MASTER'S THESIS

Moscow on its way to Smart Governance: Digitalization

NORD University

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Introductory chapter

Summary

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Several studies and international organizations have confirmed that Moscow as a capital of the Russian Federation is one of the world smart cities. With a history spanning over a thousand years, it has got through a tremendous transformation as it heads towards its tech-savvy future. However, some experts claim that Moscow aims at replicating the Singapore patterns.

The exploration of the relevance of implementing international experiences within the realities of different countries like Singapore could be of interest for the other smart city initiatives in their beginning stage. The aim of this study is to investigate the exchange of Smart City (SC) governance models and consequent standards between global cities. In this regard, the following research question was addressed: is there an isomorphism between Moscow and Singapore when it comes to smart city initiatives or does Moscow rather follow its own path?

The assumption is that through the lenses of institutional isomorphism (DiMaggio & Powell, 1983) the similarities between two smart cities could be explained with the help of the apparatus of neo-institutional theory. For disclosing the issue, the authors employ induction and deduction approaches and rely on the following methods: semi-systematic literature review, media content analysis protocol and comparative analysis.

The Singapore case demonstrates one of the best practices of digitalization in the world and it is definitely worth looking up to. Its main strength is an effective executive mechanism of the empirical implementation of the digital initiatives in the everyday life of the citizens and the ubiquitous support of innovations.

Overall, the key findings of this research prove the notion of the presence of mimetic isomorphism between the Moscow and Singapore cases with certain differences arising due to the development stages of the digitalization processes in the context of smart city governance initiatives. The technological, infrastructural limitations and the lack of focus on innovative projects in Moscow are the main factors that are hindering the digitalization process nowadays. The positive trend is though that Moscow keeps an open-mind and is ready to enhance the digitalization process.

Master's thesis as a scientific article with summary article
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The abovementioned form of the master's thesis has been chosen because of the unique opportunity, provided by the Nord university, to practice our skills in writing the scientific articles to share ideas with a scientific community and getting valuable feedback and recommendations on how to do so in the most efficient way.

Journal

The authors have chosen a scientific journal "Public Management Review", as it covers all aspects of the management of state and non-profit organizations and institutions and correlates with our topic, as we aim at exploring public management and its administrative role in terms of implementation of the digitalization and explore political and practical challenges this sector faces in Russia.

Introduction

The purpose of this article is to investigate the exchange of Smart City governance models and consequent standards between global cities – Moscow and Singapore. The main task is to make a comparative analysis of two smart city initiatives, identify the key elements of these strategies and find out, whether Moscow stands on its own path when implementing the smart city strategy in terms of digitalization or it relies on the experience of Singapore and tries to mimic the core elements of its smart city strategy. The main source of information is scientific literature on smart cities governance and managerial strategies on those states, which already successfully implemented sustainable principles in the course of their smart city development. One research question has been created for the purposes of this article: is there an isomorphism between Moscow and Singapore when it comes to smart city initiatives or does Moscow rather follow its own path?

Methodology

The answers to the research question will be determined by deductive and inductive approaches, using the following methods: scientific method, comparative analysis, statistics evaluation. All these methods would be useful for our research as they provide both theoretical and empirical basis to make conclusions relevant to our research statement. They include the international component as well as we could extract the inspiration from the other countries and smart cities and use their experience to form our suggestions. Furthermore, they include the inside-out approach where we could present how Moscow's status as a smart city is viewed by our generation of future decision-makers.

The strengths and limitations of each of the methods lie within the scope of their implementation – the analysis of data could be one-sided, the comparative analysis requires critical evaluation of the specifics of the countries, statistics could be tricky, as it could not reflect the whole society and the conclusions made owing to deductive and inductive approaches could be ambiguous if new determinants resurface. A comparative analysis between smart cities is carried out in order to learn the context-specific nature of observations and their related impact on the interplay among the multiple roles of performance measurement tools.

Overall, in the due course of this research to fill the scientific gaps detected by the literature review, the Smart City case studies of Singapore and Moscow will be explored according to the following plan: establishing the research question, defining the hypotheses and the assumption, studying the variables and drawing a conclusion. The research question explored in this article goes as follows: is there an isomorphism between Moscow and Singapore when it comes to smart city initiatives or does Moscow rather follow its own path?

In order to find the right answer, the following assumption has been made: through the lenses of institutional isomorphism (DiMaggio and Powell, 1983) the similarities between two smart cities could be explained with the help of the apparatus of neo-institutional theory.

The following hypotheses have been formulated:
1. There is general similarity between Moscow and Singapore in smart city governance, which are caused by the natural life cycle of the development of the digitalization processes.
2. This resemblance goes only up to a certain extent, which is limited by the extent of the technical and infrastructural sophistication of the digital systems.

These hypotheses would be explored through five following dimensions, which have been introduced by the authors as they are seen as the most relevant for the purposes of this research:
- the role of the legislation in smart city initiatives regulation;
- the role of the executive power in smart initiatives regulation;
- the role of digitalization in education and their current level;
- the role of Big Data in energy sector;
- the practical implementation of digital smart initiatives by the cases of e-government.

The following paragraph explains the grounds on which the choices that have been made are based. All of them are informed by the scientific literature on smart cities governance.

Legislation and regulatory frameworks

The exploration of legal frameworks, legal systems and their differences was our first priority as without legal grounds no sufficient changes could be performed. The question was whether the differences within two systems were so drastic that it would be even theoretically highly unlikely that mimetic isomorphism within the Singapore and Moscow cases exists. The thing about digital law is that many areas are regulated in secondary legislation both in Singapore and in Moscow, and these regulatory documents could be of great practical significance, if adopted wisely – as we know, our legal system here in Russia has certain similarities with Romanic-Germanic legal family (Rasskazov, 2013), so there are no obstacles as to why not to implement and imitate certain regulations from Singapore as well, if they ring true to being recognized as the best practices.

Executive power for practical implementation

Being legally grounded the necessary changes are also as well to be executed and here the following question arises – how effective the process of such execution is? Effectiveness in this case means time frames, the governmental and non-governmental structures involved, the initiatives and the process of their creation and promotion and the results of the implementation. Efficient mechanism of public bureaucracy and corruption control are some of the main contributors of the efficiency of the executive power in Singapore (Quah, 2018). According to the official statistics, bribe-taking rate increased by 20.3% in 2021 compared to the data for 2020 (The Attorney-General's Office (Crimestat), 2021). If there are such differences in this regard – does it mean that the Singaporean mechanisms are not applicable to the Moscow reality? Or yet, still, maybe they are but in somewhat transformed way?

Digital technologies in education

Technological advances are undoubtedly one of the key drivers for the digital transformation. This is due to the nature of the digitalization practices per se as it literally means transforming something into digital (meaning "electronic" form) by definition (Merriam-Webster, 2022).

Russia has long positioned itself as one of the technological leaders – and it is underlined by the researchers that precisely electronic markets are extremely exposed to the digital transformation both for individuals and globally (Kislitsyn, 2021). We decided to choose educational sphere as our scope for exploration as it is a combination of both individually-intended digitalization

mechanisms and system-oriented, and moreover, this sphere is regarded to as socially significant, which makes it an integral part of the smart cities concept.

