User-Centered Policy Interventions for Future Cities

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Abstract. Rising societal demands are a direct result of the exponential rise in urbanization and technological development. Addressing these needs in a way that is sustainable, inclusive, and user-friendly is a problem for policymakers. Citizens' participation at every stage of a policy's development is critical to the user-centricity concept's success in policymaking. By involving the citizens in this collaborative effort, we can make sure that policy interventions are specific to each community's needs, which will increase their acceptability, relevance, and longevity. In the long run, this can make cities better places to live by making them more resilient, citizen-centric, and focused on the needs of ambitious inhabitants. Overall, this paper presents a range of user-centric policy initiatives that might help policymakers better understand the varied requirements, preferences, and urban experiences of city dwellers.

Keywords: Cities · Citizens · Policy · Urban development · User-centered approach

1 Introduction

Urban areas are experiencing rapid population expansion and better economic prospects as a result of people moving from rural to urban areas [1,2]. Especially, in the developing nations an increasing number of people migrating to metropolitan areas in search of better job opportunities, easier access to a wider range of services, and an overall higher standard of living [3–5]. There will be numerous obstacles to relocating people to cities, therefore politicians should consider funding multi-modal transportation networks, building accessible and affordable housing, and pursuing smart city initiatives to meet the needs of the population and their expectations [6–9]. Green infrastructure based urban development and

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mixed-use zoning are also prioritized in the pursuit of environmentally conscious and liveable urban environments [10]. This will allow us to claim that these cities will be more technologically advanced, robust, and able to foster innovation from a social and economic standpoint [11]. These modern urban centers have a leg up when it comes to resource planning and environmental impact reduction thanks to cutting-edge smart technology like intelligent building management, smart grids, and autonomous vehicles [12–15]. Sustainable development, community innovation, and citizen-centric development are all areas where policy interventions are crucial [16,17]. It is critical to determine how to incentivize the schemes in order to meet the demands of resilient and ecologically friendly urban infrastructure. Sustainable and accessible transportation, energy-efficient housing construction, and renewable energy applications all benefit from this [18–20]. The advantages of urban development can be dispersed fairly if decision-makers prioritize inclusive and egalitarian policies [21].

Under the current regulatory framework, lawmakers face significant challenges when trying to implement the numerous policy-based decisions at the grassroots level [22,23]. Various government institutions' aversion to change and the present bureaucratic lethargy pose serious challenges to the implementation of progressive policies that would improve citizens' lives. There is also the matter of the city's development budget, which involves complicated funding procedures and the involvement of the central and state governments [24]. Working jointly, public and private entities may build the city's infrastructure, which solves the budget problem. But with all the responsibility, openness, and sharing of best practices among recipients, it's not as simple as it seems [25]. In order to address these types of problems, community involvement is crucial. Through inclusive and effective decision-making processes, we can address the concerns related to public-private partnerships and governance [26,27].

One game-changing factor that could influence the design of cities of the future is user-centered policy interventions. Incorporating citizen feedback into policymaking can help make cities better places to live by making them more adaptable, welcoming, and enjoyable for everyone [28–30]. The different needs and aspirations of urban people should be carefully considered when crafting policies. Only then can these policies be expected to tackle the real-world difficulties that communities face and provide actual benefits. The numerous approaches that can be employed by policymakers to effectively obtain and utilize collaborative information, such as user research, co-creative workshops, and iterative prototyping, can ultimately benefit communities [31–34]. The chances of effective implementation and long-term sustainability are enhanced through this collaborative approach, which guarantees that policies are based on urban life's reality and encourages individuals to feel ownership. By implementing user-centered policy interventions, we can pave the way for future smart cities, find creative solutions to the current problems of urban congestion, and spark new forms of innovation [35,36].

The structure of the paper includes, Sect. 2 covers the numerous approaches to user-centered policy intervention. The level of improvisation for user-centered

policy interventions and future problems associated with city growth are described in Sect. 3. In the final section of the paper, which is Sect. 4, the conclusion is presented.

2 User-Centered Policies

The present state of urban development is inadequate to meet the requirements of its inhabitants. A lot of things come into play here; for instance, cities often grow to accommodate industrial demands rather than those of their residents. Improving the quality of life in future cities is an urgent matter that requires the active participation of citizens. Various methods can be employed to implement policies that prioritize users, as shown in Fig. 1.

