DIGITAL TRANSFORMATION OF THE CITY MANAGEMENT PROCESS

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Abstract. The digital transformation of the city management process is fundamentally changing the way cities work, increasing efficiency, sustainability, and the quality of life of the population. Digital technologies are important for the further transformation of cities, increasing innovation and global competitiveness. To improve the methods for assessing digital processes, a multivariate econometric regression model was developed to assess the impact of urban economic development. This allows us to determine the characteristics of the impact on urban planning, as well as identify key factors. Foreign and domestic experiences aimed at urban development are based on reliable data, the results of which are of practical importance for effective urban planning. Based on the SWOT analysis associated with the research initiatives, the possibilities of introducing digital technologies in cities were studied. Based on the research conducted, recommendations were developed to optimize the city management process. Emphasis is placed on data protection, inclusiveness, and the need to attract investments. The main conclusions show that digital technologies streamline urban processes, enable data-based decision-making, and improve the quality of public services. The importance of the research results lies in the possibility of practical implementation of the effectiveness of urban management within the framework of digital transformation.
Key words: digital transformation, city, digital government, information technology, strategy

Аңдатпа. Қаланы басқару процесінің цифрлық трансформация қалалардың жұмыс істеу тәсілін түбегейлі өзгертіп, тиімділікті, тұрақтылықты және халықтың өмір сапасын арттырады. Цифрлық технологиялар қалаларды одан әрі трансформациялау, инновациялар мен жаһандық бәсекеге қабілеттілікті арттыру үшін маңызды. Цифрлық процестерді бағалау әдістерін жетілдіру үшін қала экономикасының даму әсерін бағалауда көп айнымалы эконометриялық регрессия моделі әзірленді. Бұл қалалық жоспарлауға әсер ету сипаттамасын анықтауға, сондай-ақ негізгі факторларды анықтауға мүмкіндік береді. Қаланы дамытуға бағытталған шетелдік және отандық тәжірибелер тиімді қалалық жоспарлау үшін практикалық маңызы бар нәтижелері сенімді деректерге негізделген. Зерттеу бастамаларымен байланысты SWOT-талдау негізінде қалаларда цифрлық технологияларды енгізу мүмкіндіктері зерттелді. Жүргізілген зерттеу негізінде қаланың басқару процесін оңтайландыру бойынша ұсыныстар әзірленді. Деректерді қорғау, инклюзивтілік және инвестициялар тарту қажеттілігіне баса назар аударылады. Негізгі қорытындылар цифрлық технологиялар қалалық процестерді ретке келтіретін, деректерге негізделген шешім қабылдауға мүмкіндік беретін және мемлекеттік қызметтерді алу сапасы жақсартатынын көрсетеді. Зерттеу нәтижелерінің маңыздылығы цифрлық трансформация шеңберінде қалаларды басқару тиімділігінің іс жүзінде жүзеге асыру мүмкіндігінде.
Түйінді сөздер: цифрлық трансформация, қала, цифрлық үкімет, ақпараттық технологиялар, стратегия

Аннотация. Цифровая трансформация процессов городского управления кардинально изменит способ функционирования городов, повысив эффективность, устойчивость и качество жизни горожан. Цифровые технологии имеют решающее значение для дальнейшего преобразования городов, стимулирования инноваций и повышения глобальной конкурентоспособности. Для совершенствования методов оценки цифровых процессов была разработана многомерная эконометрическая регрессионная модель для оценки влияния развития экономики города. Это позволяет нам охарактеризовать влияние на городское планирование, а также выявить ключевые факторы. Зарубежный и отечественный опыт развития городов базируется на достоверных данных, результаты которых имеют практическое значение для эффективного городского планирования. На