Digital technologies in the energy sector

Next scope for our exploration was energy sector, which is crucial for the smart cities concept too. Energy supplies are considered as part of the national security strategies and, thus, are to be included into our research. What are the focus areas of "smart" energy management in Singapore and in Moscow? How different are they and what strategy appears to be more efficient in terms of developing the smart city concept? These are the questions we are going to find the answers to.

Digital technologies in the social sector: e-government

Last, but not least are the concrete practically implemented initiatives for the electronic government. The different means used by different countries are aimed at achieving one and the very same objective – increasing the accessibility of the public services to enhance the so-called social inclusion and decreasing the inefficiency and other failures of the system along the way. Our scope for exploration goes as far as establishing the means by which these objectives are to be achieved and specify whether there is sufficient resemblance to account for mimetic isomorphism in this regard between Moscow and Singapore.

Even though all the aspects mentioned above are not projecting 100% of all the ongoing digitalization processes, yet it is our understanding that they correspond to the most crucial spheres worthy of the attention and they are not the outstanding cases, like e. g. transportation system, which we originally supposed to explore. We decided not to include the public transportation systems as it is one of the best in the world here in Moscow and we wanted to understand whether something could be improved from zero to normal level, rather than enhanced from advanced to proficiency.

Theoretical frame of reference

The main aim of this paragraph is to present the theoretical concepts used in the study and to work out a theoretical frame of reference. The latter is an indispensable part of every study and it needs to be sound and profound. Once interpreted, the theoretical lenses should be broad enough to describe the phenomenon studied and consider its specific characteristics.

Smart City Framework (Falconer & Mitchell, 2012) is one of the theories that we would like to apply to answer our research question in order to define both strengths, and weaknesses of a

systematic process of enabling public and private sectors. It is a simple decision methodology that enables both the public and private sectors to plan and implement Smart City initiatives more effectively. Most cities actually undergo this process in an intuitive way rather than in a clearly structured manner. A structured method not only will enable efficiencies in city infrastructures, but also transparencies into how cities work.

We will also employ the case study for implementing ITU-T international standards to shape smart sustainable cities, based on the case of Moscow (Smiciklas & Imran, 2018), which represents the major solutions for the government, business within the "Smart Moscow 2030" strategy and includes recommendations that correlates with the specifics of Russia's regulation.

Smart city governance tends to be a promise of rationalizing governance based on better knowledge about urban complexity. Urban auditing can be seen in different lenses: technocratic (better knowledge for better urban management), critical (selective ways of knowing to benefit urban elites) or emergent (socially constructed ways of knowing based on more cooperation and interactions between urban stakeholders). Moreover, smart city standards are not contested in the technocratic and critical perspectives, but are based on expert standards or on the dominant ideology. In these perspectives, power is concentrated in the hands of experts or elites, and is barely influenced by other stakeholders (Grossi, Meijer & Sargiacomo, 2020).

The situation with the scientific status of smart city leaves smart-city research fragmented and divided along two main development paths, and in a position whereby the future development of this new, promising, but divided area of research is put at risk. The main reason for the confusion has to do a lot, for instance, with a lack of intellectual exchange among those conducting research in the field of smart cities or divisions that smart-city research opens up in the scientific community (Mora, Bolici & Deakin, 2017).

Defining Smart City concept

Smart City means integrating multiple information and communication technologies and the Internet of Things for urban property management. The city's assets include, in particular, local information systems departments, schools, libraries, transportation, hospitals, power plants, water supply and waste management systems, law enforcement agencies and other public services.

The purpose of creating a "smart city" is to improve the quality of life with the help of urban informatics technology to improve the efficiency of service and meet the needs of residents. Yet

smart cities are smart not only in how their governments use technology, but also in how they monitor, analyze, plan and manage the city. A smart city is a designation given to a city that incorporates information and communication technologies (ICT) to enhance the quality and performance of urban services such as energy, transportation and utilities in order to reduce resource consumption, wastage and overall costs. The overarching aim of a smart city is to enhance the quality of living for its citizens through smart technology (Techopedia, 2021). Being 'smart' for a city implies different characteristics, e.g., technological, inter-connected, sustainable, comfortable, safe. This variety of meanings assigned to 'urban smartness' produces diverse perspectives and, ultimately, results in fuzziness in understanding.

Current debates in the literature focus on whether smart city should be studied through the lens of technology integration, through the role of citizens involved in urban transformations or as a holistic framework through which technological and human components are integrated (Grossi & Trunova, 2021).

In 2020, the analytical company Frost & Sullivan predicted that by 2025 there will be 26 smart megacities in the world. According to UN experts, the more a city grows, the more difficult it is to provide its residents with transport, food, utilities and medical services. In addition, environmental, social and economic problems may worsen due to overpopulation, and the concept of a smart city will help use resources more efficiently. Its main task is to simplify the lives of both citizens and authorities with the help of technology: to automatically manage the traffic situation, the healthcare system, public transport, water supply systems and power plants, and, if necessary, promptly report offenses to the police (Grossi & Trunova, 2021).

According to the report of McKinsey Global Institute (McKinsey & Company, 2018), smart cities add digital intelligence to existing urban systems, making it possible to do more with less. Connected applications put real-time, transparent information into the hands of users to help them make better choices. These tools can save lives, prevent crime, and reduce the disease burden. They can save time, reduce waste, and even help boost social connectedness. When cities function more efficiently, they also become more productive places to do business. In particular, smart technologies change the nature and economics of infrastructure. They reduce the cost of gathering information about usage patterns—and with an unprecedented volume of data points in hand, city governments, employers, and residents can find new ways to optimize existing systems. Some smart solutions both respond to demand and involve the public in shaping it. They encourage people to use transit during off-hours, to change routes, to use less energy and water and to do so

at different times of day, and to reduce strains on the healthcare system through preventive self-care. The result is not only a more livable city but also a more productive place for businesses to operate.

In fact, smart city can be represented as a set of networks of exchange, control and regulation that organize the interaction between human and technology. Similar networks based on access to information and technology and created both by the city government and residents, allow you to optimize the urban environment and save the city as a hybrid self-organizing system (Mukhametov, 2020).

Research frameworks: mimetic isomorphism

To what extent does Moscow follow the Singapore experience? Is the Singapore experience being influenced by the western concepts? Is Moscow's smart city governance system somehow westernized or is it closer to the eastern experience? Is experience in Russia more normative? How cities are developing? To answer these questions, we would like to employ isomorphism as a theoretical framework.

Isomorphism is a "constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions" (DiMaggio & Powell, 1983). American sociologists identified five field level predictors to isomorphic change:

- B-1: The greater the extent the field is dependent upon a single source, the higher level of isomorphism.
- B-2: The more interaction of the field with the state, the more isomorphism.
- B-3: The fewer the number of organizational models, the quicker the isomorphism
- B-4: The more technological uncertainty or goal ambiguity, the greater the rate of isomorphism
- B-5: More professionalism in the field, more isomorphism (DiMaggio & Powell, 1983).