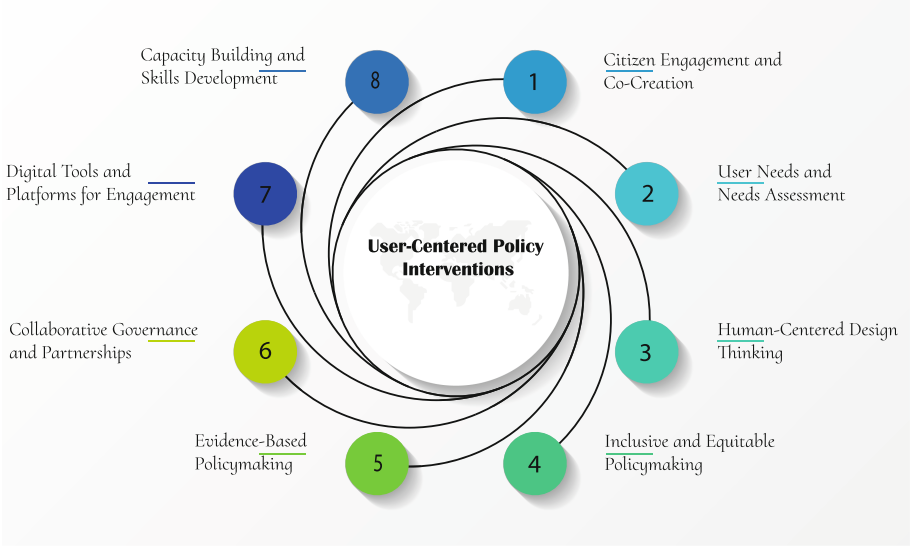

Fig. 1. Various methods for user-centered policy interventions

2.1 Citizen Engagement and Co-creation

When citizens actively participate in shaping policies, their unique perspectives, knowledge, and experience will shape emerging norms. Citizens will be happier and more engaged in the process of establishing policies as a result of this. The consultations were conducted through the use of public-private partnerships, a variety of community workshops, and participatory design methodologies [37,38]. In addition to exploring additional objectives of urban dwellers, this type of partnership guarantees that policies are made based on the grassroots experience

of occupants. Within the policy on citizen involvement and co-creation, feedback techniques may also be considered. The policies can be redesigned or revised based on the feedback that is gathered from online platforms, citizen dialogues at different venues, etc. [39–41]. By actively engaging citizens (as decision-makers), these processes cultivate a sense of ownership and trust, making the city a more liveable and equitable place for everyone.

2.2 User Needs and Needs Assessment

It is critical to understand and assess citizen demands in order to create future cities that are joyful. There are a plethora of resources available to help determine the user's requirements and conduct timely assessments. In order to receive social advantages from the government, policymakers often use qualitative data segments among different user groups, many of whom are disadvantaged and socially stigmatized [42]. Focus groups, user-focused interviews, ethnographies, surveys of the most vulnerable members of society, and in-depth interviews with members of the target community are some of the additional methods that contribute to this evaluation of user needs [43]. Data collected from the aforementioned resources helps lawmakers meet constituents' demands and objectives [44–46]. It suggests that user-centered policies and better laws could help with city life's pressing problems while also improving the quality of life for everyone involved [47].

2.3 Human-Centered Design Thinking

If you want to revolutionize service development and draft new laws to ensure that everyone can reap the benefits, try design thinking, an approach to design that puts people first by listening to and responding to their preferences and needs. To get insight into how users perceive city design, researchers can employ methods such as empathy mapping, ethnographic research, and user group interviews [48,49]. To accomplish the goals of user-centered design thinking, it is necessary to first cultivate an ideology among people regarding the creation of new designs; subsequent co-creation workshops might help with this [50,51]. Policymakers should reevaluate the entire lifecycle evaluation process of policy interventions to nurture the human-centered attention. Certainly, this paves the way for a human-centered design thinking approach while also bringing up the attractiveness, viability, and feasibility of citizens' various benefits to create future cities more liveable [52].

2.4 Inclusive and Equitable Policymaking

One of the most important weapons in the arsenal of the future city development plan is the inclusion and fairness of policymaking. Including those that have been excluded from the flow of progress up until this point is absolutely necessary in order to make the policy more inclusive. To ensure that the policy is both

inclusive and equitable, there have been modifications made to the legislative process wherever it was feasible to do so. These modifications have included the inclusion of individuals or groups of young citizens, families with low and middle incomes, people with disabilities, and various ethnic minorities [53].

Furthermore, inclusive policymaking requires anticipatorily evaluating the distributional effects of policy interventions on a variety of user groups. This is part of the process of inclusive policymaking. When legislators conduct comprehensive impact evaluations and equity analyses, they have the ability to identify potential disparities or unanticipated effects and then take steps to mitigate those concerns. For the purpose of achieving equality, it may be important to establish evaluation and monitoring systems in order to keep track of how far we have progressed, to distribute resources in a fair manner, and to adapt projects in accordance with the requirements of underprivileged groups [54]. Equal and inclusive policymaking also requires us to acknowledge the interdependence of urban issues and work toward a holistic solution. We need to break down barriers and work together across sectors if we want to make sure that economic, social, and environmental prosperity are all considered when formulating policies. When cities rule with equity and inclusion in mind, they may improve life for all city dwellers, level the playing field, and advance social justice [55].

2.5 Evidence-Based Policymaking

In most cases, lawmakers use data gathered from administrative records, social media, sensor networks, and crowd-focused polls to reach final decisions on policy-related issues [56,57]. Legislators can gain a deeper comprehension of urban systems' complex dynamics and user segments' diverse needs by utilizing data analytics and user insights. By utilizing this evidence-based framework, policymakers may zero in on the most effective initiatives and distribute funds appropriately. Policymakers can also improve results by conducting thorough evaluations and impact assessments to determine how effective policy interventions were and then adjusting those measures based on the facts [58].

Government transparency, accountability, and trust are all improved by adopting policies based on evidence. Making policy thinking and evidence clear can boost stakeholder support for user-centered initiatives and build consensus. And this approach encourages a growth mindset by giving lawmakers leeway to change regulations based on public feedback and scientific discoveries. Moreover, in addition to depoliticizing the decision-making process, evidence-based policymaking guarantees that policies are formulated on the basis of objective, data-driven insights, as opposed to being solely influenced by political expediency or intuition. Future cities can cultivate user-centric policies that are responsive, efficacious, and firmly rooted in the practical necessities and ambitions of their inhabitants by adopting an evidence-based methodology [59].

