









## Efficiency in Urban Management and Smart City Concepts: A Russian Cities Case Study

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### ABSTRACT

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In the modern context, for a city to be deemed smart, it must extend its focus beyond a mere technological infrastructure to align with the 4T model. This framework encompasses four key components: Technology, Telecommunication, Talent, and Tolerance. The model advocates for a comprehensive approach that transcends purely technological progress, emphasizing that a smart city's successful evolution requires advanced infrastructure, effective communication networks, skilled human capital, and a culture of inclusivity and tolerance. The article presents an analysis of applying the smart city concept and the 4T model in the development of Moscow, Krasnodar, Kazan, Tyumen, Yekaterinburg, and Dubna (Russia). The study aims to determine the application of the smart city and 4T model by their administrations and the difficulties in implementing these strategies. The study is conducted in five Russian cities varying in size and functionality. The research materials are documents describing the development strategy. The authors of the article conduct computer-assisted telephone interviews with residents and city administration employees. They analyze the development strategies of these cities. The authors also identify the positions of the 4T model and directions for the development of a smart city in local development policy. The analysis allows the authors to determine the maturity of local development planning mechanisms considering the 4T model and smart city tools. Since the experience of the five cities different in size and functionality is studied, the results might be of interest to both practitioners and policy theorists striving to involve residents in the formation of local development policies and use of modern technologies to improve their access to city services and increase their influence on the future of their city.

## 1. INTRODUCTION

Managing a smart city requires the constant creation and transformation of space for promoting the activity of local entities and streamlining development processes [1]. On the one hand, the role of local (municipal) policy is to unlock the city's potential. On the other hand, it aims to prevent such negative phenomena as the exclusion of certain social groups; the subordination of development to the private interests of narrow and influential actors; excessive conservatism building development on duplication of existing operating models; the degradation of the city's values, especially those that determine its positive specifics [2].

Therefore, cities should strive to strengthen their competitive advantages, especially in the context of the principles of

sustainable development [3, 4]. Modern cities should be viewed as entrepreneurial systems in which management is focused on identifying new circumstances and exploiting new opportunities [5]. This should be a collective process involving a wide range of development participants [6], and its result should be various benefits both for the city and each stakeholder [7, 8].

The described approach corresponds to one of the key tasks facing cities, which is to create and, most importantly, implement strategies that attract and retain the actors necessary for intellectual development, i.e., residents with high qualifications and the necessary competences, entrepreneurs and institutions that create and implement know-how, and investors using new business models [9, 10]. Cities following the path of reasonable development also face the problem of building a new quality of life desired by various social groups [11, 12]. Moreover, there is

a rapid spread of expectations and values that characterize different age and economic groups [13]. Quality of life and its inextricable connection with human capital are recognized as the main factors in the attractiveness of a city [14, 15]. Thus, it is necessary to study changes in the standard of life [16] and the relationship between the city conditions (for example, access to social services, cultural and leisure offers, the attractiveness of urban spaces, urban landscape, and safety) and the expectations of local actors [17]. It is worth mentioning drastic changes in the way residents use market and government services [18]. Technological progress has led to many changes in this area associated with smart city technologies.

In addition to advanced technologies, the importance of soft potentials increases, including [14, 19]:

- Technologies, including science and R&D, intelligent solutions in city management, electronic administration, digital infrastructure [20], intelligent transport, modern industries [21];

- Talent (human capital), including the level of education, work culture, work spirit, technical culture, educational offer (infrastructure, subjects, the connection of education with other areas like economy and social development), cultural offer (infrastructure, facilities, proposal and events improving the competences of various social groups) [22, 23];

- Tolerance, including the quality of life for people with special needs (elderly people, people with disabilities, groups using social security services) with the offer of services, friendly spaces, etc. [24]; openness to immigrants [25];

- Trust, including the level of social integration, the importance of cultural and natural heritage in local development, and the level of public involvement in the activities of the non-governmental sector [26].

The potentials described as 4T resources [27] are important within the smart city concept, whose development determines the intelligence, entrepreneurship, and innovation of a city [28]. The expanded use of 4T in intelligent city management is an indicator of the quality of life and its competitive edge.