Our additional task is to define, whether the Moscow smart city system includes such initiatives as in the cities of the European countries (London, Paris, Berlin) like building eco-houses or making the Reinventing Project or turns to the East. China's smart city construction as well as Russian one has just started, and the urban informatization construction is in an important structural transformation period, that is, from the stage of information technology popularization and application to the stage of information resources development and utilization (Kang & Wang, 2020).

Literature review

Experts note that within the concept of Smart City, with the development of delivery services, new challenges have appeared. One of the main problems is the shortage of personnel. Moreover, the need for big data analysts, programmers and IT developers has increased dramatically. All companies confirm the high competition between employers for personnel (Korchmarek & Eremina, 2021). Some other barriers to the development of smart city include conflict of interests of municipal authorities, citizens and business; the problem of information security (automation of urban systems leads to an increased risk of attack by hackers and data theft).

Inconsistencies between the interests of the major stakeholders within the smart city concept are also described as one of the barriers to the development of the smart cities (Veselitskaya, Karasev & Beloshitskiy, 2019). In this regard we are going to pose a question - what role do legislative and executive branches of power play and do they intersect? Sufficient research has not been conducted yet to draw up some recommendations for improving the Smart City initiatives, considering different unique factors (Vershitsky, Egorova, Platonova, Berezniak & Zatsarinnaya, 2021), which is another research gap we are going to delve into.

Cities of Russia are only starting to take advantage of digitalization and smart initiatives, and standardization could become a key to successful implementation of the smart city strategy (Kamolov & Kandalintseva, 2020). Another aspect is, whether there are some specific economic, political and social features of these two countries. Regarding the energy sector, which is one of the areas of interest in this study of digitalization, Singapore is dependent on energy imports, which is connected to rapid advancements in the energy digitization initiatives (Ho, 2018).

At the same time Russia is one of the biggest worldwide supplier of energy resources, but could it be a possible reason for hampering the digitalisation in the energy sector? It is proved that some of the technological advances could be destructive for the young and the demand for new measures within the framework of the Smart City initiative in Singapore (Vasilenko, 2018). Although technology should not be the foundation of the nation (Manasa, 2018), e-governance is being widely developed in various Smart Cities across the world.

Research results: the limitations of the findings

The research we conducted based upon our methodology, even though it brought fruitful insights into the research matter, was still limited to a certain extent by several factors. In this paragraph the key findings and the limitations of our research are to be introduced.

The role of the legislation in smart city initiatives regulation: key findings

- Smart City 2030 Moscow Strategy is a comprehensive document that includes many best practices and initiatives from dozens of foreign countries, including Singapore.
- Moscow goes its own way in terms of supporting national manufacturers of equipment and technologies, as well as in the use of Russian big data storage systems.

The limitations of this category studied within our research come down to the simple fact, that for the Moscow case digital regulatory mechanisms and cyber law are an emerging legal sphere, whereas for the Singapore case the legal and regulatory frameworks are already in their "flourishing" stage. This means that on practice it is hard to compare these two regulatory systems as for Moscow the regulation is rather about introducing general concepts and policy papers, and for Singapore it is already way beyond that as it goes farther and farther into detailed regulation of certain aspects such as introducing standards of technical character. Moreover, Singapore is a city-state and, thus, it does not possess the federal level and secondary level of regulation (Lee et al., 2022), and for Moscow the situation is quite different and for now the major scope of the regulation is being exercised within the federal frameworks.

The role of the executive power in smart initiatives regulation: key findings

- Moscow is copying the experience of Singapore in creating separate government bodies capable of effectively coordinating various departments in digitalization issues.
- A very strong basis for practical implementation of the strategic advances in Singapore could not be realized in Moscow due to the practical complications (lack of infrastructure and transparency).
- Federal bills and initiatives have a significant impact on the digitalization of Moscow.

The complexity of the practical implementation of the initiatives lies not only within the differences in the socio-cultural circumstances, but also within the scope of such implementation – as Moscow is almost twice as populated as Singapore: 10,381,222 and 5,936,160 of current population respectively (Worldometer, 2022), it becomes more challenging to establish the working digital systems and mechanisms city-wide and, what is even more important, the controlling systems that could provide an opportunity of the monitoring of the efficacy of the implemented initiatives. For the research purposes this means the lack of the available data for conducting viable analytics.

The role of technologies in education and their current level: key findings

- There is certain resemblance in establishing the platforms and upgrading the classrooms.
- Many Moscow educational initiatives, especially the Moscow Electronic School, have much in common with their counterparts in Singapore. However, Singapore's initiatives are now much more advanced and reach a broader category of students, providing more opportunities.
- The authorities of Moscow are much more focused on the digitalization of school education than on the digitalization of higher education.

The educational advances are generally quite prospective, yet it should be noted down that when we compare the smart practices of Moscow and Singapore, we compare "many/common" cases in Singapore with "a few/some" cases in Moscow and such comparison is not fully representative because of the lack of the prevalence of the digitalization in education and its slower pace of development in Moscow, especially at the university level – and when it comes down to the suburban areas, which are also part of smart city Moscow, the number of the digital technologies goes down proportionally the farther the area is from the city center. Nevertheless, it could be quite interesting to conduct a case study between two schools of the so-called "new generation" both in Moscow and in Singapore to obtain more conclusive findings.

The role of Big Data in energy sector: key findings

- Not detected on the level of the governmental projects, yet there is mimetic isomorphism when it comes to the inner digital transformation of the corporations in industry.
- Promising initiatives for the introduction of big data in the energy sector of Moscow almost completely coincide with those in Singapore, however, at the moment, Moscow projects are only in development or at the testing stage.
- Moscow's energy initiatives are more focused on energy savings and optimizing the operation of existing equipment, while Singapore is focused on developing green energy and achieving ZeroCO2 city status.

The key findings are limited by the energy priorities for the two cases: even though there is strong prevalence of the fossil fuels in both cases, for now Singapore aims at shifting to the renewables, whereas for Moscow this is not the highest priority at the moment, and this trend makes the comparison of the digitalization of the energy sector relative, as there are not so many similar precise initiatives to compare. Moreover, the emerging character of the energy sector digitalization in Moscow allows to advocate in favor of the mimetic isomorphism, but the truth is that the

emerging stages of digital transformation are generally quite similar worldwide regardless of the geography and it is the evolution of the digital means that makes the processes unique and specific for certain smart city cases.

The practical implementation of digital smart initiatives by the cases of e-government: key findings

- Most of Moscow's initiatives to create e-government have their 'twins' in Singapore, in particular, the creation of a single portal of public services with a mobile application and personalization, portals for feedback and cooperation between citizens and the state, the creation of "digital twins" and resources to help local businesses in digital transformation.
- Moscow has chosen state-owned cloud storage to create electronic data centers, while the Singapore authorities have chosen to use digital solutions from commercial companies.