2.6 Collaborative Governance and Partnerships

Governments are increasingly recognizing the efficacy of collaboration as an instrument for formulating user-centric policies pertaining to future cities. This encompasses not solely the government-to-government (G2G) approach, but also collaboration between governments and citizens (G2C), resulting in enhanced inclusivity for the populace. A multitude of sectorial communities, including educational institutions, ethnic community organizations, non-governmental organizations (NGOs), small and medium-sized enterprises (SMEs), and large business houses, can participate in this approach's integration in order to identify holistic solutions [60].

Collaborative governance instruments, such as multi-stakeholder platforms, public-private partnerships, and community-based coalitions, can be utilized by politicians to foster dialogue, the exchange of information, and collective problem-solving. Additionally, collaborative governance enables the mobilization of resources, knowledge, and innovation to develop more effective, sustainable, and scalable user-centered policies through the utilization of the strengths and capacities of numerous partners [61–63]. Through the active engagement of communities and inhabitants as participants rather than passive recipients of services, collaborative governance fosters an environment that is more inclusive and conducive to participatory policymaking [64]. Collaborative governance that fosters a sense of ownership and shared responsibility appears to provide an opportunity for all stakeholders, including grassroots ethnic groups and local actors, to participate in policymaking. Thus, we will be able to design future cities more effectively in accordance with the desires and requirements of the communities that have previously inhabited them [65,66].

2.7 Digital Tools and Platforms for Engagement

The utilization of digital tools and engagement platforms is crucial for the development of user-centered policy interventions for future cities. Legislators may be able to facilitate more opportunities for citizens to share their thoughts and collaborate on solutions that address their needs and objectives by leveraging technology [67]. Nowadays, citizens can easily communicate through a variety of media platforms, such as interactive webpages/websites, many online forums, smartphone apps, and, of course, social media [68–70]. In order to better understand the demands, requirements, preferences, experiences, and expectations of users, legislators can make use of a variety of machine learning and data analytics methods. You can easily see how people are feeling about the development process, as well as what the current trends are. Politicians have been known to gauge public opinion through the use of design sprints, online workshops with participants of varying ages, and hackathons [71].

When it comes to future city policymaking and keeping track of citizen participation, one of the biggest benefits of digitalization is the increased openness and accountability it brings to the government process [72]. Consideration of collaborative participative approaches to urban development must also take into

account the needs of individuals who are not technologically adept, so it is imperative that they find a way to participate. Such citizens should be provided with both traditional methods of cooperation and the flavour of technology. In order to better comprehend the demands and desires of the people in relation to their future expectations of cities, this would undoubtedly enhance the efficiency of the system [73].

2.8 Capacity Building and Skill Development

The foundation of the cities of the future rests on enhancing human capacity and acquiring new skills. Because young people in metropolitan areas are increasingly tech-savvy and have lofty goals for their own skill sets, etc., future policy interventions should focus on the needs of these individuals. One way to address this is through user-centered policy interventions, which help identify needs and then inform decisions about how to best support their professional growth. Both official channels and citizen-led initiatives will contribute to this capacity-building process [74,75].

One of the components that will make future cities smart and its inhabitants smarter than today is education and training. With the use of residents' insights and experiences, lawmakers will be able to formulate new legislation and shape

Table 1. Design approach differences between the various methodologies.

Method used	Specific design approach
Citizen-Engagement and Co-Creation	Public-private partnerships, community workshops, participatory design methodologies
User-Needs and Needs Assessment	Collection of qualitative data through focus-group, user-focused interviews, ethnographics, surveys of vulnerable ones
Human-Centered Design Thinking	Empathy mapping, user-group interviews, workshops
Inclusive and Equitable Policymaking	Group interview of young and old citizens, low- and middle-income families, people with disability
Evidence-Based Policymaking	Data from administrative records, sensor networks, crowd-focused polls
Collaborative Governance and Partnerships	Government-to-government (G2G) and government-to-citizen (G2C) approach, non-government organizations (NGOs), small and medium-sized enterprises (SMEs), local actors
Digital Tools and Platforms for Engagement	Online forums, websites, smartphone-based apps, and machine learning and data-analytics methods
Capacity Building and Skill Development	Digital literacy through tinkering labs, civic centers

city development in response. There should be a number of initiatives aimed at skill development, such as community-based workshops, citizen involvement in different projects, improving digital literacy, and creating new civic centers to help the less fortunate with their digital literacy [76].

Building capacity also includes creating an environment where policymaking institutions value experimentation, creativity, and ongoing learning. The cities of the future offer fresh chances, places to learn, and comprehensive methods of development that allow us to reflect on and improve upon our previous successes and failures [77]. The establishment of tinkering labs for new discoveries across streams, the implementation of policy rewards systems, and the promotion of cross-departmental cooperation are all viable options.

Overall, we are able to provide a tabular representation of the differences between all of the methodologies, as shown in Table 1.