Soft competences in the social sphere of intelligent city management are becoming increasingly important, which is reflected in urban development strategies. The sequence and hierarchy of activities carried out within the city development strategy depend on the ability of local governments to use local resources [29]. Smart city performance management are expressed in the wealth of the city, the capacity for organizational learning, the ability to implement innovative methods of city management [20], the progress in the implementation of initiatives consistent with the concept of a smart city, and the determination to implement decision-driven solutions in various urban subsystems [30].

Thus, the study is relevant as it dwells on the possibility of sustainable development of a city using the 4T data model to improve the efficiency of managing urban resource potential in the smart city concept.

The novelty of this study lies in describing the possibility of using the 4T resource model as a methodological mechanism for sustainable development in the smart city concept. The practice of urban management based on the principles of sustainable development proves that it is difficult for local authorities to make informed decisions in the absence of appropriate methodological tools.

The study aims to characterize the activities of local authorities in the field of intelligent city management in the Moscow Region, Russia. The region can be regarded as part of the smart city concept, using the capabilities of the 4T resource model designed to optimize the use of city resources, improve the quality of life in the city, and make the city more

tolerant and comfortable, friendly to all residents and stakeholders, in which inter-organizational relationships are based on trust. This applies only to those activities that can fit into the concept of a smart city and the development of 4T resources. Local governments, including development activities consistent with the smart city concept in strategic documents, should develop activities consistent with the strategic provisions to achieve measurable effects.

This article tries to answer the following research questions: (1) Does the development policy of individual cities in the Russian Federation comply with the 4T model and the concept of a smart city? and (2) Are local government activities consistent with the smart city concept leveraging the potential of 4T resources?

To answer these research questions, the study uses a qualitative approach based on the analysis of strategic and program documents of individual Russian cities and the results of a survey of residents (Dubna, the Moscow Region) through computer-assisted telephone interviews with employees of the Dubna City Administration. We compared the concept of a smart city and the 4T resource model with the functioning of the city of Dubna.

The conclusions show the potential for the development of the 4T model to improve the efficiency of managing urban resource potential in the smart city concept. These data complement existing research on this issue.

The article is organized as follows. The next section reviews the literature on the implementation of the smart city concept in urban development policy and the capabilities of the 4T model within the smart city concept. Next, the research methods and results are presented and discussed. At the end of the article, theoretical and practical conclusions and limitations of the study are identified.

## 2. LITERATURE REVIEW

### 2.1 The concept of a smart city in urban development policy

The simplest way to explain the smart city concept is as an intelligent or smart city. Corchado [31] claims that a smart city was traditionally defined as a city that uses information and communication technologies to improve the interactivity and efficiency of urban infrastructure and its components and increase the awareness of its residents. Caragliu [32] presents the smart city model by interpenetrating areas of the economy, mobility, environment, social participation, quality of life, and city management.

Capra [33] defines a smart city as an area with high learning, innovation, creativity, research institutes, higher education, digital infrastructure, communication technologies, and management efficiency. Bronstein [34] highlights the ability of cities to attract and retain highly qualified specialists and entrepreneurs. Hollands [35] mentions approaches that emphasize: a) the existence of transport and telecommunications infrastructure; b) the use of information and communication technologies; c) the role played by digital media, creative industries, and cultural initiatives .

According to Komninos [36], a smart city is a territory (district, cluster, city, or region), including a creative population engaged in knowledge-intensive activities or a cluster of such activities; effectively operating institutions and procedures in the field of knowledge generation, ensuring its

acquisition, adaptation, and development; advanced broadband infrastructure, digital spaces, e-services, and online tools for knowledge management; proven ability to innovate, manage, and solve problems that arise for the first time, as innovation and management in the context of uncertainty are key to assessing intelligence.

Turning to the practice of local government, an evolution of the smart city is presented by the authors of the Human Smart Cities manual for local authorities. Following B. Cohena, they identify three levels of development of smart cities: Smart City 1.0, Smart City 2.0, and Smart City 3.0 [37]. The challenge that local governments currently face is to build urban development on the creative participation of residents. In smart Cities 3.0, residents co-create their cities, and social projects play a significant role: equality, social inclusion, low-cost construction, etc. [38].