By taking a closer look at how all these initiatives correlate, it becomes clear that this sphere is one of the most advanced smart city governance aspects in Moscow alongside with the public transportation system. The limitation of this study is caused by the different priorities regarding e-government initiatives in Singapore and in Moscow: for Singapore it is now more about developing enhanced infrastructure for digital document management, whilst for Moscow it is more about developing necessary infrastructure for access and social inclusion of the citizens and the efficiency of the system still has some questionable inefficiencies caused e. g. by the lack of the workforce at the state services centers.

All these limitations are not to be considered hindering of our work, rather as inspiration for the further exploration and conducting more studies both on Singapore and Moscow cases and smart city governance concepts in general.

Moscow's Smart City Strategy 2030: a potential isomorphism with Singapore?

Successful formation of the digital economy is closely associated with a high level of human capital, which is equally true for the creation and development of smart cities – an insufficient level of development of human capital or its uneven distribution becomes a source of socio-political risks of digitalization, including formal implementation of the introduction of innovations, unpreparedness of the population and negative reaction of the population on transformations, socio-political conflicts, growing distrust of political institutions and decisions (McKinsey & Company, 2018).

Mimetic isomorphism has the following definition – it is an act of an institution or corporation following and copying the best practices of other organizations. Mimetic isomorphism in organization theory refers to the tendency of an organization to imitate another organization's structure because of the belief that the structure of the latter organization is beneficial. This behavior happens primarily when an organization's goals or means of achieving these goals is unclear. Experts have studied the Russian capital's smart city experience, various smart projects and their influence on city residents' quality of life. Moscow has provided data on 76 out of 91 key efficiency-assessment criteria (Mos.ru, 2018).

The key document of the city of Moscow is a "smart city", a document of the strategic development of Moscow until 2030. The main document of the federal scale to develop this area is the National District Economy project. Another growth source is a strategic initiative agency established by the Government of the Russian Federation for the development of technology. One of the main projects is the Moscow E-School, aimed at promoting educational technologies. This mechanism monitors the performance of the students and helps to improve the training of high school students. It helps future students to decide with the specialty and get better training on the profile. In addition, an important initiative is a school of new technologies, an educational platform, which provides the ability to improve digital competencies for both students and teachers. Since 2020, the program "The Digital University" has been launched, which will help provide grants to non-governmental organizations working in the field of digitalization of education, as well as create special centers for digitalization of higher educational institutions both in Moscow and in other cities of Russia.

One of the key documents regulating the strategy for the development of the energy industry in Moscow is Decree No. 451-PP on the approval of the state program of the city of Moscow "Development of communal infrastructure and energy saving". The goals of this city program include aspects of the energy sector such as increasing reliability of the energy system, reducing equipment wear, predicting the load on production facilities, improving the city's energy infrastructure, reducing the cost of electricity, and others.

To achieve these goals, cities and industry experts are developing solutions based on big data technology. In particular, the best solutions for the Moscow energy system could be:
1. Using cloud storage to organize and use big data in the energy sector;
2. Practical implementation of virtual networks, neural networks and complex algorithms for digitizing the operation of energy networks and predicting accidents;

3. Implementation of best practices for validation and analysis of big data in production.

In 2021, the transition of the state system for coordinating digital initiatives to cloud storage was announced. Unlike the Singapore experience, where data has been moved to private cloud storage systems, Russian data will be stored on the government's cloud platform. This feature is characteristic of the key trends in Russia's current policy - import substitution and protectionism in favor of its own technologies. Gos Cloud, created in Russia, will help the Russian authorities in performing computing operations and maintaining cybersecurity.

"Electronic Government of Moscow" uses an extensive technical and technological base to prevent and solve crimes. More than 135,000 CCTV cameras have been installed in the city, providing authorities with information to help identify administrative and criminal offences. The online face recognition system is actively developing. The problem here is that although this CCTV system has been inspired by the Singaporean experience and was, in fact, a huge success, when it comes to increasing the security levels – this has also been a failure in terms of privacy protection as there is no clearly defined legal framework for this surveillance activity in Russia for the moment being.

In recent years, projects have appeared in Moscow to resolve municipal issues in the format of referendums using blockchain technology. At the moment, the mos.ru website is the key platform for Moscow's e-government. Within the framework of this portal, 43 websites of the executive authorities of the capital of Russia are interconnected, the user of this website can get access to all electronic services of the Government in the shortest possible time.

A single application of the State Services for the mobile platform was also created - it allows Moscow residents to receive public services using a smartphone. Also, in order to simplify access to the information services of the city of Moscow, a single contact center was created that unites all dispatching and utility services of the city.

Another important initiative of the Moscow Electronic Government is Our City portal, which allows Muscovites to establish two-way communication with city authorities on improving living conditions in the city, publish information about problems and violations in homes and urban spaces. Complementing this platform is the Active Citizen initiative, which seeks to further engage Moscow residents in transforming the city in a positive direction.

Among the active initiatives of the Moscow Electronic Government, which are currently under development, testing and implementation, one can list such projects as:

1. Optimization of public services using artificial intelligence, as well as personification and forecasting of the provision of public services;
2. Creation of a single API for commercial organizations in the city of Moscow;
3. Implementation of Digital Democracy projects that allow citizens to participate in various elections in electronic format;
4. Creation of a digital identity of a citizen, the so-called "digital diary" of a person (Mukhametov, 2020).

Despite attempts to copy Singaporean practices in Moscow, this is technically impossible due to the more opaque infrastructure in Moscow, including the legislative one. There are certain activities in the field of education; in Singapore, the educational infrastructure looks much wider. The Moscow authorities are more focused on the digitalization of school education than on the digitalization of higher education. The introduction of innovative technologies in the energy sector in Moscow is generally similar to similar practices in Singapore, but in Moscow these processes are only at an early stage. Singapore practices are based on the development of green energy, while in Moscow they are based on energy consumption optimization.

Singapore, with all the advantages of digitalization practices, still has potential for development. The main strengths of the Singaporean approach lie in the effective mechanism for the implementation of digital initiatives and the use of innovative solutions.

Overall, the assumption and the hypotheses that have been made, are supported by the research: there is mimetic isomorphism between Moscow and Singapore on the side of Moscow in several sectors and smart city initiatives in their digitalization development stages, which are yet limited by required transformation of legal and infrastructural mechanisms.

Moscow should move in the development of digitalization in its own way, since the practices of Singapore cannot always be implemented. Despite the effectiveness of Singaporean technologies, there are a number of limitations, primarily due to the lack of interest in innovative development in Moscow. It is difficult to generalize the results only because of the study of specific sectors, for which the following study should be carried out. Many digitalization activities are at an early stage, which makes it extremely difficult to conduct research on this topic. The practical significance of this work is focused on the prospects for the implementation of smart city

technologies in less tech-savvy environments and infrastructure transformation. Existing good practices should be appropriate for different socio-economic conditions. As some relevant recommendations for further implementation of the "Smart City" initiatives in Moscow, the following points are to be introduced:

1. focusing on creating the necessary infrastructure to improve the educational environment;
2. developing a sufficient and effective regulatory mechanism for the implementation of "smart city" initiatives, especially in the energy sector;
3. promoting the values associated with smart city management so that they become more widespread and popular among the population.

