# BALANCING SMART CITY STAKEHOLDERS' EXPECTATIONS: CASE OF KAZAKHSTANI CITIES

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**Abstract.** In Kazakhstan, the implementation of individual Smart City initiatives began more than ten years ago. Comprehensive goal setting was carried out in 2017 as part of the Digital Kazakhstan state program, and a comparative rating for the cities is being calculated from 2020.
The article describes major factors that influence stakeholders' expectations and limitations associated with the unbalanced penetration of Smart City technologies. The article substantiates the need to adjust the national policy and change priorities for successful Smart City projects.
**Keywords:** city management, smart city, interviews, officials, sustainability.
**JEL code:** O35

**Аңдатпа.** Қазақстанда Smart City жеке бастамаларын жүзеге асыру он жылдан астам уақыт бұрын басталған. «Цифрлы Қазақстан» мемлекеттік бағдарламасы аясында 2017 жылы кешенді мақсат қою жүргізілді, 2020 жылдан бастап қалалар бойынша салыстырмалы рейтинг есептелуде. Мақалада мүдделі тараптардың күтулеріне әсер ететін негізгі факторлар мен Smart City технологияларының теңгерімсіз енуіне байланысты шектеулер сипатталған. Мақалада сәтті Smart City жобалары үшін ұлттық саясатты түзету және басымдықтарды өзгерту қажеттілігі негізделеді.
**Түйін сөздер:** қала менеджменті, смарт қала, сұхбаттар, шенеуніктер, тұрақтылық.
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**Аннотация.** В Казахстане реализация отдельных инициатив Smart City началась более десяти лет назад. Комплексное целеполагание проведено в 2017 году в рамках госпрограммы «Цифровой Казахстан», с 2020 года рассчитывается сравнительный рейтинг по городам. В статье описаны основные факторы, влияющие на ожидания стейкхолдеров и ограничения, связанные с несбалансированным проникновением технологий Smart City. В статье обосновывается необходимость корректировки государственной политики и изменения приоритетов для успешных проектов Smart City.
**Ключевые слова:** сити-менеджмент, умный город, интервью, чиновники, устойчивость.
**JEL код:** O35

## Introduction

Each city is a unique system of systems with a common goal to improve people's living conditions and advance human well-being *(Gardner, 2017).* Given that Smart City's introduction is based on progress or even a revolution in information and communication technologies, there is a natural bias toward technological innovations, a shift in the ratio of social and technical aspects of development *(Kopackova, et al., 2017).* This situation is especially typical for cities at the initial stage of implementing Smart City *(Lu, et al., 2019).* The standards used in Smart City's field allow us to compare technology implementation quality and level in a reasonably limited range of impact (domains)

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*(Lai, et al., 2020).*

Current discussions about the need to implement Smart City are twofold. On the one hand, Smart cities are presented as the only correct solution or panacea for solving urban problems. On the other hand, there is an understanding that Smart City is expected to lead to societal change, with cities having to adapt to new technologies to mitigate the social impacts of changes *(Goi, 2017).*

The Smart City concept has not yet encountered the problems mentioned above in Kazakhstan, as the plans focus mainly on developing telecommunications infrastructure *(The Parliament of the Republic of Kazakhstan, 2020; Dubirova, et al., 2019).*

Since the 2010s, development strategies have focused on infrastructure development, and only in a few cities do citizens feel the smartification. In recent years, pollution problems, the inefficiency of administrative services, inefficient management, and the high cost of services in housing and communal services have been on the agenda of interaction between society and the state *(The President of the Republic of Kazakhstan, 2018).*

According to official data, the level of urbanization in Kazakhstan is 59.6%, and there is a significant regional variation: from 24.5% in Almaty region to 80.8% in Karaganda region. The country-level is very low, and in the Urban Population Index 2019, Kazakhstan ranks 103rd out of 195 countries globally *(World Bank Data Bank, 2020).*

By 2050, the Belt and Road countries' population is expected to grow to 64% *(Liu, et al, 2018).* For Kazakhstan, the expected growth is evaluated from 21.4 *(Starr, et al., 2016)* to 22.4 million people by 2040 and the level of 24.0 million people by 2050 *(World Population Prospects, 2019).*

Since 2017, the Kazakhstan government has been implementing the «Digital Kazakhstan» program, which partially determines the developing smart cities' policies. The goals are to digitalize the economy and the state, develop the «Digital Silk Road» initiative and human capital, and create an innovative ecosystem. It is assumed that the state will act as a catalyst for development in each block.