## 2.2 Analysis of the capabilities of the 4T model

The most interesting concept of a smart city is described by the 4T model of urban resources [39] based on the relationship of urban innovation with the resource potential of the city. According to this concept, it is a synergistic interaction of four components: tolerance, trust, talent (human capital), and technology.

The literature on development based on the 4T concept describes both general problems and specific solutions implemented using these directions [40, 41]. Cities following the path of reasonable development also face the problem of reaching a new quality of life for various social groups. It is necessary to constantly study the correlation between changes in the quality of life and the potential of 4T resources.

Florida [42] proves that there is a combination of factors from the sphere of a tolerant community, creative professions, and a high level of technological development that promotes the growth of cities. Cities that score high on four aspects (trust, tolerance, talent, and technology) attract highly skilled and creative employees, people from the arts and culture, and investors. Due to this potential, such cities become the most developed smart cities [43].

An integral feature of such a city is the ability of the people who create it to cooperate, i.e., information exchange [44]. Scholars suggest that collaboration based on talent, tolerance, and trust [45] with the support of technology allows effectively and efficiently achieving organizational goals or objectives that cannot be achieved alone. This is ensured by the use of 4T capital [46].

With the development of technology and the increasing complexity of the business environment, the need to build relationships based on talent, tolerance, and trust is becoming obvious [47]. Scholars note that the creation of interorganizational connections (managing relationships with entities from the organization's environment) opens up space for the construction and development of 4T capital [48].

Connections between actors are verified by the exchange of information characterized by durability, dependence, and interpersonality. Bayliss [49] concluded that recent works on control processes and modeling socio-spatial relationships challenge the hierarchical approach. More attention should be paid to the spatial extent of various networks that intertwine in urban areas, which can also be a field for using the 4T concept.

Okulicz-Kozaryn [50] argues that market participants act in conformity with not only prices, contracts, or official orders, but also social connections, prestige, behavioral norms, or the

development of 4T capital [51]. The relational or social coordination of cooperation is based on the trust of the parties and behavioral norms applicable in a given community reinforced by intensive information exchange [52].

## 3. MATERIALS AND METHODS

### 3.1 Research approach

In accordance with the approaches to the development of the 4T model, to improve the efficiency of managing urban resource potential in the smart city concept, we selected a qualitative-quantitative approach as the most appropriate for the study of complex phenomena in the context of heterogeneity and uncertainty of initial information.

This approach emphasizes the importance of pursuing long-term development policies, especially implementing strategic changes through such policies based on the participation of city residents in decision-making processes. In the cities that were analyzed as part of the study, there is a complex system of local documents: strategic, program, design, and analytical.

The main focus of the study was not to document examples of the smart city functioning but, first, to recognize the importance of the smart city and 4T model in development policy and urban management and, second, to determine the activities of local authorities in the field of intelligent management of cities in the Moscow Region. These activities considered in line with the smart city concept using the potential of 4T resources will help reduce operating costs. They will also contribute to optimizing the use of city resources, improving the quality of life, increasing tolerance and comfort, and creating a city friendly to all residents and stakeholders, in which inter-organizational relations are based on trust.

### 3.2 Empirical context

The cities under study are characterized by high population density and extensive multi-level information exchange between their municipalities. In the cities, there is great potential for smart technologies that direct the development of such cities towards the smart city concept. Their analysis indicates that these cities can be trained to adapt smart technologies, which creates opportunities for implementing the concept of a smart city using the 4T model. Moreover, Moscow and the Moscow Region (as a single territorial entity in the near future) can play a key role in this process, which can lead to the implementation of the smart city idea.

In accordance with the study objective, we selected the main strategic documents of Moscow, Krasnodar, Kazan, Tyumen, Yekaterinburg, and Dubna and scientific sources on the research topic from the Russian Science Citation Index and the Web of Science and Scopus international databases.

### 3.3 Data collection

Data were collected from July 10, 2022 to August 10, 2023 by analyzing scientific literature on the research problem and strategic documents.