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основе SWOT-анализа, связанного с исследовательскими инициативами, были изучены возможности внедрения цифровых технологий в городах. На основе проведенных исследований были разработаны рекомендации по оптимизации процесса управления городом. Особое внимание уделяется защите данных, инклюзивности и необходимости привлечения инвестиций. Основные результаты показывают, что цифровые технологии оптимизируют городские процессы, позволяют принимать решения на основе данных и повышают качество государственных услуг. Значимость результатов исследования заключается в практической реализации эффективности управления городом в рамках цифровой трансформации.
Ключевые слова: цифровая трансформация, город, цифровое правительство, информационные технологии, стратегия

Introduction

In many countries, traditional approaches to local governance are being re-examined and re-structured, re-imagining the role and purpose of local authorities. These changes have led to the emergence of a “new urban management” associated with a paradigm of public governance described as “new public governance” [1]. But new urban management involves the development of a set of management tools for city governance, such as consumer-based decision-making and public service delivery. The changing roles of politicians, managers and citizens in local governance are also driving innovation in public service management. Successful urban management in the 21st century is associated not only with managerial innovation but also with democratic renewal [2]. Local economic and social interests, as well as innovative approaches to community development, need to be considered as part of the governance agenda and will allow for improved service delivery to citizens.

There are significant differences in the ways in which local government has grown and developed over the years across countries. These need to be considered in any cross-national analysis of urban management. Thus, the constitutional position of local government, the powers, and functions of elected local authorities, and so on, vary across nation-states [3]. However, the value of the new perspective on urban governance is not to put the complex issues of different countries on a single agenda for the modernization of local government, but rather to provide a set of indicators that help us understand how the processes of urban governance are changing and how cities will change in the future.

Digital technologies are increasingly being implemented in the modern urban structure. The problem in cities is twofold: on the one hand, as centers of attraction, cities need to expand the information field using innovative technologies, and on the other hand, the consistent introduction of innovations into urban life is one of the most difficult tasks [4].

The main parameters of cities are aimed at improving the ability to build, saving resources, intelligence, and quality of life. The criteria for the intelligence of a city are environmental compatibility, safety, energy efficiency, and maximum comfort of living [5].

The digitalization of urban processes, as well as the increase in urbanization, leads to the need to optimize processes in urban spaces. According to United Nations research, in 2018, 55.3% of the world's population lived in urban areas, and it is predicted that this figure will reach 60.4% by 2030 [6]. These facts indicate the need for innovative approaches and strategies in planning and ensuring a quality of life through concepts such as agricultural production planning, education, healthcare, traffic optimization, inefficiency in traditional urban management, lack of data-based decision-making, etc.

The purpose of the study is to study the digital transformation of the process of optimizing the urban structure as a special approach to urban planning, where digital technologies are used to increase the efficiency of the operation of urban infrastructure and to manage it operationally. Cities need to create a holistic infrastructure managed by data processing centers capable of storing a large amount of information received from various systems and objects of the "smart city". Thus, it can become an information hub, corresponding to the function of the city center, as a large-scale object of a completely new type, due to its unique characteristics.

By implementing digital technology, cities want to facilitate the interaction of citizens with government and other actors to enrich the existing relationship between the

local and economic environment [7]. Smart city initiatives clearly indicate that they aim to improve urban productivity by using data, information, and digital technologies to provide more efficient services to citizens, monitor and optimize existing infrastructure.

In this context, new paradigms of life in society require the management processes of urban centers to use innovation, creativity, and planning to solve the challenges of social life [8]. Cities are complex ecosystems inhabited by people with diverse interests, who are called to cooperate with each other, striving to achieve a sustainable environment and an adequate standard of living. Accordingly, cities can use information technology in their governance processes to understand and create smart solutions to the demands of the public and private sectors. This phenomenon represents the convergence of two trends, the digital revolution, and the urbanization process towards becoming a smart city [9]. The idea of a smart city is a motivator for developing policies that contribute to improving society and, therefore, the quality of life of citizens [10]. It confirms that the basis of cities is the integration of human capital, social capital, and information, using digital technology infrastructure to improve economic development, improving the well-being and quality of life of the population. Therefore, quality of life is a key element in the development of cities.