Ideas for future research

The research that has been conducted was dedicated to some specific areas of the digitalization process in two different cases. It is important not to forget about the "big picture"- smart city concept is not limited to digitalization processes only. It comprises so much more, e. g. environmental initiatives and developing a highly efficient public transportation system with an enhanced functionality.

In this regard, more scientific exploration could be dedicated to cross-analyzing the waste management within the largely populated smart cities in order to suggest the best practices, which could preferably also be cost-effective, to be implemented empirically under different infrastructural and natural conditions.

There are also certain general challenges to be addressed by the global community, such as involvements of the citizens in the governing processes, interconnectibility, developing the strategies for social appeal of the smart cities (especially the small or emerging ones) so that people actually move in there, and solid data storage systems (TWI, 2022). Thus, the personal data protection strategies efficiency could be studied within the scope of smart cities, as now the process does not seem to be very well established in Moscow in comparison with the European standards, for example. The latter one is also mentioned in the article provided as part of this master thesis, not because it is more important than the other ones, but rather because it is the most urgent.

Legislation and regulatory frameworks

Regulatory mechanisms could be tricky to adapt due to the differences in the legal systems and the approaches to the regulation. Still, the idea of useful implementation of the necessary incentives

to provide the ideal circumstances to boost the digitalization processes is one of the perspective research ideas under the following notion: how could this be exercised?

One of the possible answers could be the imperative for the authorities to focus more on the general regulatory frameworks, which provide certain flexibility and inter-connectivity for the digitalization technologies across several industries, rather than regulating every process precisely, leaving no room for fast changes according to the developing technology upgrades (Threlfall, 2020). Incentives conducted through various taxation mechanisms could also be of great interest if studied properly on the cases of digitalization in certain countries. These two possible ways of expanding research available on the matter through comparative studies are quite eye-catching.

One more idea for further research is comprehensive analysis on the impact of harmonization of regulatory standards between different countries, e. g. between the USA and the EU. Such harmonization is being viewed as a means to prevent the hindering of innovation sector and to increase the competitiveness of the economy in general (Anderson-Hall et al., 2020). The research question could be connected with either proving this assumption or denying it.

Executive power for practical implementation
The most interesting aspect for the empirical execution of the digital concepts is financing of this transformation. In order to guarantee such investment, which could not be governmentally-funded to the full extent, private capital should be attracted through establishing public-private partnerships and special funds.

There is a brilliant proposal for such cooperation by KPMG and the World Economic Forum through the Sustainable Energy Innovation Fund, which objectives include the creation of synergies between private and public capitals (World Economic Forum, 2019). The projects in digital area within the smart city initiatives that are to be funded by the similar funds could be a possible idea for further research to point out how efficient and viable such approach actually is.

Digital technologies in education
The advantages and potential prospects long-term are very well outlined alongside with the inevitability of the spread of digitalization of education. However, it is hard to deny the fact, that more and more concern is being raised about the negative impact of this process.

There could be quite strict positioning on the matter, when dehumanization of social relations and increasing levels of individualism and selfishness along with the overall crisis of intellectual culture are being suggested as the direct outcome of the digitalization of the educational processes (Strokov, 2020).

Some researchers find inconclusive evidence to the extent of the negative impacts, e. g. when it comes down to the communication skills of the medical students because not all possible digital means (like virtual reality) have been studied so far in the due course of the research (Kyaw et al., 2019).

The majority of the educators agree that the right combination of digital and in-person learning should be introduced – so the idea for the further research could be as follows: to what extent could digitalization go to enhance the educational process without hindering the communicative part of this process and the communicative skills of the students?

Digital technologies in the energy sector

Singapore is the worldwide acknowledged leader of digitalization when it comes to the electrification with one of the most famous projects of digital twins for the national power grid. Its focus on the sustainable energy management is excellent and the multiple projects of space-saving tools for renewable energy are truly innovative and inspirational. Thus, some of the ideas for further scientific exploration could be connected with the challenges of the implementation of the digital twin for the national power grid and the establishment of national energy security by the renewable sources, rather than by import of the energy carriers.

For Moscow case, the possible idea for further research could be to explore the public awareness of the smart energy solutions and the ways of making such solutions more accessible, cost-effective and popular among the citizens. What is more, the possible system of regulations with the incentives for the private sector is to be explored, alongside with the infrastructural solutions for transportation of the more ecologically friendly energy alternatives within the city (due to the abundance of the natural gas, such solution could be hydrogen).

Digital technologies in the social sector: e-government

Building an eco-system is outlined as one of the core milestones for the creation of the Smart Nation in Singapore. Interestingly enough is the definition of such eco-system: the overall scope

of interconnections within the living beings and the surrounding physical environment, which are beneficial for all the participating actors (Cathelat, 2019).

Technological integration changes the ways of interactions within this system of connected actors and they all become more reliant on the digital devices and the electronic infrastructure for having uninterrupted access to the communicative processes. In this regard, it becomes an interesting area for research, to find ways to ensure the digital literacy as part of the social inclusion across the most vulnerable social groups (because of age, location, physical conditions and other factors) – and to ensure it not through traditional school curriculum (which does not seem to be effective for these groups), but through alternative ways.

Overall, each of these ideas for the further research is valid and equally interesting, it would be our pleasure to become a scientific inspiration for the other researchers in their scientific exploration.

Conclusions

The research question explored in the article goes as follows: is there an isomorphism between Moscow and Singapore when it comes to smart city initiatives or does Moscow rather follow its own path? In order to find the right answer, the following assumption has been made: through the lenses of institutional isomorphism (DiMaggio and Powell, 1983) the similarities between two smart cities could be explained with the help of the apparatus of neo-institutional theory.

The following hypotheses have been formulated:

1. There is general similarity between Moscow and Singapore in smart city governance, which are caused by the natural life cycle of the development of the digitalization processes.
2. This resemblance goes only up to a certain extent, which is limited by the extent of the technical and infrastructural sophistication of the digital systems.

These hypotheses would be explored through five following dimensions (or variables), which have been introduced by the authors of the article informed by the scientific literature on smart city governance practices:

- the role of the legislation in smart city initiatives regulation;
- the role of the executive power in smart initiatives regulation;
- the role of digitalization in education and their current level;

- the role of Big Data in energy sector;
- the practical implementation of digital smart initiatives by the cases of e-government.

Both the assumption and the hypotheses have been confirmed by conducting the research. Therefore, there is mimetic isomorphism between Moscow and Singapore cases on the side of Moscow in certain sectors of societal life when it comes to the developing stage of the digitalization, limited by the yet-to-be further developed legal and infrastructural mechanisms.

Salvador Dalí once said that perfection is impossible to reach, yet that does not necessarily mean the society should not strive for it. Even if the perfectly customized smart city concept is yet to be found for both Singapore and Moscow, it is already becoming clear that the resemblance in the development of smart city initiatives allows the global approach and isomorphism to be mentioned.