3 Challenges in Deployment of User-Centered Policies

Using the knowledge and experience of the people, user-centered policy methods are responsive, inclusive, and effective in improving city life. This is particularly true when it comes to accountability. Even if there are many challenges ahead, the user-centered policymaking approach to future city development is still in its early stages. There are numerous other challenges, but the most important ones are:

1. *Diversified user needs:* It can be somewhat challenging to provide an accurate assessment of user demands at times because they change over time. Policymakers will face a formidable challenge in conducting further explorations of this area with a user-centered approach [78,79].
2. *Inequality in access and digital division:* The digital revolution has brought numerous benefits, but it has also brought certain drawbacks, such as the fact that only very tech-savvy individuals can understand and respond to digital platforms [80–82]. As a result, other low-income families, those with disabilities, or others unfamiliar with digital services will be unable to take part in the groundbreaking user-centered collaborative movement.
3. *Data security and privacy concerns:* Concerns about data security, who holds the data, and the level of security for acquired data make data collection a challenging procedure. Persuading the public to uphold data security and privacy standards is an arduous task for legislators [83,84]. Because it raises both legal and ethical questions, maintaining faith in the process is a major challenge.
4. *Balancing competing interests and priorities:* One typical difficulty in user-centered policymaking is striking a balance between the diverse and, at times, conflicting needs and desires of numerous user groups. As lawmakers try to settle these disputes, come to compromises, and reach accords, it is critical that they do not ignore the needs of oppressed or underrepresented groups [85].

5. *Policy silos and institutional resistance:* There are a number of things that need to alter in order to adopt user-centered policies, including the institutional working culture, different power centers, and traditional policymaking processes [86]. Policymakers need to develop plans for different types of cooperation, management techniques, and accountable leadership if they want to solve these problems [87].
6. *Scalability and resource constraints:* Prior to incorporating user-centered techniques into policymaking decisions, it is crucial to verify the budget for user research, capacity building, resource development, and citizen involvement [88]. Among the most pressing issues facing lawmakers is the question of how to increase the magnitude of financial support.
7. *Accountability and impact measures:* The ability to make a final choice in policymaking processes depends on accountability and openness. Any policy's success was defined by its robust and well stated framework for evaluation and other policy metrics. Concurrently, user-centered interventions will suffer from lengthy and complicated decision-making procedures leading to effects that are hard to assess [89,90].

4 Conclusions

When creating a smarter city than the one we currently have, it is important to give careful consideration to the implementation of policy interventions that are user-centered. The strategies in question are superior in terms of their responsiveness, inclusivity, and potential for sustainability. Due to the fact that the "user" is an essential component of the development process as a whole, it is also simple to give priority to the preferences, requirements, and various experiences of individuals. The effect of interventions that create a sense of ownership and empowerment among residents is the creation of urban places that are collaborative, intelligent, co-creative, innovative, responsible, resilient, and people-centric. At the same time that user-focused group interviews provide information on the needs and desires of citizens who are not proficient with computers, digital resources guarantee that we will have complete transparency about policies. Overall, user-centered policymaking will result in an increase in the magnitude, timeliness, and priority of people's dreams for the future.

References

1. Glaeser, E.L., Kallal, H.D., Scheinkman, J.A., Shleifer, A.: Growth in cities. J. Polit. Econ. **100**(6), 1126–1152 (1992). https://www.jstor.org/stable/2138829
2. Bettencourt, L.M.A.: Urban growth and the emergent statistics of cities. Sci. Adv. **6**(34), 1–12 (2020). https://doi.org/10.1126/sciadv.aat8812
3. Abhishek, N., Jenamani, M., Mahanty, B.: Urban growth in Indian cities: are the driving forces really changing?. Habitat. Int. **69**, 48–57 (2017). https://doi.org/10.1016/j.habitatint.2017.08.002
4. Sharma, M., Abhay, R.K.: GeoJournal **87**, 797–819 (2022). https://doi.org/10.1007/s10708-021-10570-8

