



General Smart City Experts' Perceptions of Citizen Participation: A Questionnaire Survey

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Abstract. Smart cities gained the support of scientists, urban planners, and governments all over the world because they suggest innovative solutions for all urban development problems using Information and communication technologies (ICT).

Citizen participation is the key challenge to develop a smart city project since the main objective of a smart city is to improve the quality of life of citizens. Thus, decision-makers should cooperate with citizens and stakeholders.

In this article, we will explain the current state of the art in the process of empowering citizens within smart cities and detail the results of a survey conducted in the frame of the Smart City Expo event held in Casablanca in April 2018.

We administered the survey to key stakeholders in smart cities spread all over the world like city council representatives, technology developers and scientists (n = 20 respondents) in order to evaluate citizen participation in a smart city in practice.

Keywords: Smart city · Citizen participation · Literature review · Survey

1 Introduction

Urbanization is a factor of economic growth; cities produce 80% of the Gross National Product (GNP) worldwide [2]. According to the United Nations Population Fund, half of the world's population lives in cities, this figure will reach about 5 billion by 2030 [2]. Moreover, cities consume about 75% of the global primary energy and generate between 50 and 60% of global greenhouse gas emissions [3].

In this difficult context, smart cities have reached unprecedented progress and gained the support of scientists, urban planners, and governments all over the world, because they suggest innovative solutions for all urban development problems using Information and communication technologies (ICT) [1].

Citizen participation is the key challenge to develop a smart city project since the main objective of a smart city is to improve the quality of life of citizens. However, there are no recent studies about practices, barriers and new ways to increase civic participation in smart cities. In order to contribute to reducing this research gap, we will

try to answer the following research question: **“How to enhance citizen participation in a smart city project?”**

To this end, we will represent in this article the citizen participation theory and a literature review of smart city concept and then discuss the role of citizen participation in smart cities, we will also report the results of a survey administered to smart city experts from different cities in the world (n = 20 respondents).

2 Citizen Participation Theory

Top-down decision-making approach has shown its ineffectiveness in most democracies, citizens become more demanding and aware of their rights [4, 5]. Actually, there is a big gap between citizens' aspirations and government politics, which has led to social movements and declining trust in public institutions [6]. In this democratic deficit context as labeled by Hindess [7], citizen participation has appeared as an alternative to break through this deadlock and give an active role to citizens. Those citizens, who are often excluded from the government's decision-making process and are only considered as elections voters, can act also as experts and information providers for their communities [8].

First scientific researches on citizen participation in public decision making were started in the late 1960s in a period marked by urban struggles and students' protest movement, from which came the first demands for “participatory democracy” [9]. Thus, the famous article «A Ladder of Citizen Participation» of Sherry Arnstein come out in 1960. Arnstein 1960 suggested a ladder for participation levels starting from manipulation to citizen control with each rung corresponding with the extent to which citizens can determine the product. As it is argued, citizen participation is a power redistribution that allows the disadvantaged citizen to be deliberately involved and consulted in urban planning, information diffusion, political programs, and resource allocation. However, it can take a “tokenism” form being just a consultation directed by public administrations to allow citizens to hear and to have a voice [10].

Scientists and experts have also studied the objectives, functions, advantages, and inconveniences of participation, and developed many models and frameworks to categorize and understand citizen participation.

Bishop and Davis define participation as “the expectation that citizens have a voice in policy choices” and categorize it according to policy objectives (Table 1). In concrete terms, the authors provide a map of policy participation [6].

and different contexts, there are numerous terms similar to “smart cities” such as intelligent city, knowledge city, wired city, digital city, and so on [12–15].

Over the last decade, the term “Smart City” has grown more than its analogues including “Intelligent City” and “Digital City” for the following reasons:

- From a Marketing perspective, the word “Smart” is used more than the adjective “Intelligent” because it focuses on the needs of users. In order to attract a wider base of community members, “Smart” serves better than “intelligent” who is more elitist. “Smart” is also more user-friendly than “intelligent”. Smart is needed to adapt to user needs and provide custom interfaces [12]. Thus, a city can become smart if it adapts to the needs of its inhabitants.
- [31] focused on the different ways of using the term “Smart”. More concretely, if the word “Intelligent” clearly implies a kind of positive technological innovation based on the city and the change via ICT, the adjective “Smart” has also been used in relation to governance, communities, social learning and to address issues of urban growth and social and environmental sustainability.
- In 2007, the Apple Company launched and marketed the smartphone “iPhone” which democratized the daily use of Smart devices. The success of the term Smart in mobile telephony has influenced the adoption of this term in urban context [13].

