities and market transformations from a service-dominant logic perspective. *Sustainable Cities and Society*, *51*(February), 101731. https://doi.org/10.1016/j.scs.2019.101731

Gagliardi, D., Schina, L., Sarcinella, M. L., Mangialardi, G., Niglia, F., & Corallo, A. (2017). Information and communication technologies and public participation: interactive maps and value added for citizens. *Government Information Quarterly*, *34*(1), 153–166. https://doi.org/10.1016/j.giq.2016.09.002

Góngora, G. P. M., & Bernal, W. N. (2015). Key Factors in Information Technology Management for Smart Government Systems. *Journal of Technology Management and Innovation*, *10*(4), 109–117.

Gupta, P., Chauhan, S., & Jaiswal, M. P. (2019). Classification of Smart City Research - a Descriptive Literature Review and Future Research Agenda. *Information Systems Frontiers*, 661–685. https://doi.org/10.1007/s10796-019-09911-3

Habibzadeh, H., Nussbaum, B. H., Anjomshoa, F., Kantarci, B., & Soyata, T. (2019). A survey on cybersecurity, data privacy, and policy issues in cyber-physical system deployments in smart cities. *Sustainable Cities and Society*, *50*(August 2018), 101660. https://doi.org/10.1016/j.scs.2019.101660

Heaton, J., & Parlikad, A. K. (2019). A conceptual framework for the alignment of infrastructure assets to citizen requirements within a Smart Cities framework. *Cities*, *90*(January), 32–41. https://doi.org/10.1016/j.cities.2019.01.041

Hollands, R. G. (2008). Will the real smart city please stand up? *City*, *4813*. https://doi.org/10.1080/13604810802479126

ITIL: Key Concepts and Summary. (2020). Retrieved April 15, 2020, from https://www.simplilearn.com/itil-key-concepts-and-summary-article

Janssen, M., Konopnicki, D., Snowdon, J. L., & Ojo, A. (2017). Driving public sector innovation using big and open linked data (BOLD). *Information Systems Frontiers*, *19*(2), 189–195. https://doi.org/10.1007/s10796-017-9746-2

Javed, B., Khan, Z., & McClatchey, R. (2018). An adaptable system to support provenance management for the public policy-making process in smart cities. *Informatics*, *5*(1). https://doi.org/10.3390/informatics5010003

Johannes, A., & Snoeck, M. (2019). Hearing the Voice of Citizens in Smart City Design : The CitiVoice Framework, *61*(6), 665–678. https://doi.org/10.1007/s12599-018-0547-z

Komninos, N., Pallot, M., & Schaffers, H. (2013). Special Issue on Smart Cities and the Future Internet in Europe. *Journal of the Knowledge Economy*, *4*(2), 119–134. https://doi.org/10.1007/s13132-012-0083-x

Kumar, H., Singh, M. K., Gupta, M. P., & Madaan, J. (2018). Smart neighbourhood: A TISM approach to reduce urban polarization for the sustainable development of smart cities. *Journal of Science and Technology Policy Management*, *9*(2), 210–226. https://doi.org/10.1108/JSTPM-04-2017-0009

Ludlow, D., Khan, Z., Soomro, K., Marconcini, M., José, R. S., Malcorps, P., … Metz, A. (2017). From top-down land use planning intelligence to bottom-up stakeholder engagement for smart cities – A case study: DECUMANUS service products. *International Journal of Services, Technology and Management*, *23*(5–6), 465–493. https://doi.org/10.1504/IJSTM.2017.10009861

Marrone, M., & Hammerle, M. (2018). Smart Cities: A Review and Analysis of Stakeholders' Literature. *Business and Information Systems Engineering*, *60*(3), 197–213. https://doi.org/10.1007/s12599-018-0535-3

Mohanty, S. P., Choppali, U., & Kougianos, E. (2016). Everything You Wanted to Know About Smart Cities,

(August 2016). https://doi.org/10.1109/MCE.2016.2556879

Nam, T., & Pardo, T. A. (2011). Smart city as urban innovation. In *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance - ICEGOV '11* (p. 185). https://doi.org/10.1145/2072069.2072100

Nicolas, C., Kim, J., & Chi, S. (2020). Quantifying the dynamic effects of smart city development enablers using structural equation modeling. *Sustainable Cities and Society*, *53*(November 2019), 101916. https://doi.org/10.1016/j.scs.2019.101916

Ojala, J., Korhonen, H., Laaksonen, J., Mäkelä, V., Pakkanen, T., Järvi, A., … Raisamo, R. (2015). Developing novel services for the railway station area through experience-driven design. *Interaction Design and Architecture(S)*, *25*(1), 73–84.