5. Angel, S.: Urban expansion: theory, evidence and practice. Build. Cities **4**(1), 124–138 (2023). https://doi.org/10.5334/bc.348
6. Patel, A.R., Roscia, M., Vucinic, D.: Legal implications for autonomous vehicles mobility in future smart cities. In: Proceedings of 9th IEEE International Smart Cities Conference (ISC2), pp. 1-5, Bucharest, Romania (2023). https://doi.org/10.1109/ISC257844.2023.10293522
7. Jonek-Kowalska, I.: Housing infrastructure as a determinant of quality of life in selected Polish smart cities. Smart Cities **5**(3), 924–946 (2022). https://doi.org/10.3390/smartcities5030046
8. Lee, J.: Smart city in urban design. Int. J. Sustain. Build. Technol. Urban Dev. **12**(4), 380–393 (2021). https://doi.org/10.22712/susb.20210031
9. Muller-Eie, D., Kosmidis, I.: Sustainable mobility in smart cities: a document study of mobility initiatives of mid-sized Nordic smart cities. Eur. Transp. Res. Rev. **15**(36), 1–12 (2023). https://doi.org/10.1186/s12544-023-00610-4
10. Trindade, E.P., Hinnig, M.P.F., Costa, E.M., Marques, J.S., Bastos, R.C., Yigitcanlar, T.: Sustainable development of smart cities: a systematic review of the literature. J. Open Innov Technol. Mark. Complex. **3**(11), 1–14 (2017). https://doi.org/10.1186/s40852-017-0063-2
11. Patel, A.R., Tesoriere, G., Campisi, T.: Users' socio-economic factors to choose electromobility for future smart cities. In: Proceedings of the 22nd International Conference on Computational Science and Its Applications (ICCSA), pp. 331–344, Malaga, Spain (2022). https://doi.org/10.1007/978-3-031-10542-5_23
12. Koman, G., Toman, D., Jankal, R., Krupova, S.: Public transport infrastructure with electromobility elements at the smart city level to support sustainability. Sustainability **16**(3), 1091 (2024). https://doi.org/10.3390/su16031091
13. Patel, A.R., Patel, D., Sathavara, R.: Future smart home using intelligent electronic devices. In: Proceedings of the 2016 IEEE Smart Energy Grid Engineering (SEGE), pp. 100–105, Oshawa, ON, Canada (2016). https://doi.org/10.1109/SEGE.2016.7589508
14. Patel, A.R., Vyas, D.R., Markana, A., Jayaraman, R.: A conceptual model for integrating sustainable supply chain, electric vehicles, and renewable energy sources. Sustainability **14**(21), 14484 (2022). https://doi.org/10.3390/su142114484
15. Omrany, H., Al-Obaidi, K.M., Hossain, M., Alduais, N.A.M., Al-Duais, H.S., Ghaffarianhoseini, A.: IoT-enabled smart cities: a hybrid systematic analysis of key research areas, challenges, and recommendations for future direction. Discov. Cities **1**(2), 1–34 (2024). https://doi.org/10.1007/s44327-024-00002-w
16. Blezer, S., Abujidi, N., Sap, H.: Urban living labs as innovation infrastructure for local urban intervention acceleration and student social learning: the impacts on community wellbeing in Heerlen.: Front. Publ. Health **11**, 1–13 (2024). https://doi.org/10.3389/fpubh.2023.1242151
17. Bayode, T., Siegmund, A.: Tripartite relationship of urban planning, city growth, and health for sustainable development in Akure, Nigeria. Front. Sustain. Cities **5**, 1–13 (2024). https://doi.org/10.3389/frsc.2023.1301397
18. Elgohary, M.M., Abdin, A.R., Khalil, H.A.E.: Upgrading informal areas through sustainable urban development principles. J. Eng. Appl. Sci. **71**(65), 1–28 (2024). https://doi.org/10.1186/s44147-024-00367-0
19. Lattman, K., Otsuka, N.: Sustainable development of urban mobility through active travel and public transport. Sustainability **6**(2), 534 (2024). https://doi.org/10.3390/su16020534

20. Patel, A.R., Trivedi, G., Vyas, D.R., Mihaita, A.S., Padmanaban, S.: Framework for user-centered access to electric charging facilities via energy-trading blockchain. In: Proceedings of the 24th International Symposium on Wireless Personal Multimedia Communications (WPMC), pp. 1–6, Okayama, Japan (2021). https://doi.org/10.1109/WPMC52694.2021.9700475
21. Campisi, T., Georgiadis, G., Basbas, S.: Developing cities for citizens: supporting gender equity for successful and sustainable urban mobility. In: Gervasi, O., Murgante, B., Misra, S., Rocha, A.M.A.C., Garau, C. (eds.) ICCSA 2022. LNCS, vol. 13382, pp. 410–422. Springer, Cham (2022). https://doi.org/10.1007/978-3-031-10592-0_30
22. Keshvardoost, S., Renukappa, S., Suresh, S.: Developments of policies related to smart cities: a critical review. In: Proceedings of the 2018 IEEE/ACM International Conference on Utility and Cloud Computing Companion (UCC Companion), pp. 370–375, Zurich, Switzerland (2018)
23. Goi, C. L.: The impact of technological innovation on building a sustainable city. Int. J. Qual. Innov. **3**(6), 1–13 (2017). https://doi.org/10.1186/s40887-017-0014-9
24. Jose, R., Rodrigues, H.: A review on key innovation challenges for smart city initiatives. Smart Cities **7**(1), 141–162 (2024). https://doi.org/10.3390/smartcities7010006
25. Arora, R.U.: Financial sector development and smart cities: the Indian case. Sustain. Cities Soc. **42**, 52–58 (2018). https://doi.org/10.1016/j.scs.2018.06.013
26. Bhatt, Y., Roychoudhury, J.: Smart cities from an Indian perspective: evolving ambitions. In: Belaïd, F., Arora, A. (eds.) Smart Cities. Studies in Energy, Resource and Environmental Economics, pp. 359–383. Springer, Cham (2023). https://doi.org/10.1007/978-3-031-35664-3_19
27. Mondschein, J., Clark-Ginsberg, A., Kuehn, A.: Smart cities as large technological systems: overcoming organizational challenges in smart cities through collective action. Sustain. Cities Soc. **67**, 102730 (2021). https://doi.org/10.1016/j.scs.2021.102730
28. Wirts, B.W., Becker, M., Schmidt, F.W.: Smart city services: an empirical analysis of citizen preferences. Publ. Organ. Rev. **22**, 1063–1080 (2022). https://doi.org/10.1007/s11115-021-00562-0
29. Wirsbinna, A., Grega, L., Juenger, M.: Assessing factors influencing citizens' behavioral intention towards smart city living. Smart Cities **6**(6), 3093–3111 (2023). https://doi.org/10.3390/smartcities6060138
30. Lehtio, A., Hartikainen, M., Ala-Luopa, S., Olsson, T., Vaananen, K.: Understanding citizen perceptions of AI in the smart city. AI Soc. **38**, 1123–1134 (2022). https://doi.org/10.1007/s00146-022-01589-7
31. Yahia, N.B., Eljaoued, W., Saoud, N.B.B., Colomo-Palacios, R.: Towards sustainable collaborative networks for smart cities co-governance. Int. J. Inf. Manag. **56**, 102037 (2021). https://doi.org/10.1016/j.ijinfomgt.2019.11.005
32. Bhagavathula, S., Brundiers, K., Stauffacher, M., Kay, B.: Fostering collaboration in city governments' sustainability, emergency management and resilience work through competency-based capacity building. Int. J. Disaster Risk Manag. **63**, 102408 (2021). https://doi.org/10.1016/j.ijdrr.2021.102408
33. Robb, K.A., LaPointe, M., Hemsing, K., Anderson, G., Anderson, J., de Jong, J.: Inter-city collaboration: why and how cities work, learn and advocate together. Glob. Policy **14**(5) (2023). https://doi.org/10.1111/1758-5899.13292
34. Anthony Jr., B.: The role of community engagement in urban innovation towards the co-creation of smart sustainable cities. J. Knowl. Econ. 1–33 (2023). https://doi.org/10.1007/s13132-023-01176-1