Data describing the current urban development level was collected and assured by semi-structured interviews with experts and city managers. According to the administrative division, there are 88 cities in Kazakhstan, with 48 regional significance cities among them *(Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, 2020b).* The entire urban population at the beginning of 2020 was 10.938 million people, or 58.7% *(Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, 2020a).*

Within the framework of this work, Kazakhstan's Smart City projects' focus was studied, their compliance with global trends in the smartification of cities, and General changes in socio-technical systems at the national and urban levels.

Identifying differences related to different initial situations and development goals of different cities allows us to assess the achievability of the declared goals of smartification. This approach makes it possible to assess the state's efforts to promote industrial development and understand the changes in society due to increasing the level of technology. The research questions are as follows: what, if any, signs of unbalanced efforts indicate the need to transform urban development policies from a socio-technical perspective? Does the articulated approach consider key stakeholders' expectations of smart development in Kazakhstan's cities?

The government portal presents the Smart City rating for the largest Kazakhstani cities, including more than 110 indicators in 11 areas: health, education, security, transport, social spheres, ecology, business and tourism, utilities, construction, and agriculture *(Government portal, 2020).* The list of indicators also contains about 20 indicators that characterize the intensity of technology use. The most developed cities are Almaty and Nur-Sultan, which have made significant progress on the indicators.

This paper evaluates the stakeholders' expectations and features of Kazakhstan's digital agenda concerning the development of urban systems and the introduction of the Smart City concept based on the progress of technological, managerial, and socio-technical parameters. From an applied point of view, it is recommended to change policies and approaches for the Smart City concept implementation. This experience may be useful for city managers as a starting point

for (re) developing plans and smart city projects.

**Literature Review**

Most of the studies devoted to the implementation of Smart cities have been conducted relatively recently and, at the same time, reflect the need to raise awareness in academic and political circles on the implementation of truly smart and sustainable cities *(Yigitcanlar, et al.,2019).*

For example, Tan, S. Y., Taeihagh, A. on a study of 56 cases of introduction of the concept of Smart City in developing countries show that it is necessary to conduct socio-economic, humanitarian, legal, and regulatory reforms simultaneously with technological innovations *(Tan, et el., 2020).*

Odendaal, N. proves that information and communication technologies stimulate quality management development and create conditions for growth and amplification *(Odendaal, 2003).*

Examples of several European cities described by Cortés-Cediel, M. E., Cantador, I., Bolívar, M. P. R. argue that smart cities complement smart government. In particular, it is noted that new technologies can make the government more open and bring it closer to understanding citizens' needs *(Cortés-Cediel, et al., 2018).*

Shalbolova U., Kenzhegaliyeva Z., exploring Kazakhstan's case, determines that it is necessary to coordinate urban development policies at national and local levels *(Shalbolova, 2019).*

Bibri, S. E., Krogstie, J. proved that the success and sustainability of smart cities are provided by the legitimization of the use of information and communication technologies at the level of institutional, social relations and also depends on the efforts of transformation, the change in the ratio of competences and powers *(Bibri, et al., 2017).*

A study conducted by Yigitcanlar T., Kamruzzaman M., Foth M., Sabatini-Marques J., da Costa E., Ioppolo G. identified three problem areas in the implementation of Smart City: technocentrism, practical implementation difficulties, and the trial-and-error approach itself *(Yigitcanlar, et al., 2019).*

Studies determine the directions of solving urban problems using smart technologies, involving citizens in developing ideas and solutions and indicate that the implementation of Smart City is a challenge for city management and the state as a whole *(Kirimtat, et al., 2020).*