Okwechime, E., Duncan, P., & Edgar, D. (2018). Big data and smart cities: a public sector organizational learning perspective. *Information Systems and E-Business Management*, *16*(3), 601–625. https://doi.org/10.1007/s10257-017-0344-0

Pourzolfaghar, Z., & Helfert, M. (2017). Taxonomy of Smart Elements for Designing Effective Services. *Proceedings of the 23rd American Conference on Information Systems*, 1–10. https://doi.org/10.1037/rmh0000009

Rana, N. P., Luthra, S., Mangla, S. K., Islam, R., Roderick, S., & Dwivedi, Y. K. (2019). Barriers to the Development of Smart Cities in Indian Context. *Information Systems Frontiers*, *21*(3), 503–525. https://doi.org/10.1007/s10796-018-9873-4

Schaffers, H., Komninos, N., Pallot, M., Trousse, B., Nilsson, M., & Oliveira, A. (2011). *Future Internet Assembly. Smart Cities and the Future Internet: Towards Cooperation Frameworks for Open Innovation* (Vol. 9). https://doi.org/10.1016/0020-7101(78)90038-7

Shareef, M. A., Kumar, V., Dwivedi, Y. K., & Kumar, U. (2016). Service delivery through mobile-government (mGov): Driving factors and cultural impacts. *Information Systems Frontiers*, *18*(2), 315–332. https://doi.org/10.1007/s10796-014-9533-2

Simonofski, A., Vallé, T., Serral, E., & Wautelet, Y. (2019). Investigating context factors in citizen participation strategies: A comparative analysis of Swedish and Belgian smart cities. *International Journal of Information Management*. https://doi.org/10.1016/j.ijinfomgt.2019.09.007

Sofiyabadi, J., Kolahi, B., & Valmohammadi, C. (2016). Key performance indicators measurement in service business: a fuzzy VIKOR approach. *Total Quality Management and Business Excellence*, *27*(9–10), 1028–1042. https://doi.org/10.1080/14783363.2015.1059272

Solaimani, S., Bouwman, H., & Itälä, T. (2015). Networked enterprise business model alignment: A case study on smart living. *Information Systems Frontiers*, *17*(4), 871–887. https://doi.org/10.1007/s10796-013-9474-1

Timeus, K., Vinaixa, J., & Pardo-Bosch, F. (2020). Creating business models for smart cities: a practical framework. *Public Management Review*, *22*(5), 726–745. https://doi.org/10.1080/14719037.2020.1718187

Van der Graaf, S., & Veeckman, C. (2014). Designing for participatory governance: Assessing capabilities and toolkits in public service delivery. *Info*, *16*(6), 74–88. https://doi.org/10.1108/info-07-2014-0028

van Waart, P., Mulder, I., & de Bont, C. (2016). A Participatory Approach for Envisioning a Smart City. *Social Science Computer Review*, *34*(6), 708–723. https://doi.org/10.1177/0894439315611099

Weerakkody, V., Irani, Z., Kapoor, K., Sivarajah, U., & Dwivedi, Y. K. (2017). Open data and its usability: an empirical view from the Citizen's perspective. *Information Systems Frontiers*, *19*(2), 285–300. https://doi.org/10.1007/s10796-016-9679-1

Wolff, A., Barker, M., Hudson, L., & Seffah, A. (2020). Supporting smart citizens: Design templates for co-designing data-intensive technologies. *Cities*, *101*. https://doi.org/10.1016/j.cities.2020.102695

Yigitcanlar, T., Foth, M., Sabatini-marques, J., & Ioppolo, G. (2019). Can cities become smart without being sustainable ? A systematic review of the literature. *Sustainable Cities and Society*, *45*(June 2018), 348–365. https://doi.org/10.1016/j.scs.2018.11.033