35. Becker, J., et al.: City 5.0: citizen involvement in the design of future cities. Electron. Mark. **33**(10), 1–21 (2023). https://doi.org/10.1007/s12525-023-00621-y
36. Molinengo, G., Stasiak, D., Freeth, R.: Process expertise in policy advice: designing collaboration in collaboration. Human. Soc. Sci. Commun. **8**(310), 1–12 (2021). https://doi.org/10.1057/s41599-021-00990-9
37. Nunes, N., Bjorner, E., Hilding-Hamann, K. E.: Guidelines for citizen engagement and the co-creation of nature-based solutions: Living knowledge in the URBiNAT project. Sustainability **13**(23), 13378 (2021). https://doi.org/10.3390/su132313378
38. Cappa, F., Franco, S., Rosso, F.: Citizens and cities: leveraging citizen science and big data for sustainable urban development. Bus. Strateg. Environ. **31**(2), 648–667 (2021). https://doi.org/10.1002/bse.2942
39. Webster, C.W.R., Leleux, C.: Smart governance: opportunities for technologically-mediated citizen co-production. Inf. Policy **23**(1), 95–110 (2018). https://doi.org/10.3233/IP-170065
40. Choque, J., Medela, A., Echevarria, J., Diez, L., Munoz, L.: Enabling incentivization and citizen engagement in the smart-city co-creation paradigm. In: Proceedings of the 2018 Global Internet of Things Summit (GIoTS), pp. 1–6, Bilbao, Spain (2018). https://doi.org/10.1109/GIOTS.2018.8534567
41. Ehwi, R. J., Holmes, H., Maslova, S., Burgess, G.: Towards a co-creative stakeholder engagement in Smart City projects: a life-cycle approach. Innov. Eur. J. Soc. Sci. Res. **36**(4), 774–799 (2023). https://doi.org/10.1080/13511610.2023.2266579
42. Ahari, S.S., Habibzadeh, S., Yousefi, M., Amani, F., Abdi, R.: Community based needs assessment in an urban area; A participatory action research project. BMC Publ. Health **12**(161), 1–8 (2012). https://doi.org/10.1186/1471-2458-12-161
43. Du, X., Liporace, D., Varde, A.S.: Urban legislation assessment by data analytics with smart city characteristics. In: Proceedings of the IEEE 8th Annual Ubiquitous Computing, Electronics and Mobile Communication Conference (UEMCON), pp. 20–25, New York, NY, USA (2017). https://doi.org/10.1109/UEMCON.2017.8248972
44. Banach, M., Dlugosz, R.: A novel approach to cities' assessment in terms of their implementation of smart city idea. J. Comput. Appl. Math. **428**, 115161 (2023). https://doi.org/10.1016/j.cam.2023.115161
45. Patel, A.R., Ljepava, N.: How will autonomous vehicles increase ease of life? In: Bhattacharyya, S., Banerjee, J.S., Köppen, M. (eds.) ICHCSC 2023. Smart Innovation, Systems and Technologies, vol. 376, pp. 655–665. Springer, Singapore (2023). https://doi.org/10.1007/978-981-99-7711-6_51
46. Tikhaleva, E.Y.: "Smart cities": legal regulation and potential of development. J. Digit. Technol. Law **1**(3), 803–824 (2023). https://doi.org/10.21202/jdtl.2023.35
47. Keita, K., Kourouma, S.: Assessment of policy and legal frameworks of urban green infrastructure development: republic of Guinea. Buildings **13**(8), 1945 (2023). https://doi.org/10.3390/buildings13081945
48. Pushkar, T., Serogina, D., Matvieieva, N., Sobolieva, H., Zhovtyak, H.: Human-centered approach to shaping smart city development strategies. In: Arsenyeva, O., Romanova, T., Sukhonos, M., Biletskyi, I., Tsegelnyk, Y. (eds.) STUE 2023. LNNS, vol. 808, pp. 23–37. Springer, Cham (2023). https://doi.org/10.1007/978-3-031-46877-3_3
49. Andreani, S., Kalchschmidt, M., Pinto, R., Sayegh, A.: Reframing technologically enhanced urban scenarios: a design research model towards human centered smart cities. Technol. Forecast. Soc. Change **142**, 15–25 (2019). https://doi.org/10.1016/j.techfore.2018.09.028