The development of European cities makes it possible to rank them according to various parameters, compare achievements in terms of technology efficiency, citizen involvement in management, and other parameters *(Yeh, 2017; Sikora-Fernandez, 2018).* Studies on the implementation of Smart City in developing countries reflect significant variability in technologies *(Shen, et al., 2018; Dameri, et al., 2019).* Cities that have chosen the path of Smart City development vary significantly in their level of achievement *(Aina, 2017; Junior, et al., 2018; Turgel, et al., 2019).*

Thus, research can be divided into three categories. The first one defines the essential characteristics that define Smart City, strategic parameters of urban development, and main directions of development *(Giffinger, et al., 2007).* The second one details procedures, individual components, and development indicators *(Albino, et al., 2015; Anthopoulos, et al., 2016).* The third category forms an understanding of the need to assess Smart City's quality based on changes in the level of openness, proactivity of citizens, and smart management *(Lee, et al., 2014).*

Several studies conduct a comparative analysis of urban development based on a set of criteria *(Silva, et al., 2018).* Comparison is possible for various parameters *(Huovila, et al., 2019).* Still, in this paper, we consider the parameters of the top level of the Smart City taxonomy: the coincidence or difference of development goals, key elements and methods or development plans, the balance ratio of technology efficiency and social orientation.

The basic guiding document for the implementation of the concept of smart cities in Kazakhstan is a government program that defines the following goals "designed to accelerate the development pace of the Kazakh economy and improve the quality of our citizens life" *(The Parliament of the Republic of Kazakhstan, 2020).*

**Research Methodology**

In this work, we used official documents, statistical data, information from articles describing the level of development

of the Smart City concept in Kazakhstan, and data on the Smart City rating of cities in Kazakhstan in 2020.

Critical stages of the methodology used: expanded categorization of the list of indicators used to assess the development of Smart cities in various cities and clarification of research questions; development of comparative analysis criteria that address research questions, and assessment of the level and prospects of development of Kazakhstan's smart cities based on high-level criteria. As part of the last stage, semi-structured interviews were conducted with employees responsible for implementing Smart City projects in Kazakhstan's largest cities.

The interviews were conducted in October 2020, and specialists from Almaty, Astana, Pavlodar, and Shymkent involved in urban development planning were interviewed. The purpose of the interview was to obtain information from stakeholders, clarify the parameters of implementing the Smart City concept, goals, and implementation plans, and receive comments on the set of indicators used in the Kazakhstan smart city rating.

The use of indicators defining a Smart City's measurable characteristics requires adjustment based on the research hypothesis. Each indicator has a certain logic and corresponds to a specific type of characteristic or block of indicators *(ITU, 2016; ITU, 2018; Sharifi, 2019)*. As a method, categorization of indicators allows analysis and compares the development of cities, despite the significant differences in the taxonomies used. Combining and enlarging categories of indicators enables the maintenance of a balance between excessive enlargement and detailing of indicators; makes a process of interpretation of results more applicable for decision-making, especially in case of cross-value of indicators *(Huovila, et al., 2019)*.

### Data and Analysis

The largest cities in Kazakhstan are also regional centers, which determine their role and status both in political and administrative management and in the system of allocating budget resources for their development. There are only three large agglomerations in Kazakhstan, with a total population of just over 4.0 million people:

Nur-Sultan (1.1 million), Almaty (1.9 million), and Shymkent (1.0 million people).

According to the interviews obtained, the directive nature of the planning of implementing the concept of smart cities on the initiative of the central government body was confirmed. In the case of Nursultan and Almaty, the implementation of individual smart city projects was initiated before the approval of the Digital Kazakhstan state program. Successful security and transport projects were used as examples and justified projects to be replicated in other cities.

No program for the development of digital cities contains points for motivating the involvement of citizens in the city management system. The interviewees confirmed the technological bias towards the development of smart cities. Separate comments were received from interviews on Pavlodar and Shymkent as cities with the least developed ICT infrastructure. The cities of Almaty, Shymkent, and Nur-Sultan set the trend of smartification and determined the requirements for changing the norms, legislation, and standards of the Smart City level. Other cities adopt experiences and implement successful projects on a smaller scale, such as Smart Akkol, Smart, and others *(Government portal, 2020)*.