Materials and methods

The following methods and research principles were used during the study:

- Description of the research methodology – a multivariate econometric regression model was determined by analyzing statistical data based on quantitative and qualitative methods. Multivariate econometric regression models are used to analyze and predict relationships between several independent variables and one dependent variable.

- City Data Collection. Case studies of cities implementing digital tools are compiled, providing several examples of cities that have successfully implemented digital tools to improve urban governance and improve the quality of life of their citizens.

- SWOT analysis used to assess the effectiveness of digital transformation in cities. Based on the SWOT analysis, the strengths, weaknesses, opportunities, and threats of the city management process were identified.

Results

The world's population is growing, and with this growth, new strategies are being planned to ensure a better life for humanity. New initiatives and innovative technologies are emerging in several ways, contributing to a new wave of innovation in city services [11]. Digital technologies help connect city residents with key areas of urban services such as transportation, governance, education, healthcare, public services, public openness, and citizen rights, etc [12].

Urban governance involves the management, service delivery, organization, and policy formulation of urban communities located in urban areas. It works to develop technologies to encourage citizen participation in various areas that have received attention in recent decades due to their impact on the quality of life of urban residents [13].

The evaluation of the urban governance process has revealed that it can only be solved by involving citizens in urban planning processes. The urban governance process plays a key role in involving citizens in urban issues [14]. In this context, it helps to bring the government and citizens closer together.

It highlights the need to use digital technologies to encourage citizen participation in decision-making processes, improve information and service delivery, and strengthen transparency, accountability, and trust. This increases the opportunities for new research into the issues of effective implementation of the urban governance process. By improving the efficiency of the governance process, citizens can quickly access services wherever they are.

The digital transformation of cities is not just about using technology. It also requires more interactive systems at key points in the city to bridge the gap between citizens and technology, as well as developing a model to assess the impact of

urban economic development on the city's needs.

Methods for developing an econometric model to assess the impact of urban economic development are considered by foreign scientists A. Alsharif, B. Pradhan [15], G. Zhang, Y. Jia [16] and domestic scientists S. Mukhametzhan, G. Zhunisbekova, M. Daueshov [17] in their studies, which use urban data and a correlation-regression model to determine the expansion of the city, and spatial econometric analysis based on urban data has yielded results and will lead to significant achievements in urban planning. Multivariate econometric models are widely used in various fields such as economics, finance, marketing, and agriculture. The proposed econometric model demonstrates the need for goals, priorities, and strategies for the digital transformation of the city.

Based on statistical data for 2023, we determine the dependence of the level of gross regional product for the management of cities in Kazakhstan on the volume of industrial production and the number of urban populations in the regions (Table 1).

Table 1. Dependence of the level of gross regional product in Kazakhstan on the volume of industrial production and the number of urban populations, *2023*

№	Regions	Gross regional product, *billion tenge*	Volume of industrial production, *billion tenge*	Urban population in the regions, *thousand people*
1	Abai	3 034,10	1 597,08	370 746
2	Akmola	3 685,30	1 793,15	441 997
3	Aktobe	4 717,85	2 544,95	692 467
4	Almaty	4 974,85	1 753,15	243 889
5	Atyrau	14 950,42	10 815,03	382 459
6	West Kazakhstan	4 811,06	3 527,14	386 775
7	Zhambyl	3 108,41	856,26	526 938
8	Zhetysu	1 923,71	325,23	310 599
9	Karaganda	8 449,35	3 531,68	922 380
10	Kostanay	4 613,16	2 670,33	515 257
11	Kyzylorda	2 860,04	1 043,54	391 207
12	Mangystau	4 867,00	3 065,80	346 958
13	Pavlodar	4 346,51	3 157,70	532 886
14	North Kazakhstan	2 229,28	674,86	258 935
15	Turkestan	4 166,43	1 054,75	519 243
16	Ulytau	1 949,73	1 141,37	175 100
17	East Kazakhstan	4 470,60	2 320,00	483 403
18	Astana city	12 874,96	1 933,02	1 354 556
19	Almaty city	24 828,71	2 096,03	2 161 902
20	Shymkent city	3 699,65	1 090,72	1 192 199

Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan

The general form of the multifactor regression equation (1) for our study is as follows:

$$\tilde{y} = a + b_1 x_1 + b_2 x_2 \quad (1)$$

The ordinary least squares system of equations (2) for estimating model parameters has the following form:

$$\begin{cases} na + b_1 \sum x_1 + b_2 \sum x_2 = \sum y \\ a \sum x_1 + b_1 \sum x_1^2 + b_2 \sum x_1 \cdot x_2 = \sum y \cdot x_1 \\ a \sum x_2 + b_1 \sum x_1 \cdot x_2 + b_2 \sum x_2^2 = \sum y \cdot x_2 \end{cases} \quad (2)$$

Where n is the number of regions and cities of republican significance in Kazakhstan.

y – gross regional product.

x_1 – volume of industrial production.

x_2 – the number of urban populations in the regions.

Substituting the found values of the sums into the formula, we obtain the following normal system of equations (3):

$$\begin{cases} 20a + 46991{,}79b_1 + 12209896b_2 = 120561{,}1 \\ 46991{,}79a + 203196078{,}21b_1 + 27909288055{,}86b_2 = 387378636{,}14 \\ 12209896a + 27909288055{,}86b_1 + 11746456184968b_2 = 113113303367{,}45 \end{cases}$$

(3)

Thus, by solving the system of equations using the inverse matrix method, the required regression equation takes the following form (4):

$$\tilde{y} = -2546{,}87344 + 1{,}201164223x_1 + 0{,}009422989x_2$$

(4)

The results show that with an increase in industrial production in Kazakhstan's cities by 1 billion tenge, the gross regional product will increase by 1.2 billion tenge per year. An increase in the urban population in Kazakhstan by 1 million people will lead to an increase in the gross regional product in each region by 0.009 billion tenge or 9 million tenge per year. Thus, we can say that there is an enormous potential for effective resource allocation and reduction of urban emissions to improve urban governance and the quality of life of urban residents in Kazakhstan.

The correlation coefficient of the multifactor regression equation (5) is estimated by the following formula and has a value between [-1:1]. If R=1, we get a positive result of the dependence of the level of gross regional product in Kazakhstan on the volume of industrial production and the number of urban populations, and if R=-1, we get a negative result. If R=0, it indicates that there is no dependence result:

$$R_{yx_1x_2} = \sqrt{\frac{r_{yx_1}^2 + r_{yx_2}^2 - 2 \cdot r_{yx_1} \cdot r_{yx_2} \cdot r_{x_1x_2}}{1 - r_{x_1x_2}^2}} = \sqrt{\frac{0{,}44^2 + 0{,}78^2 - 2 \cdot 0{,}44 \cdot 0{,}78 \cdot (-0{,}03)}{1 - (-0{,}03)^2}} = 0{,}91.$$

(5)

The resulting correlation coefficient value R=0.91 indicates a strong positive relationship and a high correlation coefficient indicates that changes in one variable can predict changes in the other variable. A value of 0.91 is close to 1, meaning that as one variable increases, the other variable also tends to increase. This regression model shows a high result of the change in gross regional product based on the factors of the volume of industrial production and the growth of the urban population in the regions. Thus, the level of gross regional product in Kazakhstan shows a close relationship between the volume of industrial production and a strong positive linear relationship between the number of urban populations in the regions and the gross regional product in the region. This means that as the number of urban populations in the regions increases, the gross regional product increases, and the relationship between these quantities is expressed quite strongly. If we analyze the relationship between the number of urban population and the volume of industrial production, the value of the correlation coefficient 0.91 indicates that the growth of the possibility of mass introduction of digital technologies in cities and the optimization of urban management processes are associated with the growth of the urban population and the increase in productivity in the production sector, and the effectiveness of the process of transferring work carried out in the urban environment to the digital environment.

Digital technologies help create data-driven environments that improve urban services and the quality of life of citizens. This can increase efficiency and accountability in areas such as transportation, energy management, and public safety in cities [18].