50. Bleja, J., Neumann, S., Krueger, T., Grossmann, U.: A human-centered design approach for the development of a digital care platform in a smart city environment: implications for business models. In: Companion Proceedings of the Web Conference 2022 (WWW '22 Companion), pp. 1237–1244, Lyon, France (2022). https://doi.org/10.1145/3487553.3524854
51. Crandall, M.: Human-centered design and community engagement. Natl. Civic Rev. **108**(1), 40–51 (2019). https://www.jstor.org/stable/10.32543/naticivirevi.108.1.0040
52. Borthwick, M., Tomitsch, M., Gaughwin, M.: From human-centred to life-centred design: considering environmental and ethical concerns in the design of interactive products. J. Respons. Technol. **10**, 100032 (2022). https://doi.org/10.1016/j.jrt.2022.100032
53. Pineo, H.: Towards healthy urbanism: inclusive, equitable and sustainable (THRIVES) - an urban design and planning framework from theory to praxis. Cities Health **6**(5), 974–992 (2022). https://doi.org/10.1080/23748834.2020.1769527
54. Liang, D., Jong, M.D., Schraven, D., Wang, L.: Mapping key features and dimensions of the inclusive city: a systematic bibliometric analysis and literature study. Int. J. Sustain. Dev. World Ecol. **29**(1), 60–79 (2022). https://doi.org/10.1080/13504509.2021.1911873
55. Biswas, A.: A framework to analyse inclusiveness of urban policy. Cities **87**, 174–184 (2019). https://doi.org/10.1016/j.cities.2018.09.022
56. Banks, G.: Evidence-based policy making: what is it? How do we get it?. In: ANU Public Lecture Series, Productivity Commission, pp. 1–31 (2009). https://ssrn.com/abstract=1616460
57. Demir, F.: Evidence-based policy-making: Merits and challenges. In: Farazmand, A. (ed.) Global Encyclopedia of Public Administration, Public Policy, and Governance, vol. 1, pp. 1–13. Springer, Cham (2020). https://doi.org/10.1007/978-3-319-31816-5_3901-1
58. Mills, D., Pudney, S., Pevcin, P., Dvorak, J.: Evidence-based public policy decision-making in smart cities: does extant theory support achievement of city sustainability objectives?. Sustainability **14**(1), 1–23 (2022). https://doi.org/10.3390/su14010003
59. Chang, D.L., Sabatini-Marques, J., Moreira da Costa, E., Selig, P.M., Yigitcanlar, T.: Knowledge-based, smart and sustainable cities: a provocation for a conceptual framework. J. Open Innov. Technol. Mark. Complex. **4**(5), 1–17 (2018). https://doi.org/10.1186/s40852-018-0087-2
60. Nastjuk, I, Trang, S., and Papageorgiou, E. I.: Smart cities and smart governance models for future cities. In: Electronic Markets, vol. 32, pp. 1917-1924, 2022. https://doi.org/10.1007/s12525-022-00609-0
61. Florini, A., Pauli, M.: Collaborative governance for the sustainable development goals. Asia Pac. Policy Stud. **5**(3), 583–598 (2018). https://doi.org/10.1002/app5.252
62. Moraci, F., Errigo, M.F., Fazia, C., Campisi, T., Castelli, F.: Cities under pressure: strategies and tools to face climate change and pandemic. Sustainability (12)(18), 7743 (2020). https://doi.org/10.3390/su12187743
63. Bradley, S., Mahmoud, I.H., Arlati, A.: Integrated collaborative governance approaches towards urban transformation: experiences from the CLEVER cities project. Sustainability **14**(23), 15566 (2022). https://doi.org/10.3390/su142315566