The basic research method that characterizes and evaluates urban development policy in the context of the 4T model and smart city concept is the analysis of source materials in the form of strategic documents, in particular, urban development

strategies included as the main documents. These documents were selected due to their comprehensive nature, long-term horizon, and central position in local planning systems.

Considering the differences in size, rank, functions, and potential of individual cities, the study deliberately included only certain cities, namely: Moscow as the largest metropolis and the capital of the Russian Federation; Krasnodar as a regional center and a large metropolis; Kazan as a republican center and a large metropolis; Tyumen as a regional center and densely populated area; Yekaterinburg as a regional center and the fourth most populous metropolis in Russia; Dubna (the Dubna City District) as a science city with a technology-innovation economic zone. For these five cities, the study was carried out within the framework of existing strategic documents presented in Table 1.

**Table 1.** Strategic documents

City	Strategic Document
Moscow	The main directions of the Moscow city development strategy for the period until 2025 The investment strategy of Moscow until 2025 Strategy for the socio-economic development of the Municipal Formation of the City of
Krasnodar	Krasnodar until 2030 Strategy for the socio-economic development of the Krasnodar Territory until 2030
Tyumen	Strategy for the socio-economic development of Tyumen until 2020 Strategy for the socio-economic development of the Tyumen Region until 2030
Yekaterinburg	Strategic development plan for Yekaterinburg Strategy for the socio-economic development of the Sverdlovsk Region until 2035
Dubna	Strategy for the socio-economic development of Dubna as a science city for 2017-2026

The purpose of the subsequent study (survey) was to gather the opinions of residents regarding the functioning of government bodies and their relationships with residents of the cities in which they live. The study was conducted using the computer-assisted telephone interviewing (CATI) method [1, 4]. A computer program selects respondent numbers, generates questions, records conversations, and creates reports in real time. The number of residents who participated in the survey was  $n = 300$ . The study utilized quota sampling. When forming the sample, we considered such characteristics of the population as location, gender, and age (Table 2).

**Table 2.** Sample characteristics

Gender		Age	
Male	53%	18-25	9%
		26-35	18%
		36-45	18%
		46-55	15%
Female	47%	56-65	18%
		66+	23%

The last research tool was in-depth interviews conducted with employees of the Dubna City Administration (36 respondents). During the interview, the participants were briefly introduced to the 4T concept and answered three structured questions:

1. What are the most important conditions determining the development of the Moscow Region as a network of smart cities?
2. What activities can create a network of intellectual solutions and develop creative capital according to the 4T model in your city and other cities of the Moscow Region?
3. What are the most important changes in your city and other cities of the Moscow Region caused by the creation, implementation, and use of smart solutions?

### 3.4 Data analysis

The analysis of the strategies in the context of the 4T potential was conducted according to two main parameters: 1) significant factors that make up T resources (tolerance, talent, trust, technology) in the current situation of the city and its development processes; 2) the future perception of an individual T resource and the type of activity undertaken to develop it.

The first aspect of the analysis is to determine the extent to which factors associated with the 4T model are regarded as strategic differentiators. The second aspect is the answer to the question about the directions and tools postulated in the documents to support and strengthen the factors that make up 4T resources. In this case, strategic and operational goals and long-term directions and projects were analyzed. A similar two-dimensional approach was used to analyze development policies to see whether they have direct references to the concept of a smart city.

During telephone interviews, residents were asked to evaluate the functioning of their city government bodies and their relationships with residents on a 4-point scale: 1 – no, 2 – more likely no than yes, 3 – more likely yes than no, 4 – yes.

The result of in-depth interviews with employees of the Dubna City Administration was the development of a case study “Formation of a network of smart cities”.

All results obtained from the study were recorded in a research report.

## 4. RESULTS

The first aspect of analyzing development policies was the assessment of their provisions from the viewpoint of direct references to the concept of a smart city. The content of strategic documents was examined with individual provisions relating to the current state and fragments defining the desired future state in the form of visions, goals, directions, or development projects (Table 3).