The digital transformation of urban governance processes requires significant decision-making to identify the needs and priorities of cities, using a clear roadmap, a reference model in innovation zones with knowledge and skills requirements. In addition, city-specific indicators that describe specific needs still need to be integrated into models for assessing the quality-of-service delivery.

How the introduction of digital tools is transforming urban governance and contributing to the development of cities. Examples from foreign countries and cities around the world that have successfully implemented digital tools to improve urban governance and improve the quality of life of city residents are shown in Table 2:

Table 2. Case studies of cities implementing digital tools

Cities	Examples
Cambridge, United Kingdom	The Digital Cities for Change project aims to integrate digital tools for better decision-making in urban planning and management. Supported by the Ove Arup Foundation and the Digital Built Britain Centre, the project works with local authorities to address issues such as air quality and congestion. They are developing a digital twin prototype to support policy objectives and improve city services [19].
Greece	A comprehensive study on Digital Twin technology highlights its role in the development of a smart city in Greece. This technology creates virtual representations of physical systems that allow for real-time data analysis and predictive service delivery. This technology is essential for advanced urban management that combines IoT and machine learning for better decision-making [20].
Helsinki, Finland	A project to create a 3D model of cities has been launched. This model is intended for free use by citizens and external organizations, as well as for research and development [21].
Minsk, Belarus	The city is actively using innovative digital technologies to manage its affairs. This will help the city successfully overcome the consequences of the COVID-19 pandemic and improve the quality of life of its residents.
Singapore	Singapore is known for its advanced smart city technologies. The implementation of digital twins and traffic management systems has significantly improved the accessibility and safety of transportation in the city. Collaboration between the government and the private sector is being implemented by leveraging expertise and funding [22].
Barcelona, Spain	The Internet of Things (IoT) is being actively used to manage city resources through public-private partnerships. Smart sensors help optimize lighting, waste management, and water supply, significantly reducing costs and improving the environment.
Tokyo, Japan	It has implemented advanced traffic management systems that use real-time data to optimize traffic flow and reduce congestion. The city is also actively developing infrastructure for autonomous vehicles.
New York, USA	Big data and analytics platforms are being used to improve public safety and emergency management. For example, the ShotSpotter system helps police respond quickly by pinpointing the location of gunshots using acoustic sensors.

Source: Compiled by authors based on Scopus Database

These case studies demonstrate the transformative potential of digital tools in urban governance and how digital technologies can transform cities, making them more livable and efficient places to live. Digital technologies play a crucial role in urban development, helping to solve pressing urban challenges and improve the quality of life of urban residents. Digital transformation in cities also involves integrating advanced technologies to improve city governance and improve access to public services.

Although the Smart City initiative offers many advantages, its implementation faces challenges such as comprehensive coordination among stakeholders, significant financial investments, and ensuring cybersecurity in digital systems. The process of implementing the Smart City concept in Kazakhstan is provided for in the Resolution of the Government of the Republic of Kazakhstan No. 269 dated March 28, 2023 “On approval of the Concept of digital transformation, development of information and communication technologies and cybersecurity for 2023–2029”. The initiative aims to improve urban living conditions, ensure sustainable development, and address socio-economic, environmental, and cultural needs by integrating digital technologies and smart solutions. These measures are expected to facilitate the transition to smart technologies, which will benefit the city and the population.

Kazakhstan is making progress in urban digitalization, especially in large cities such as Astana, Almaty and Shymkent. Astana’s smart city initiatives are aimed at implementing projects in the areas of

transport, public safety, utilities, etc. The Smart Street Lighting project is being implemented to introduce energy-efficient and remotely controlled streetlights to reduce energy consumption, as well as the Safe City project to install surveillance cameras and artificial intelligence (AI)-controlled systems to increase public safety and monitor traffic violations. The Astana Hub international technology park supports urban startups and aims to develop innovations in areas such as artificial intelligence, IoT and blockchain. Branched networks consisting of regional IT hubs managed by Astana Hub are operating in other cities of Kazakhstan.