64. Pereira, G.V., Cunha, M.A., Lampoltshammer, T.J., Parycek, P., Testa, M.G.: Increasing collaboration and participation in smart city governance: a cross-case analysis of smart city initiatives. Inf. Technol. Dev. **23**(3), 526–553 (2017). https://doi.org/10.1080/02681102.2017.1353946
65. Mills, D.E., Izadgoshasb, I., Pudney, S.G.: Smart city collaboration: a review and an agenda for establishing sustainable collaboration. Sustainability **13**(16), 9189 (2021). https://doi.org/10.3390/su13169189
66. Grossi, G., Welinder, O.: Smart cities at the intersection of public governance paradigms for sustainability. Urban Stud. 1–13 (2024). https://doi.org/10.1177/00420980241227807
67. Kim, H.M., Sabri, S., Kent, A.: Smart cities as a platform for technological and social innovation in productivity, sustainability, and livability: a conceptual framework. In: Smart Cities for Technological and Social Innovation: Case Studies, Current Trends, and Future Steps, pp. 9–28 (2021). https://doi.org/10.1016/B978-0-12-818886-6.00002-2
68. Stratigea, A., Papadopoulou, C.A., Panagiotopoulou, M.: Tools and technologies for planning the development of smart cities. J. Urban Technol. **22**(2), 43–62 (2015). https://doi.org/10.1080/10630732.2015.1018725
69. Toukola, S., Ahola, T.: Digital tools for stakeholder participation in urban development projects. Project Leadersh. Soc. **3**, 100053 (2022). https://doi.org/10.1016/j.plas.2022.100053
70. Marshall, S., Farndon, D., Hudson-Smith, A., Kourniotis, A., Karadimitriou, N.: Urban design and planning participation in the digital age: lessons from an experimental online platform. Smart Cities **7**(1), 615–632 (2024). https://doi.org/10.3390/smartcities7010025
71. Parker, C., Tomitsch, M., Fredericks, J.: Smart engagement for smart cities: design patterns for digitally augmented, situated community engagement. In: Shaping Smart for Better Cities: Rethinking and Shaping Relationships Between Urban Space and Digital Technologies, pp. 177–200 (2021). https://doi.org/10.1016/B978-0-12-818636-7.00010-X
72. Anthony Jr., B.: Managing digital transformation of smart cities through enterprise architecture - a review and research agenda. Enterp. Inf. Syst. **15**(3), 299–331 (2021). https://doi.org/10.1080/17517575.2020.1812006
73. Bibri, S.E., Krogstie, J.: The emerging data-driven Smart City and its innovative applied solutions for sustainability: the cases of London and Barcelona. Energy Inform. **3**(5), 1–42 (2020). https://doi.org/10.1186/s42162-020-00108-6
74. Pereira, G.V., Schuch de Azambuja, L.: Smart sustainable city roadmap as a tool for addressing sustainability challenges and building governance capacity. Sustainability **14**(1), 239 (2022). https://doi.org/10.3390/su14010239
75. Gasco-Hernandez, M., Nasi, G., Cucciniello, M., Hiedemann, A.M.: The role of organizational capacity to foster digital transformation in local governments: the case of three European smart cities. Urban Gov. **2**(2), 236–246 (2022). https://doi.org/10.1016/j.ugj.2022.09.005
76. Keith, M., O'Clery, N., Parnell, S., Revi, A.: The future of the future city? The new urban sciences and a PEAK Urban interdisciplinary disposition. Cities **105**, 102820 (2020). https://doi.org/10.1016/j.cities.2020.102820
77. Campbell, T.: Learning cities: knowledge, capacity and competitiveness. Habitat. Int. **33**(2), 195–201 (2009). https://doi.org/10.1016/j.habitatint.2008.10.012
78. Batty, M.: Complexity in city systems: understanding, evolution, and design. In: A Planner's Encounter with Complexity, 1st edn, pp. 1–24 (2010). https://discovery.ucl.ac.uk/id/eprint/3473

79. Shapek, R.A.: Problems and deficiencies in the needs assessment process. Publ. Admin. Rev. **35**, 754–758 (1975). https://doi.org/10.2307/974614
80. Kvasny, L., Keil, M.: The challenges of redressing the digital divide: a tale of two US cities. Inf. Syst. J. **16**(1), 23–53 (2006). https://doi.org/10.1111/j.1365-2575.2006.00207.x
81. Mullick, M., Patnaik, A.: Pandemic management, citizens and the Indian Smart cities: reflections from the right to the smart city and the digital divide. City Cult. Soc. **30**, 100474 (2022). https://doi.org/10.1016/j.ccs.2022.100474
82. Caragliu, A., Bo, C.F.D.: Smart cities and the urban digital divide. NPJ Urban Sustain. **3**(43), 1–11 (2023). https://doi.org/10.1038/s42949-023-00117-w
83. Sookhak, M., Tang, H., He, Y., Yu, F.R.: Security and privacy of smart cities: a survey, research issues and challenges. IEEE Commun. Surv. Tutor. **21**(2), 1718–1743 (2018). https://doi.org/10.1109/COMST.2018.2867288
84. Rao, P.M., Deebak, B.D.: Security and privacy issues in smart cities/industries: technologies, applications, and challenges. J. Ambient Intell. Human. Comput. **14**, 10517–10553 (2023). https://doi.org/10.1007/s12652-022-03707-1
85. Xia, L., Semirumi, D.T., Rezaei, R.: A thorough examination of smart city applications: exploring challenges and solutions throughout the life cycle with emphasis on safeguarding citizen privacy. Sustain. Cities Soc. **98**, 104771 (2023). https://doi.org/10.1016/j.scs.2023.104771
86. Scott, I., Gong, T.: Coordinating government silos: challenges and opportunities. Glob. Publ. Policy Gov. **1**, 20–38 (2021). https://doi.org/10.1007/s43508-021-00004-z
87. Guenduez, A.A., Mergel, I., Schedler, K., Fuchs, S., Douillet, C.: Institutional work in smart cities: interviews with smart city managers. Urban Gov. (2024). https://doi.org/10.1016/j.ugj.2024.01.003
88. Majeed, U., Khan, L.U., Yaqoob, I., Kazmi, S.M.A., Salah, K., Hong, C.S.: Blockchain for IoT-based smart cities: recent advances, requirements, and future challenges. J. Netw. Comput. Appl. **181**, 103007 (2021). https://doi.org/10.1016/j.jnca.2021.103007
89. Giuffrida, I.: Smart cities and sustainability: a new challenge to accountability?. William & Mary Environ. Law Policy Rev. **45**(3), 739–773 (2021). https://scholarship.law.wm.edu/wmelpr/vol45/iss3/5
90. Argento, D., Grossi, G., Jaaskelainen, A., Servalli, S., Suomala, P.: Governmentality and performance for the smart city. Account. Audit. Account. J. **33**(1), 204–232 (2020). https://doi.org/10.1108/AAAJ-04-2017-2922