Although the unique combination of socio-economic realities and the geopolitics are vastly different for the cases of Moscow and Singapore, we can summarize that the Moscow authorities largely relied on the experience of Singapore in creating their own vision of a Smart City.

In particular, the impact of Singapore's success in creating specific projects in the field of open digital government, educational initiatives, transforming the executive branch to achieve digital development, and creating strategic documents for digitalization is especially noticeable. Nevertheless, it is worth noting that Moscow is currently lagging behind both Singapore and many other world megacities in many areas. Also, some spheres of digitalization are similar enough for most cities in the world, so it would be unfair to note the copying of basic principles in industries such as energy.

More specifically, Smart City 2030 Moscow Strategy should be mentioned as one of the most vivid examples of the regulatory isomorphism; development of the governmental structures to specify on the digitalization processes and maximizing the efficiency of the practical implementation of the smart city governance initiatives by eliminating the systematic failures of various kinds, although, being generally quite common for the countries actively involved in the digitalization process, is inspired by the Singapore case.

Moscow Electronic School as a resemblance with the Singaporean school systems; e-government initiatives, e. g. "digital twins" – for the governmental services. However, there are differences within the energy sector as Moscow has not yet been invested enough in the development of the

sustainable energy and the technological solutions chosen for some specific objectives, like cloud computing, do differ.

Practically, such differences could be caused by a range of factors, like the different energy mix for one of the cases on the national level and the absence of the required technological solutions within the private contractors due to the lack of prevalence of the popularity of the digitalization enablers. Looking for the potential explanations of these tendencies is how the best practices could constantly be further developed into becoming the golden standards of all times – and that is exactly how not only Moscow takes a piece of advice from Singapore, but also how Singapore gets some feedback worth taking a look at.

The resemblance could also be faulty to some extent because of the legal limitations, as it happened in the case of the CCTV surveillance introduction in Moscow as the legal frameworks and efficient mechanisms of privacy protection are yet to be introduced in the digital law field in Russia.

So, what is it that should be done now? We believe that the notion of the unattainability of perfection could be a valid point, meaning that every smart city concept has its weak spots and some of them obviously more, than others, yet the mimetic isomorphism between Singapore and Moscow smart city governance concepts detected in this research could help achieve better results in this strive for the best – and hopefully, it will.

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Abstract

The aim of this study is to investigate the exchange of Smart City (SC) governance models and consequent standards between global cities. A brief media review suggests that Moscow SC initiative relies on Singapore experience. So, to achieve our aim, we pose the following research question within the scope of the scientific method:

Is there an isomorphism between Moscow and Singapore when it comes to smart city initiatives or does Moscow rather follow its own path?

To answer this question, we employ a comparative case study strategy through describing and analyzing two cases of global city smart initiatives within 2015-2022: Singapore and Moscow. Russia is the country where context as one of essential components of the case study strategy (Saunders, Lewis & Thornhill, 2009) really matters, especially when it comes to governance. That is why case study strategy is considered as the optimal choice for our study.

We employ semi-systematic literature review (Snyder, 2019) to map out the area of the research and the scientific gaps to be studied. In data collection and analysis, we rely on media content analysis protocol (Macnamara, 2005). Furthermore, we have an ambition to frame our findings through the lenses of institutional isomorphism (DiMaggio and Powell, 1983) and expect to see

similarities in our comparison that may be explained with the help of the apparatus of neo-institutional theory.

This article is one of the first of this kind as Moscow is still in the beginning of the implementation of the smart city initiatives in terms of digital transformation and the legal field for digitalization is only being established. Thus, the exploration of this relevance of implementing international experiences within the realities of different countries could be of interest for the other smart city initiatives in their beginning stage.

The analysis shows that the Moscow authorities largely relied on the experience of Singapore in creating their own vision of a Smart City. In particular, the impact of Singapore's success in creating specific projects in the field of open digital government, educational initiatives, transforming the executive branch to achieve digital development, and creating strategic documents for digitalization is especially noticeable.

Key words

Smart city concept, smart governance, open innovations, comparative case study, governance strategies

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Introduction

In the frame of the constantly developing world, it is essential for the Russian Federation to get ready for the transition towards Smart City initiative that has already been proven to demonstrate significant results in the ongoing shift towards a sustainable future in various countries.

This article is devoted to the exploration of the exchange of Smart City governance models and coherent standards that are applicable to the global cities such as Moscow and Singapore in order to establish a connection and the differences between the two smart systems. Both Moscow and Singapore are the world leaders, based on the level of implementing the smart city initiatives in different fields of life, particularly when it comes to a digital urban development and some researchers believe there is a certain resemblance in the way how they enhance the "smartness" of the governmental practices.

Therefore, our research question goes as follows: is there a mimetic isomorphism between Moscow and Singapore when it comes to smart city initiatives or does Moscow rather follow its

own path? In order to find the answer, we employed a comparative analysis of digitalization practices, examining the smart city initiatives of the two countries starting from 2015 up to the present day. Besides, we have implemented semi-systematic literature review for exploring the research gaps. Previously, Russia used to implement many of the European initiatives in order to keep up with the European standards of life. However, there has been a noticeable shift towards Asian influence in city governance described by Alexander Lukin in his article "Russia's Pivot to Asia: Myth or Reality?" (2016)

One of the possible reasons could be the changing geopolitical situation and considering the current circumstances this trend is highly likely to be continued. In that regard, it becomes essential to explore where exactly the current inspiration comes from in order to understand and modify, if necessary, the consequences and develop a set of recommendations for the future smart city governance enhancements in Russia.

Based upon the research question, the following assumption has been made: through the lenses of institutional isomorphism (DiMaggio and Powell, 1983) the similarities between two smart cities could be explained with the help of the apparatus of neo-institutional theory, and the following hypotheses have been formulated:

1. There is general similarity between Moscow and Singapore in smart city governance, which are caused by the natural life cycle of the development of the digitalization processes.
2. This resemblance goes only up to a certain extent, which is limited by the extent of the technical and infrastructural sophistication of the digital systems.

These hypotheses would be explored through five following dimensions introduced by the authors of the article informed by the scientific literature on smart city governance practices (which comprises the scientific contribution of this article):

- the role of the legislation in smart city initiatives regulation;
- the role of the executive power in smart initiatives regulation;
- the role of digitalization in education and their current level;
- the role of Big Data in energy sector;
- the practical implementation of digital smart initiatives by the cases of e-government.

The key findings are to be presented in the tabular form in the end of the article.

Theoretical frame of reference

The main aim of this paragraph is to present the theoretical concepts used in the study and to work out a theoretical frame of reference. The latter is an indispensable part of every study and it needs to be sound and profound. Once interpreted, the theoretical lenses should be broad enough to describe the phenomenon studied and consider its specific characteristics.

Smart city governance tends to be a promise of rationalizing governance on the basis of better knowledge about urban complexity. Moreover, urban auditing can be seen as technocratic (better knowledge for better urban management), critical (selective ways of knowing to benefit urban elites) or emergent (socially constructed ways of knowing based on more cooperation and interactions between urban stakeholders) (Grossi, Meijer & Sargiacomo, 2020).