According to the administrative division, 40 cities in Kazakhstan have national significance, and 48 are regional importance cities *(Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, 2020a)*. The total urban population at the beginning of 2020 was 10.938 million people or 58.7%.

The main characteristics of the Smart City implementation approach practiced in Kazakhstan can be summarized as follows: (1) demonstration of technologies in all cities and promotion of the idea of technological improvement, (2) focus on infrastructure development, (3) breaking the goals and existing conditions for implementing digital solutions. The latter statement is very critical since technologies cannot be immediately applied to citizens' lives. Setting unattainable goals leads to a distortion of perception and loss of motivation to implement them.

National-level policies determine the need to develop an urbanized territory, which provides for the interaction of urban services and automation of life support systems, including the development of heat supply

systems, water supply, sewerage, and the housing and communal sector. It is planned to introduce standard management systems and architectures at the city level. The implementation of the concept is recommendatory, as it contains a list of possible solutions to be applied. None of the state planning system documents includes direct funding for initiatives, and accordingly, the design used does not ensure the sustainability of Smart City implementation. The projects' success is also highly questionable, as there is no information on the progress of new initiatives in the period 2018-2020.

Key elements of Smart City implemented since 2017 in Kazakhstan cover initiatives in the field of education, healthcare, transport, urban administration, economy and business, security, ecology, housing, and communal services *(Ministry of Information and Communications of the Republic of Kazakhstan, 2020; Ministry of Internal Affairs of the Republic of Kazakhstan, 2020).*

The Smart City rating of Kazakhstani cities developed by the government company includes more than 110 indicators in 11 areas: health protection, education, security, transport, social spheres, ecology, business and tourism, public utilities, construction, and agriculture *(Government portal, 2020).* The development of information and communication technologies was also monitored by 20 indicators that characterize technology use intensity. The list of indicators used partially coincides with those used in international practice *(Lai, et al., 2020; Huovila, et al, 2019).*

Comparing the program documents' objectives and the rating reveals the discrepancy between the goals and initiatives declared in the program documents and the criteria that monitor progress in the implementation of Smart City initiatives. It can be argued that there is a bias towards monitoring infrastructure indicators, indicators of physical infrastructure availability, and not services or services in the entire list. Thus, the approach used in Kazakhstan distorts the signals in the Smart City implementation management system city.

The ratio of technological efficiency and social orientation is also not observed. Moreover, the implementation goals are not

obvious and are dictated by the need to form a service infrastructure. The Smart City concept initiatives are limited to developing "non-participative" factors, mainly focusing on improving the state of infrastructure and listing a set of technologies that can be implemented theoretically without considering the demand and availability of financial opportunities.

The introduction of Smart City technologies in many countries catalyzes the development of democratic institutions, as it implies the need for simultaneous adjustment of the legislative framework, policies, and organizational changes in the public administration system.

In Kazakhstan, the imbalance of measures is evident since no initiatives provide real smartification, ensuring changes in urban development management models and interaction systems between citizens and the state. The task of introducing technologies to increase the responsibility of city authorities for their decisions is absent. Real smartification nowadays radically increases the requirements for transparency and the availability of competencies for conducting a dialogue with the population in the "city as a platform" format *(Repette, et al., 2021).*

Specific problems in major cities are:

1) lack of integration of management systems and projects Smart City as a result of preservation of administrative nature of activities of the city government;

2) the problem of low engagement of citizens in the planning, despite the permissible 2018 the possibility of forming a participatory budget;

3) the lack of risk management implementation of smart technologies and impact assessment;

4) the lack of transparency of financial flows generated by the use of modern Smart technologies;

5) preservation of the archaic system of distribution of powers and resources in the city management system;

6) lack of mass participation of citizens due to the underdevelopment of digital channels of interaction and formal application of the Institute of public hearings, local self-government;

7) lack access to information, knowledge, and experience in using Smart City technologies, except for individual

project reports.