**Table 3.** Direct references to the concept of a smart city in the development strategies of individual cities

City	Current State	Future State
Moscow	++	+++
Krasnodar	-	++
Tyumen	-	+
Yekaterinburg	+	+++
Dubna	+	++

Source: The research is based on the Development Strategies of the cities under consideration. Note: +++ describes a high level of direct connection to the smart city concept; ++ describes an average level of direct connection to the smart city concept; + describes a low level of direct connection with the smart city concept; - describes the lack of direct connection to the smart city concept.

The second aspect is the analysis of local policies regarding provisions characterizing 4T resources. An analysis of the development strategies of these cities is presented in Table 4.

**Table 4.** Direct references to the 4T model of development strategies for individual cities of the Moscow Region

City	Talent	Tolerance	Technology	Trust
Moscow	+++	+	+++	++
Krasnodar	++	-	+++	+
Tyumen	+	-	++	-
Yekaterinburg	++	+	+++	+
Dubna	++	-	+++	-

Source: The research is based on the Development Strategies of the cities under consideration. Note: +++ describes a high level of direct connection to the 4T model; ++ describes an average level of direct connection to the 4T model; + describes a low level of direct connection to the 4T model; - describes the lack of direct connection to the 4T model.

The results of the survey conducted on a sample of 600 residents are presented in Table 5.

**Table 5.** Assessment of the functioning of the Dubna City Administration and their relationships with residents

No.	Question	Score				Average Value
		1*	2	3	4	
1	Do residents have the opportunity to participate in city governance?	5%	24%	49%	20%	2.85
2	In your opinion, is the city administration friendly to residents?	5%	17%	53%	25%	2.98
3	Is there electronic/telephone communication with the city administration?	2%	14%	52%	32%	3.14
4	Do you think there is nepotism in the city administration?	8%	57%	25%	10%	2.37
5	In your opinion, is the city administration tolerant?	4%	14%	60%	22%	3.0
6	Do you trust the competence of the city administration?	5%	19%	54%	22%	2.92

Source: The research is based on computer-assisted telephone interviewing.  
\*Note: 1 – no, 2 – more likely no than yes, 3 – more likely yes than no, 4 – yes.

## 5. DISCUSSION

The study results (Table 3) proved that the strategies directly indicated the smart city concept in relation to the current state only in three cities. In Moscow and Yekaterinburg, it receives a positive evaluation and is understood as internal processes and distinctive features of the city. The Dubna strategy mentions a smart city as a tertiary and external factor (opportunity). For the remaining cities, the documents did not contain direct references to the smart city concept in its current state. However, there is a different situation with the analysis of strategic provisions regarding the smart city concept in the future state: through visions, goals,

directions, or development projects. All strategic documents analyzed contain these references, mainly as an element of visions or goals. In the case of Krasnodar and Tyumen, these provisions relate only to technological development and not directly to the smart city concept.

Summarizing the results of the analysis, the conclusions from Table 4 can be viewed from a subjective and objective perspective. Under the subjective approach, we can rank the cities in the following manner: Moscow comes in first; Krasnodar, Yekaterinburg, and Dubna take the second place; Tyumen is ranked last. This assessment concerns the strategic documents. Since they were not based on uniform principles, differences in assessments are also associated with differences in the procedure for creating strategies and methodologies. In addition, the new Strategy for the socio-economic development of Tyumen has not been updated yet.

From an objective perspective, it is also possible to evaluate 4T resources in the strategic documents. The components can be ranked as follows: technology, talent, trust, and tolerance. The main aspect in all strategic documents is technology. Its level can significantly vary. In addition, the very presence of a 4T component can be interpreted as a stimulant and non-stimulant [48]. Moreover, the strategic part contains a direct mention of talent. A direct reference to trust (also in the strategic part) was found only in the case of Moscow, Krasnodar, and Yekaterinburg.

In view of the foregoing, we drew the following conclusions:

- There are significant gaps in defining the current state of quantitative and non-quantitative aspects in the city strategies related to 4T resources: the reviewed documents do not always identify the issues that form the basis for assessing the potential and gaps in 4T resources;

- The area emphasized in the goals and development directions of the analyzed cities is technology; less attention is paid to the development of human capital, i.e., talent; the areas of trust and tolerance are mostly ignored.