The Digital Almaty program is aimed at introducing digital technologies into the fields of healthcare, education, transport, and public safety. Mobile applications for effective parking management, the Almaty Parking system, have been implemented to simplify the city's road network. The Digital Almaty Forum is an annual event where stakeholders discuss urban digitalization and present innovative solutions.

The installation of “smart electricity metering” systems in cities such as Astana and Aktobe allows citizens to monitor and manage their energy and water consumption through apps. These systems, designed to monitor energy use and maintenance needs in the city in real time, contribute to environmental sustainability by managing energy more efficiently and reducing emissions.

In the field of public transport management in Shymkent, a project to monitor the movement of public transport has been implemented. The mobile application "I-kolik" allows you to monitor the movement and arrival of a specific public transport vehicle at a stop using GPS tracking.

In Karaganda, the unified coordination center "Senim109" has been launched, which has become a single space for interaction between residents and local executive bodies. This will allow for good relations with citizens.

Kazakhstan’s Smart City initiative demonstrates a forward-thinking approach to urban development, with a focus on sustainability, efficiency, and quality of life. It aims to create modern, livable cities that meet the needs of city residents by leveraging digital technologies across sectors. The experience gained from this initiative can serve as a model for other countries pursuing similar goals.

Digital technologies allow cities to integrate various urban services, such as transport, health, and security, and improve their coordination and efficiency. The digital transformation of city management allows cities to quickly adapt to new requirements and make them more resilient to external challenges. To assess the effectiveness of city management, we present the results of a SWOT analysis that helps identify strengths and weaknesses, as well as opportunities and threats associated with the introduction of digital technologies (Table 3).

Table 3. SWOT analysis to assess the effectiveness of digital transformation of city development

Strengths	Weaknesses
- Efficiency. Digital technologies streamline city management processes and lead to faster and more efficient service delivery. - Data-driven decision-making. Access to real-time data enables better decision-making and resource allocation.	- Initial costs. Implementing digital infrastructure can be expensive and requires significant investment. - Technical challenges. Integrating different digital systems can be complex and require specialized skills.

- Improved public services. Digital technologies improve public services such as transportation, healthcare, and security [23]. - Sustainability. Digital solutions contribute to environmental sustainability through efficient energy management and reduced emissions. - Demographic growth. The positive dynamics of urban population growth [24] implies the optimization of the process of new urban management.	- Data privacy concerns. The increase in data collection raises concerns about privacy and data security. - Digital divide. Not all citizens may have equal access to digital services, leading to potential inequalities.
Opportunities	Threats
- Innovation and growth. Digital transformation opens opportunities for innovation and economic growth [25]. - Public-private partnerships. Collaboration between government and the private sector can boost digital initiatives. - Citizen participation in urban issues. Digital platforms allow for better communication with citizens. - Global competitiveness. Cities that embrace digital transformation can become globally competitive.	- Cybersecurity risks. Increasing reliance on digital systems makes cities vulnerable to cyberattacks. - Resistance to change. Stakeholders may resist change due to misunderstanding or fear of the unknown. - Technological obsolescence. Rapid technological advances can quickly make current systems obsolete.

Source: Compiled by authors

The research presented in the SWOT analysis allows us to better understand the potential and risks of digital transformation in city management and to develop strategies to minimize risks and maximize benefits by better understanding the potential impact of digital transformation. Efficiency can be considered the most crucial factor affecting the degree of satisfaction of city residents with public services.

The digital transformation of city management is a complex process that requires effective planning and consideration of many factors. The importance of digital technologies for effective city management increases the quality of life of city residents. The implementation of digital technology systems, which are the internal systems of cities, requires investment.

For urban governance challenges, managing upfront costs, technical challenges, and cybersecurity risks are potential solutions. The various components of digital adoption help to avoid physical contact, anticipate demand, and expand market access. Encouraging the use of digital technology to improve the quality of life of urban residents is one of the important steps.