In his literature review, A. Cocchia distinguished smart from the digital city and tried to define the “smart city” according to two different approaches:

- **Their contents:** the digital city regards the use of ICT in urban areas; the smart city regards the attention to be paid to the environmental quality in cities;
- **Their nature and relationship with the government:** the digital city is a free trend emerging from the daily use of smart and digital devices by citizens. It incites the local governments to supply e-services, that is, to transform gradually the city into a digital city; smart city is a political trend, driven by international institutions, to implement adequate initiatives to improve the environmental quality in cities [13].

Giffinger et al. identified economy, mobility, people, governance, environment and living as the main factors of the smart city: “A city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens. Smart city generally refers to the search and identification of intelligent solutions which allow modern cities to enhance the quality of the services provided to citizens.” [16]. The Smart City Council highlighted the smart city in the use of technology across all city functions [17].

Some definitions argue the use of technologies, the private firm IBM was the first to introduce the term “Smart city” and defined three main characteristics for it: instrumented, intelligent and interconnected. Other definitions stressed different aspects like natural resources management [18, 19].

Other scientists claimed that Smart cities must undertake open access and inclusive strategies to diminish the digital dividend [20] and consider that a successful smart city should be inclusive and must concern all citizens including people with disabilities. Therefore, the new term “Inclusive Smart City” is defined as “A city that uses digital assistive technology in the urban spaces in order to enhance the experience that people

with disabilities have in these spaces, extending to a considerable number of citizens the gain envisaged by SC initiatives" [20].

Nam & Pardo organized the definitions according to three dimensions depending on some recurrent characteristics:

- **Technology dimension:** The use of urban information and communication technology (ICT) infrastructure to improve quality of life is the main driver for the smart city. The concepts included in this dimension are Virtual City; Digital City, Wired City, Information City, Intelligent City, and Ubiquitous City;
- **Human dimension:** It includes human capital and it binds smart city to education, citizens, learning and knowledge. This dimension includes the concepts about Learning City and Knowledge City;
- **Institutional dimension:** The combination of technological and human dimensions is very important but without cooperation between stakeholders and institutional governments, it will be difficult to develop a smart city project. This dimension concerns the concepts about Green City, Smart Community and Sustainable City [12].

4 Citizen Participation in Smart Cities

Citizen participation is the key challenge to develop a smart city project since the main objective of a smart city is to improve the quality of life of citizens. Thus, all actions should be done in cooperation with citizens and stakeholders. Otherwise, the smart city will not achieve its objectives.

In fact, ICT technologies are certainly the main driver of any smart city project, but without considering people, technologies and strategic visions will not create public value for citizens [21].

Hollands 2008 criticized the smart city approach based on the use of ICT only, and argued that Smart cities should start with people and human capital of the city: "Progressive smart cities must seriously start with people and the human capital side of the equation, rather than blindly believing that IT itself can automatically transform and improve cities." ICT should be adapted to citizen needs and used to empower and educate them in order to create a smart community in place of a smart city. Cities with more educated populations experience more rapid growth [22].

Actually, the most used and accepted definitions of smart city take into account this critique plus the other dimensions: "A city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance" [26].

Many scientists acknowledge citizen participation as the main component for smart city projects; decision-makers should innovate in interactions with citizens [23].

According to Berntzen & Johannessen (2015), Citizens can be involved as:

- **Democratic participants in the decision making process** and build sustainable local communities where every inhabitant cares for the other.

- **Main source of experience and competencies** in order to develop better solutions and plans. Thanks to competent citizens, problems can be avoided early and the risk of failure decreases.
- **Data collectors**; The citizens can help to collect data after the implementation of the smart city as data collectors by using mobile devices or other technologies, in this way, they will feel like an active and integral part of the smart city [24].

Other researches argue that the Quadruple Helix Model for innovation should be followed to create an alliance between the four pillars of innovation: university, government, industry, and civil society and involve them in the early innovation of the smart city process in order to develop new ideas that can meet social needs. The civil society is introduced as an important stakeholder, which has updated the classical triple helix model [25–27].

5 Survey About Citizen Participation in Smart Cities

5.1 Methodology

In order to compare cities initiatives for the citizen participation in smart cities projects and identify smart practices and new ways to increase civic participation, we have administered a survey to smart city experts from different cities in the world (n = 37 interviewed): Amsterdam, Chicago, Boston, Washington, Barcelona, Toronto, Mulhouse, London, Lethbridge, Coimbatore, Casablanca and Palo Alto. We got responses from 20 experts.