The distribution of answers regarding the functioning of city government bodies and their relationships with residents of Dubna (Table 5) shows that the respondents positively assessed the work of their administration. These bodies were characterized as professional and striving to create good relationships with residents using remote communication tools. Most respondents believed in opportunities for participation in city management. The highest rating was given to the ease of electronic circulation consistent with the study results [51]. The Dubna City Administration was assessed negatively from the viewpoint of nepotism.

In-depth interviews with employees of the Dubna City Administration allow to compare the smart city concept and 4T model with the functioning of Dubna and other cities of the municipality within the case study “Formation of a network of smart cities”. It is worth mentioning various ideas of the respondents on the creation of relationships between the cities of the Moscow Region.

## 6. CASE STUDY “FORMATION OF A NETWORK OF SMART CITIES”

The Moscow Region is a territory whose cohesion has been largely formed, while it is still influenced by the processes of metropolization on a different scale. In this case, we can talk about the functional sphere, strong ties in the common labor market, the public services market, infrastructure networks,

and transport connections.

The interview results show that local managers view the emerging Moscow metropolis from the perspective of relationships based on the generation and transfer of broad knowledge. The Moscow Region has various potentials that help it develop towards networking smart cities. In this regard, the respondents highlighted the following actors working in the Moscow Region: business entities (global and local companies working in innovative industries, other entities of the business environment), public sector entities (local authorities open to making strategic changes), and scientific and academic institutions common to Dubna as Russia's largest center for research in the field of nuclear physics.

The functioning of the entities involves strengthening human capital in the form of creative employees and students, including those coming to the cities of the emerging metropolis from abroad. The respondents emphasized the importance of structural transformations in the Moscow Region, in particular the formation of new economic specialties in the field of information technology. Transformation and digitalization processes also affect companies operating in traditional industries [53].

Changes in the economic structure of the emerging metropolis are supported by its demographic potential, which influences the demand for innovative goods and market services, including those based on innovation and digital solutions [54]. The level of entrepreneurship is also increasing, including among young residents. This is a crucial phenomenon in the region where the labor market has been dominated by traditional industries.

The emerging metropolis is characterized by a high level of urbanization, which can also be considered a factor contributing to the formation of a network of smart cities. The Moscow Region is a complex of many centers having different ranks and fulfilling different functions. In recent years, the interest of local government bodies in various forms of cooperation has increased. On the one hand, these are joint (inter-municipal) projects that have a high innovative value. On the other hand, there is a noticeable desire to build long-term integration structures. First of all, this is achieved through the functioning of the Government of the Moscow Region which becomes the leader of the network created. Most of its activities are devoted to the development of network infrastructure (road network, public transport, etc.). There has also been an increase in local government awareness of the smart city concept and a shift in interest from typical infrastructure solutions to initiatives that promote collaboration.

Positive phenomena include the use of various tools that expand the scope and forms of dialogue with residents and the introduction of modern tools for managing local development, including with the participation of residents (e-services government platform).

Furthermore, the respondents mentioned the rich cultural heritage of the cities within the emerging metropolis and their historical diversity since they have various features that characterize local communities and form their sense of identity. This demonstrates a cultural mosaic of the metropolis and unlocks potential for the development of creative activities. In general, the territory of the Moscow Region is a multi-cultural space open to its neighborhoods and absorbing new entities.

Considering negative conditions for the development of a network of smart cities in the Moscow Region, the respondents noted a complex of phenomena that complicate or slow down

the process under discussion. In some parts of the Moscow Region, traditional industries with a low level of innovation dominate and create jobs that are less attractive for the new generation of human capital. This economic situation leads to a gradual outflow of young residents with high qualifications and many entrepreneurs to Moscow. This weakens the intellectual potential of the territory and negatively affects its image.

There are also shortcomings associated with the quality of life in several cities within the emerging metropolis. Compared to the center (Moscow), the other cities require large-scale measures aimed at restoring the functions of public spaces, post-industrial territories, and objects that largely determine the urban landscape. The respondents believed that these processes were going too slowly. This applies to both investment activities and activities aimed at solving social problems.