The Smart City concept implies a change in social relations, lifestyle, type, and form of participants' actions. Simultaneously, most of Kazakhstan's cities' announced plans are declarative, without assessing the created added value for citizens. The need to balance the expectations of various players involved in the implementation of the Smart City concept is confirmed by several studies *(Kummitha, et al., 2017; Mora, et al., 2017; Albino, et al., 2015)* and determine the need to refine strategies considering the real needs of the parties *(Richter, et al., 2015).*

Since technologies alone cannot ensure the consolidation of organizational, human, institutional, and political factors to create a real Smart City, it is necessary to recognize the underestimation of human impact factors in the current Smart City development plans at the national level. It is aso confirmed that links between the state and civil society are weak, as stated by recent researches *(Iskakova, et el., 2021).*

Currently, the concept of Smart City in Kazakhstan does not cover the necessity of change in legislation regulating citizens' participation in city management processes. There are no tools that ensure the application of social inclusion components in Smart city management in practice. Accordingly, the stakeholders' expectations of more efficient resource allocation should be prioritized.

The current Smart City implementation approach in Kazakhstan is shifted towards infrastructure development and the promotion of individual projects promoted by successful technology solution vendors. The development planning system at the national and urban levels does not fully consider the need to stimulate demand for technology on the part of citizens. None of the projects or initiatives aim to change the status quo or the relation model between citizens, businesses, the state, or non-governmental organizations. Therefore, there is a high probability that citizens' expectations of more involvement or citizen participation will not be ensured.

**Conclusion**

The Smart City concept is the technology of the future for Kazakhstan. The potential allows addressing the upcoming challenges of social and public changes. In many cases, using modern technologies by default is considered the best solution to problems. However, the city as a system of systems should be constructed on citizens, businesses, and city management expectations on processes changes and interaction rather than on infrastructural development.

Undoubtedly, the state's participation in Smart City development is a positive factor that signals city authorities and solution providers about the need and opportunities for engaged parties. The government encourages investment by demonstrating interest in implementing various solutions. It is still necessary to manage and balance smart services and technological innovations, especially participatory technologies and infrastructure enhancement, city and citizens interaction tools.

Numerous studies show that the smart city implementation strategy significantly improves city governance quality through greater transparency, accountability, and citizen involvement in decision-making *(Cabannes, 2004).* Citizen participation ensures a significant contribution to the overall improvement of public administration and the development of democratic institutions *(Paskaleva, 2009; Mendybayev, 2022).*

In these policies, little attention is paid to successful implementation's key factors: involving citizens in managing urban development, assessing the real need and effects of implementation, and creating conditions for an interaction.

The rapid development of technologies without ensuring the development of citizen participation elements of Smart City will not allow achieving the planned effects. A combination of democratization processes and the use of modern participatory technologies would allow the young generation of Kazakhstanis to develop the necessary skills for sustainable development of participation in public administration, improve the quality of living and competitiveness of each city on a regional and global scale.

Real smart cities have a much longer path of change to take than just implementing technology. In Kazakhstan, smart cities should take the risks of using technology, eliminating the inequality of stakeholders' positions in the development of

the city, empowering ordinary citizens.

Thus, Kazakhstan will have to develop more balanced interaction models between the state, city authorities, and citizens in promoting Smart City. It is necessary to expand the list of priority projects to develop tools for joint planning of the urban environment, involving citizens in monitoring and evaluating the policy and quality of an urban project. The transition to more complex models of interaction between citizens and the city is inevitable and should be used for cities' real smartification.

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## SMART CITY МҮДДЕЛІ ТАРАПТАРЫНЫҢ ҮМІТТЕРІН ТЕҢЕСТІРУ: ҚАЗАҚСТАН ҚАЛАЛАРЫНЫҢ МЫСАЛЫНДА

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## БАЛАНС ОЖИДАНИЙ ЗАИНТЕРЕСОВАННЫХ СТОРОН SMART CITY: НА ПРИМЕРЕ ГОРОДОВ КАЗАХСТАНА

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