We administered the survey during the Smart City Expo in April 2018 in Casablanca, which helped us to meet respondents that are participating in a smart city projects development in their countries and serving in important positions like Mayor, strategy advisor - international smart city ambassador; Future Cities Council President, Ph.D. students, Professors; Intelligent Community Program Manager; CIO and Consultants.

5.2 Survey Highlights

This survey gives insights about smart city projects and citizen participation in different cities. Key topics explored include city priorities for smart city and citizen participation, city inclusiveness, budget allowed to citizen participation, Practices used to enhance citizen participation, citizen participation barriers.

Smart City Priorities: How important are each of the following objectives for smart city project in your country? (Check one box for each row.) (Fig. 1).

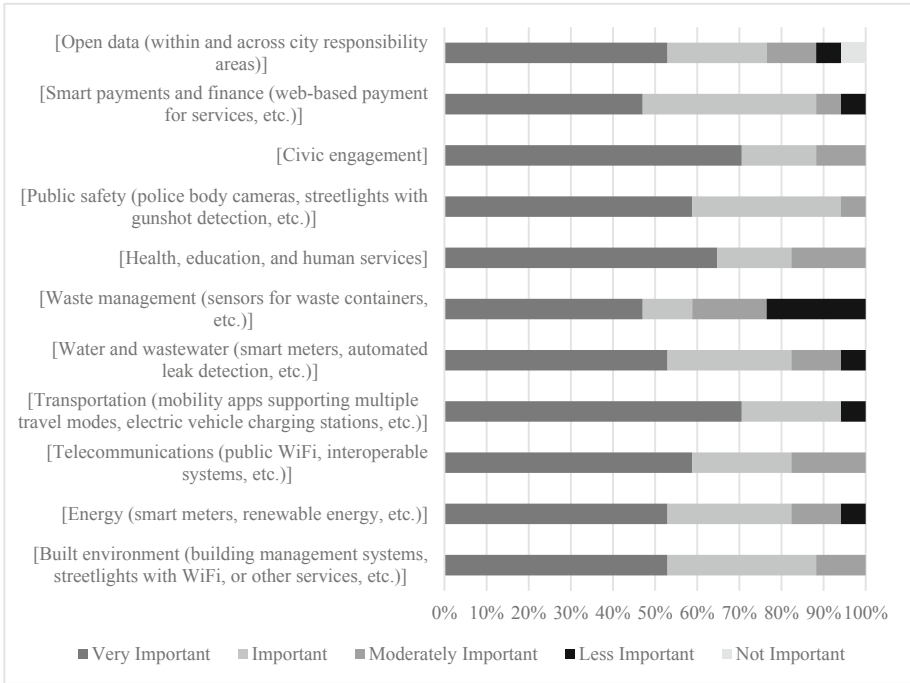


Fig. 1. Smart city priorities

Respondents most frequently identified smart city technologies as a priority in civic engagement and transportation, with 71% of respondents identifying these initiatives as a top priority in this area. Health, education and human services (65%), telecommunications (59%), public safety (59%), built environment (53%) were also among the top five sectors in which smart-city technologies were identified as a top priority by respondents. Other respondents chose to add other priorities and qualify them as very important like cybersecurity, big data for urban informatics, embedded computing, and networks for smart cities, regulation, public facilities and an open-air ground for people, interoperable data rather than open data.

Citizen Participation Priorities: How important are each of the following benefits in motivating your local government to implement or expand the citizen participation in a smart city project? (Check one box for each row.) (Fig. 2).

Enhanced services for residents and open/sharing data was identified as the most important benefits from citizen participation in a smart city project by the respondents, Economic development and administrative efficiencies were also among the top five benefits.