Considering the context and requirements associated with the development of a smart city, we showed that social capital requires strengthening and even restructuring (social activity in many cities of the Moscow Region is limited to a narrow group of leaders). The willingness of local residents to participate in civil initiatives is also low.

Disadvantages also include a narrow understanding of the smart city concept and insufficient knowledge of residents about smart technologies. There is a need to expand the range of reliable data to support decision-making processes and participation of local actors in creating an innovative future for their cities.

During the interviews, the respondents were given the opportunity to generate ideas for activities that should be launched to create a network of intelligent solutions and develop creative capital according to the 4T model in the cities of the Moscow Region.

The respondents emphasized the need to build a brand for an integral metropolis. Forming an image and brand is important both in the internal context (the creation of a metropolitan identity and increasing awareness of its residents about available services not only in the place of residence but also in other metropolitan centers) and in the external context (promoting a strong, attractive territory).

Most responses related to the use of academic and educational potential. It was proposed to strengthen scientific institutions and support their active participation in the development and promotion of smart solutions for cities. Much attention was drawn to the need to educate the youngest residents (in schools and kindergartens) and older people about the smart city concept. The best ways to attain this end include promoting specific smart projects and their products that benefit local communities.

According to the respondents, the most important group from the viewpoint of developing smart city competences is employees of local city administrations. A metropolis is a good place for exchanging experience between local governments. This is also an area where large joint projects can be implemented as part of smart city solutions. It is important to inform officials and local policymakers about the needs of various residents and adjust smart city solutions according to their requirements.

Most of the interviews were devoted to information projects. They support the creation of tools for the automated collection and dissemination of data about cities. In addition, the high potential of solutions in the field of open data exchange is indicated, which not only supports decisions regarding each

city and the metropolis but also limits the risks of making inappropriate decisions.

A separate area of the interviews was related to specific infrastructure projects. These included proposals related to sustainable mobility (including the development of public transport and cycling), the use of drones to collect information and provide public services, the creation of linear parks along rivers, and the development of linear infrastructure connecting the cities within the Moscow Region.

A significant part of the proposals aimed at strengthening cooperation (especially intersectoral). This can be facilitated by multifunctional platforms for dialogue between actors representing various industries and holding events, meetings, and workshops that allow the creation of new ideas and innovative partnership projects.

General proposals include those related to improving the quality of life and the environmental condition.

The final stage of the interview was a discussion of the desired effects of the creation, implementation, and use of smart solutions. The respondents emphasized the importance of the solutions discussed for the formation of relational capital in the Moscow Region: the exchange of experience, the participation of various actors in the creation and implementation of local and municipal policies, the integration and coordination of development in the emerging metropolis through agreement on common priorities and goals, and the use of consistent information about this areas. The expected effect is also an improvement in the quality of life, in particular through better provision of public services. The culmination of these effects is the creation of an agglomeration that is based on the principles of sustainable, cohesive, and participative management.

## 7. CONCLUSIONS

This study answered the following research questions: (1) Does the development policy of individual cities in the Russian Federation comply with the 4T model and the concept of a smart city? and (2) Are local government activities consistent with the smart city concept leveraging the potential of 4T resources?

As previous studies have shown, the smart city concept is ambiguous and difficult to define. The concept is complex and constantly evolving. It concerns many aspects of urban development and the complex structure of local development goals. The 4T resource model specifies certain elements included in the structure of a smart city which can be determined by data sets describing the following topics: talent is the level of education of the local community, the number of university graduates entering the labor market in relation to the total number of people entering the labor market, the proportion of university graduates in various specialties; tolerance is the openness of local communities to new ideas, social inclusion, multiculturalism, multiple ways of life; technology is innovation and high technology in the city/region; trust is a form of social capital that supports creativity and limits control.

This article is limited by the number of studied cities and does not allow generalization. We recognize the need to conduct parallel research on the issue. The results of several studies will create a more generalized picture of the 4T model to improve the efficiency of managing urban resource potential within the smart city concept.

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