Discussion and conclusions

The results of the study show that the correlation-regression model contributes to the increase in the possibility of mass introduction of digital technologies in cities and the optimization of urban management processes, as well as the growth of the city's population, which contributes to an increase in productivity in the production sector. For effective city management, it can be used to determine the specific quantitative and qualitative results of medium-term plans aimed at increasing the volume of industrial production and gross regional product. At the same time, it provides clear insights into the process of city management, which has a positive effect on the effective interpretation and analysis of the results.

The potential impacts of digital transformation on city governance will help identify opportunities to maximize the benefits of digital initiatives while minimizing the risks that could negatively impact sustainable and urban development. Quantitative and qualitative data will be used to develop recommendations for planning measures to gain a comprehensive understanding of the factors influencing urban development. Digital transformation will foster new urban governance models and innovations that will lead to economic growth. As a result, cities can become a

common hub for technological startups and innovation.

The increasing reliance on digital systems can expose city dwellers to cyberattacks. Ensuring cybersecurity is a major challenge. While digital technologies offer significant benefits, financial and security challenges need to be addressed to facilitate widespread adoption. To mitigate these challenges, cities need to develop strategies that align with their goals and priorities in terms of funding support and robust data protection regulations. Engaging citizens, businesses and other stakeholders in the planning process is a major step in ensuring that digital initiatives meet the needs of city residents. The significant investment required for digital infrastructure can be a barrier, especially for cities with limited budgets. This includes costs for technology, training, and maintenance. It is important to implement investment-led projects to implement digital technology systems that are an integral part of cities. Collaboration between government and the private sector can boost digital initiatives by leveraging expertise and funding. Smart city projects in Barcelona and Singapore are examples.

Assessing the effectiveness of urban digital transformation will allow for improved urban governance and public services. Digital technologies reduce the time and costs associated with managing cities and simplify the processes for citizens to receive services. Access to real-time data allows for informed decisions by optimizing resource allocation and improving service delivery.

Digital platforms can foster positive attitudes towards urban governance and foster better relationships with citizens. At the same time, cities that incorporate digital transformation components into their governance processes can attract investment and become globally competitive.

The future of city governance is to leverage digital technologies to create suitable for living urban environments that are more efficient. Through strategic planning, infrastructure investment, and innovation, cities can harness the full potential of digital transformation to meet the challenges of the 21st century.

Conclusion

With emerging technologies offering unprecedented opportunities to improve urban life, the digital transformation of city governance holds great promise. Cities that embrace digital transformation can deliver significant improvements in efficiency, sustainability, and quality of life for their residents. However, this requires careful planning, investment, and ensuring inclusiveness and security.

Digital technologies facilitate urban management processes by delivering urban services faster and more efficiently. They improve the overall functionality of urban services, reduce operating costs, and increase citizen satisfaction. At the same time, they allow for decision-making based on access to real-time data and effective resource management. Based on the results of the study, the following measures are recommended to implement the main initiatives for the digital transformation of the urban management process:

- implementing comprehensive data protection rules to protect citizens' data.

- development of financing mechanisms based on public-private partnerships for the implementation of digital infrastructure projects.

- Ensuring that digital transformation initiatives aimed at eliminating digital inequality and ensuring equal access for all citizens are inclusive (equal and accessible to all).

By embracing digital technologies, cities can become more globally competitive. It is important for urban planners to collaborate with stakeholders to ensure that digital initiatives are well-funded, safe, and accessible to all citizens. Digital transformation provides the infrastructure for effective decision-making in city governance and is a key driver of urban development. The goal is to create an urban environment that is not only technologically advanced, but also just and sustainable for future generations.

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ҚАЛАНЫ БАСҚАРУ ПРОЦЕСІНІҢ ЦИФРЛЫҚ ТРАНСФОРМАЦИЯСЫ

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ЦИФРОВАЯ ТРАНСФОРМАЦИЯ ПРОЦЕССА УПРАВЛЕНИЯ ГОРОДОМ

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