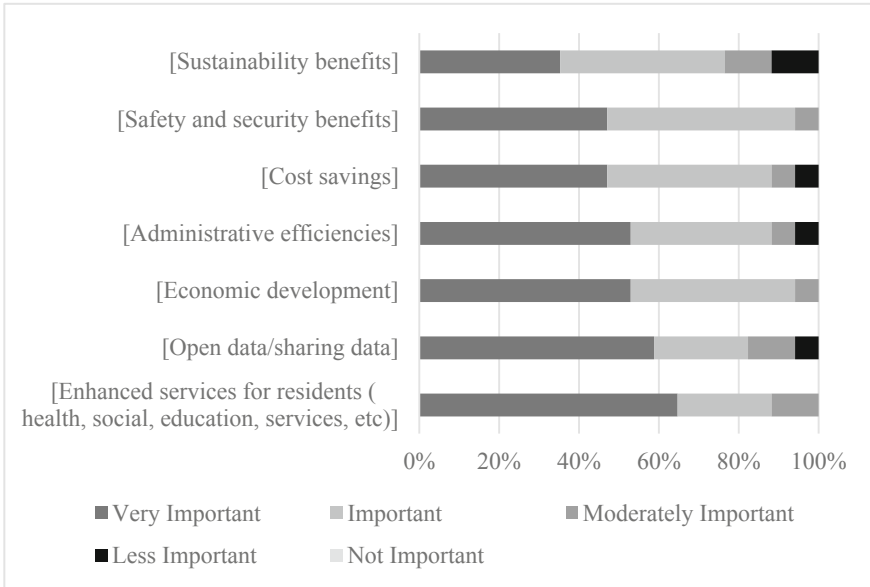


Fig. 2. Citizen participation in Smart cities benefits

Budget Allocation to Citizen Participation: Does your local government typically allocate a certain amount of funding for civic engagement in a smart city project? (Fig. 3).

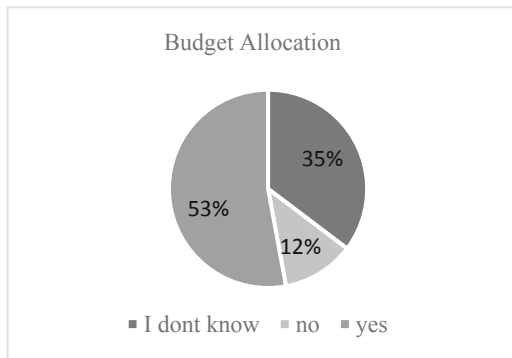


Fig. 3. Budget allocation

If yes, on average what percentage of the project budget is typically allocated for civic engagement?

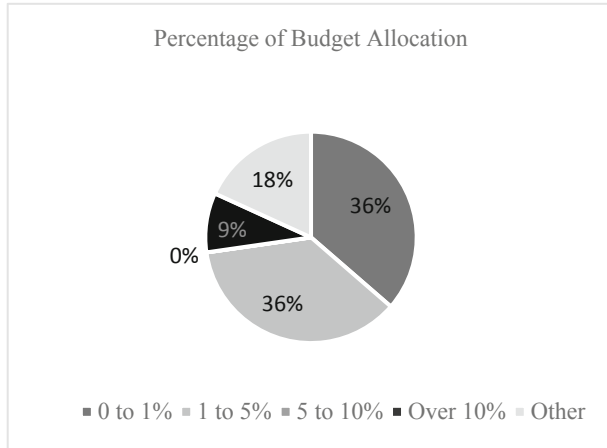


Fig. 4. Percentage of budget allocation

Only half of the respondents think that their cities are allocating a certain amount of funding for civic engagement in a smart city project and 72% of them ranged the budget from zero to 5%, which means that even if decision-makers are aware of the importance of citizen participation, they do not give enough budget for it (Fig. 4).

Practices Used to Enhance Citizen Participation: Which of these practices do you use in your city to enhance citizen’s participation in your city? Please rate it (Fig. 5).



Fig. 5. Practices used to enhance citizen participation

Among seventeen practices suggested to respondents, allowing access to city services via smartphones; reporting service problems via mobile app; being involved in the planning of the new public services; participation in political decisions concerning issues of citizenship’s interest; creation or expansion of public wireless networks, were the top five practices. This proves that smart city experts insist on the important role of citizens in the early stage of planning public services as co-creators, also as experiences providers by reporting problems.

Free courses in computer literacy for youth and adults were also identified as an important practice by 47% of respondents, which highlight the smart city experts’ awareness about City inclusiveness.

Citizen Participation Barriers: To what extent do each of the following issues represent barriers for your community to implement or expand the citizen engagement in a smart city project? (Check one box for each row.) (Fig. 6).