The main reason for the confusion around the scientific status of smart-city research rests with different reasons, starting from the lack of intellectual exchange among those conducting research in the field of smart cities to struggles that communities have in finding any common currency between their lives and the knowledge smart-city research produces cities (Mora, Bolici, Deakin, 2017).

Mimetic isomorphism

Mimetic isomorphism is the act of an institution or corporation following and copying the best practices of other organizations. This adds to the use of the exact optimal approach by many organizations.

For instance, Singapore is uniquely poised to become a smart city leader, primarily because it focuses on the needs of its citizens foremost. The example of Singapore is often used, when it comes to the comparison with the other smart cities in different areas: urban planning, transport system, ICT etc. This way key smart city initiatives of different centers on its way to transformation may overlap with the initiatives of Singapore, and the whole smart system often builds upon the historical need to congregate and innovate.

At the same time Atlanta is also adopting smart city solutions that are garnering international attention. Three recent projects include the North Avenue Smart Corridor, the city's extensive camera network, and the first biometric terminal at a U.S. airport (Johnston, 2019).

In order to examine the implementation of smart city initiatives from cities in the neighbouring Asian regions, Singapore and Seoul were chosen. In this case, Singapore was supported by its status as a city-nation whereby as both a city and country, there was a substantial motivation for it to be as „smart" as possible bearing its limited resources and small size (Adnan, Dali, Hamzah & Daud, 2016).

Other centers like London, Paris and Berlin are also shaping themselves into smart cities, with the initiative of London to establish a datastore and developing technology that allows the city to reuse waste heat from underground chambers. The key smart city initiatives of Paris include the Reinventing project, which is a good example of how the city plans on facilitating innovation by inviting both national and international talents to rebuild many of its significant sites along with a green initiative (equipping the cooling system, the solar power station in Halle Pajol and district heating network). Berlin's smart system consists of building eco-houses with solar panels, energy storage batteries and the latest smart home innovations and technology. Moreover, as a part of the 'Deutschland Digital' project, the city is planning to create a platform in the healthcare field, where specialists, hospitals and emergency units will be able to exchange valuable data in compliance with individual patients (Pradel, 2018).

Analytics

Smart City Framework (Falconer & Mitchell, 2012) describes a process that will help key stakeholders and city/community participants to mitigate the issues that the city faces nowadays, for instance, increased greenhouse-gas emissions, decreased budgets, polarized economic growth, increased populations etc. Smart City Framework explains how the cities operate, how to define city objectives and stakeholder roles, and how to understand the role of ICT within physical city assets. It is one of the theories that we would like to apply to answer our research question in order to define both strengths, and weaknesses of a systematic process of enabling public and private sectors to plan and implement Smart City initiatives more effectively for economic, social and environmental gain.

The case study for implementing ITU-T international standards to shape smart sustainable cities, based on the case of Moscow (Smiciklas & Imran, 2018) also represents the major solutions for the government (efficient urban management), business (well-developed urban infrastructure) and the community relations (citizens) and the path towards developing a "Smart Moscow 2030" strategy and its six dimensions like:
- providing smart environment by the principles of ecology and safety,

- smart economy (advanced financial technologies and industries),
- smart mobility in tourism, ICT sector and public transport (for instance, electric busses, cars etc.),
- smart living with all the modern housing and utilities and developed city planning,
- smart government (providing e-services to the citizens and becoming more open-digital) and
- smart people concept that includes improvements in the spheres of education, health, social, culture and innovations. According to the case study, "people should take part in running and developing the city at every level."

Literature review

Smart City Concept is a system, in which the existing resources of city services are used in the most optimal way and provide the greatest convenience to city residents. This requires a close connection between smart city projects (street video surveillance, public services, intelligent transport system, and others) on the scale of a megalopolis. Modern technologies are changing the urban environment, the economic landscape and social ties, creating an opportunity to manage municipal farms at a qualitatively new level and creating an active demand for new digital services in this area. Many different initiatives are already being implemented on the market, an important step will be the creation of publicly available open source platforms based on domestic hardware and software.

The smart city concept is a multi-dimensional theoretical construct which corresponds to several possible interpretations (Fedonenko, 2019). For the purposes of this study, the smart city concept is interpreted as *a mechanism to satisfy the needs of the population and economy as well as sustainable energy management.* This approach is also reflected in the official strategy "Smart City - 2030". Although the general attitude towards such priorities is absolutely positive, it can not be omitted that a reasonable concern has been raised (Korchmarek & Eremina, 2021) as well, as it is already quite obvious that there is a lack of qualified workforce to fulfill the requirements of smart city digital portrait.

Inconsistencies between the interests of the major stakeholders within the smart city concept are also described as one of the barriers to the development of the smart cities (Veselitskaya, Karasev & Beloshitskiy, 2019), which provides an area for scientific exploration: what role do legislative and executive branches of power play and do they intersect?

As further underlined by Vershitsky, Egorova, Platonova, Berezniak & Zatsarinnaya (2021), sufficient research has not been conducted yet to develop the recommendations for Smart City initiatives in Russia considering the national specifics - which is another research gap this study is supposed to focus on.

Standardization is what could be described as the driving force to successful implementation of the smart city initiative in practice by the comparativists (Kamolov & Kandalintseva 2020). The role of applying international expertise (in this case, Smart City initiatives in Singapore) to the still developing cases (Moscow) should not be underestimated, however, in practice, does it really work? As the specific economic, political and social features of the countries are quite different, is it really being done? That is one more place to start.

Regarding the energy sector, which is one of the areas of interest in this study of digitalization, Singapore is dependent on energy imports, which could be one of the reasons for such rapid advancements in Smart City energy digitization initiatives (Ho, 2018). Considering the fact that Russia is a world-wide supplier of the energy resources, could this be hindering the digitalization in the energy sector in the Moscow case?

Some of the technological advances have been proven to be destructive for the young and the demand for new measures within the framework of the Smart City initiative in Singapore (Vasilenko, 2018). Is the technological level of digitalization in Moscow high enough to raise such concerns? Are there measures taken to prevent the dying out of creativity?

Although technology should not be the foundation of the nation (Manasa, 2018), e-governance is being widely developed in various Smart Cities across the world. The question this study would answer is whether the e-governance system in the Moscow case is organized by the Singapore case's principles.

Overall, in the due course of this research to fill the scientific gaps detected by the literature review, the Smart City case studies of Singapore and Moscow will be explored according to the following plan: establishing the research question, defining the hypotheses and the assumption, studying the variables and drawing a conclusion. The scientific method appears to be optimal for this research to be combined with the additional means of scientific exploration mentioned above. The main objective of this method is to guarantee the fundamentality of the research (Blystone & Blodgett, 2006).

The research question explored in this article goes as follows: is there an isomorphism between Moscow and Singapore when it comes to smart city initiatives or does Moscow rather follow its own path? In order to find the right answer, the following assumption has been made: through the lenses of institutional isomorphism (DiMaggio and Powell, 1983) the similarities between two smart cities could be explained with the help of the apparatus of neo-institutional theory.