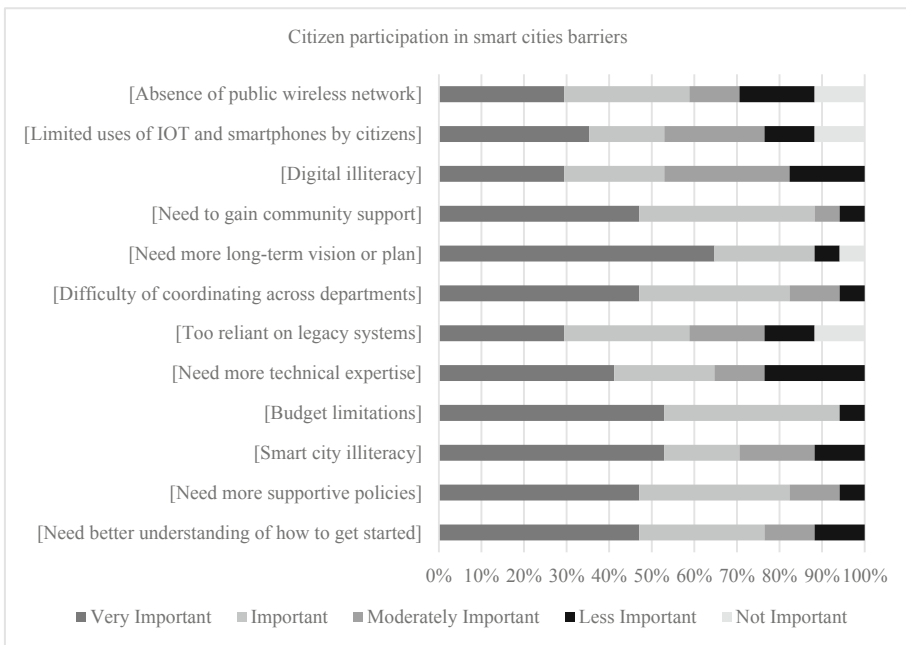


Fig. 6. Citizen participation in smart city barriers

Approximately 70% of responding smart city experts indicated that the need for more long-term vision or plan is the most significant citizen participation barrier. More than half of respondents (53%) agreed that smart city illiteracy and budget limitations are preventing decision-makers from involving citizens in their smart city projects. Needs for a good start, community supports, supportive policies, and coordination across departments are also very significant barriers according to 47% of respondents.

5.3 Summary

In summary, according to survey participants, smart city technologies are a priority in civic engagement and transportation, health, education, and human services. Enhanced services for residents and open/sharing data was identified as the most important benefits from citizen participation in a smart city project. Respondents highlighted also the need for a budget's allocation for citizen participation in smart cities; they are more likely to involve citizens in the early stage of planning public services as co-creators, also as experiences providers by reporting problems. They are also willing to provide free courses in computer literacy for youth and adults in order to build an inclusive smart city.

Based on survey results, the need for more long-term vision or plan; smart city illiteracy and Budget limitations are the most significant barriers for citizen participation in smart cities.

6 Conclusion

In order to answer the research question: “**How to enhance citizen participation in a smart city project?**” we presented in this article a literature review about smart city, citizen participation theory and citizen participation in smart cities. Then, we evaluated citizen participation in smart city in practice among a survey administered to smart city experts from different cities in the world.

The first key finding is that smart city experts are aware of the importance of citizen participation in smart cities and identified it as a priority. They are more likely to involve citizens in the early stage of planning public services as co-creators and after delivering services as experiences providers by reporting problems. We notice also an interest in the role of citizens as data collectors, indeed citizens can provide decision-makers with important data. Thanks to this data, they can get valuable insights to provide services to many sectors in the smart city, as well as improve citizens' experiences and create new business opportunities [28].

City Inclusiveness was also among the major concerns of respondents since they agreed that smart city illiteracy is preventing them from involving citizens in their smart city projects, they are also willing to give free courses in computer literacy for youth and adults in order to reduce the digital divide. Actually, decision-makers should create a good environment for developing a smart city for all and promoting city inclusiveness.

Our study noted also a lack of long-term vision and specific budget allocation for citizen participation in smart city, which provides a significant barrier. Local government should not only act as the initiator of new policies but also the main organizer of citizen participation, knowing that citizen participation level increases when it comes to implementing a policy already agreed on by local government [29].

We acknowledge that our survey has a relatively reduced sample, however, respondents are participating in a smart city projects development in their countries and serving in important positions like Mayor, strategy advisor...etc., which can offer a first impression of what citizen participation in smart cities currently looks like. We also

believe that our findings can help both researchers and local governments further. Academically, researchers can try to address the research gap about citizen participation in smart cities and come up with smart practices to enhance citizen participation. Governments can take lessons from our survey highlights, namely, the citizen participation barriers in order to update their policies and support financially citizen participation.

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