The following hypotheses have been formulated:
1. There is general similarity between Moscow and Singapore in smart city governance, which are caused by the natural life cycle of the development of the digitalization processes.
2. This resemblance goes only up to a certain extent, which is limited by the extent of the technical and infrastructural sophistication of the digital systems.

These hypotheses would be explored through five following dimensions (or variables), which have been introduced by the authors of the article informed by the scientific literature on smart city governance practices:
- the role of the legislation in smart city initiatives regulation;
- the role of the executive power in smart initiatives regulation;
- the role of digitalization in education and their current level;
- the role of Big Data in energy sector;
- the practical implementation of digital smart initiatives by the cases of e-government.

Research results

Singapore case

Singapore has worldwide recognition as the leader in "smart city" initiatives development. As of 2021, it has been renowned as №1

- of Smart City Index 2021 by IMD-SUTD;
- of Roland Berger's Digital Inclusion Index;
- of Smart City Governments ranking and other reputable ratings.

Quoting John Low, "Governments and societies must proactively become digital-ready to survive in the new normal" (Kaur et al, 2021). The question is how to do so effectively enough for it to become the golden standard and one of the best practices worldwide.

The digital transformation of Singapore is based upon three so-called "Pillars of a Smart Nation": digital society, digital economy and digital government. Each of these is essential to constitute the ultimately successful digital reality for the Singaporeans.

Digital Society

The purpose of this pillar is to guarantee the digital inclusiveness for all categories of the population and, thus, level out the inequality within the society. To achieve this objective, the following areas (or "digital enablers") are currently being developed:

- regarding digital access – there are governmental programs to provide electronic devices to low-income segments of the population at subsidized rates and wireless connectivity is being upgraded not only in terms of household use, but also in public places;
- regarding digital identities – e-payment is being encouraged in order to undergo a transition to cashless community and safe transaction systems alongside with the secure authentication methods are being implemented;
- regarding digital literacy – providing information for the Singaporeans to obtain necessary skillset to put their digital opportunities into effect, which implies mass education on online information management (including fake news phenomenon i. a.), cybersecurity, transaction activities and accessing the e-government services;
- regarding communities and business – encouraging and supporting the initiatives, such as "Digital for Life" so that the knowledge-sharing practices on digital literacy are not only enforced by the governmental bodies, but rather by the Singaporeans themselves;
- regarding design of the e-services – digital products, services and *even legal regulations* are to be designed in a way which makes them understandable, accessible and easy to use for the people without specific know-how on the subject.

The role of technologies in education and their current level

As the expression goes, every medal has its reverse – and using technology as part of an educational process in Singapore is not an exception in this regard. The transformation of the educational process could be linked to two major tendencies: the transformation of the means of learning and the transformation of the learning process.

Traditional classrooms look quite differently these days, compared to the ones from 2000s. They are now very well equipped with such technological means as projectors, 3D googles, digital boards instead of whiteboards and visualisers. Hard copies are being commonly replaced by various soft forms (e. g. e-books instead of conventional "old school" books made of paper).

Online platforms for courses and submitting the assignments are provided, alongside with e-libraries and an opportunity to pass all the tests and exams electronically. Physical presence is no longer required as zoom and other resources made it quicker, easier and more accessible to join classes per Internet.

The way students collaborate has been transformed as well with a noticeable improvement in teamwork skills (Invictus, 2022). It has also been outlined by the researchers that round the clock connectivity is one of the key drivers of modern educational practices (Raga & Nagasubramani, 2018).

However, there are some negative aspects of the overall positive resulting tendencies of digitalization in education in Singapore. Even though it is a fact that e-learning is more interactive and, thus, more engaging for the students, it may still lack the involvement due to the possible distractions, which become harder to set aside due to the fact that the students' learning environment is online, and the offline site is to be chosen by themselves. One more aspect to be closely considered and addressed is the lack of interpersonal communication because of the increasing role of online interaction.

Many specialists are also wondering, whether technology (AI) could replace the teachers at some point. The answer to that, at least for now, is as follows: only up to a certain degree. In Singapore several pilot projects are being introduced to outsource the less complicated mechanical teaching responsibilities to learning feedback assistants so that the teachers could focus on more complicated tasks. A vivid example of such successful cooperation is the practice when the basics of writing are introduced by AI, which automatically corrects spelling and grammar mistakes, and the professionals could focus on developing the students' creative expression (Kai, 2021).

Digital Economy

The acceleration of digitalization in business is based upon the notion that the following key drivers are to be developed: digital transformation of the industries and the businesses per se, developing an "eco-system" for such digital transformation and prioritization of the Infocomm Media Development Authority activities. Talent (or manpower), innovation, legal regulation and infrastructure are viewed as crucial enablers, ultimately leading the Singapore's digitalization strategy to success (Digital Economy Framework for Action, 2018).

Digital transformation of the industries and the businesses

Supporting small- and medium-sized businesses is extremely important as it allows to build up sufficient grounds for market development without a threat of monopolies. In Digital Economy Framework for Action (2018) two pilot projects are presented as an example of integral and natural digital transformation: Kampong Glam Retail Neighbourhood and Nationwide e-invoicing framework. It is believed that these models are beneficial in terms of enhancing trade both locally and nationwide. The digital transformation of the industries could be explored following the energy sector developments.

The role of Big Data in energy sector

The energy profile of Singapore is currently based on fossil fuels imported in the country. Nevertheless, Singapore aims to increase the share of renewable energy sources in its energy mix. Due to the geographic specifics of the region, the range of renewables, which could be produced locally is limited, and the main priority within those is solar energy. Singapore has one of the highest solar densities in the world actively compensating the lack of available spaces for establishing the necessary infrastructure with the cutting-edge innovative energy solutions such as deploying solar panels at sheltered walkways.

According to the Energy Market Authority, the energy strategy of Singapore consists of four "switches":

- to natural gas;
- to solar energy;
- building regional power grids;
- to new alternative energy solutions that are yet to emerge.

Digitalization is one of the key enablers along the way to implement this strategy as it provides the system with the vital characteristic, i. e. interconnectivity, – and efficient Big Data management is the direct means for that.

As of now, the main area of governmental interest in regards to energy digitalization is the power system of Singapore. The Grid Digital Twin project by EMA, SP and S&TPPO consisting of Asset Twin and Network Twin is being developed. Enhanced energy management is the required outcome of this initiative.

At the level of energy enterprises, digitalization is being encouraged as well. For instance, the SLNG is currently following its digital roadmap to provide the cost-efficient and valuable energy to the Singaporeans, acknowledging the need to constantly upgrade the existing Big Data management strategies (including cloud storage, AI and advanced analytics) in order to stay competitive in the energy segment.

Developing an "eco-system"

However interesting and beneficial all the above-mentioned upgrades are, they can only guarantee the profound digital transformation, if conducted in a systematic manner. That is the reason why the Singaporeans go further to establish a digital ecosystem (meaning integrated business models with altered supply-demand economy dynamics) instead of focusing on certain developments within economy sectors separately.

The role of the legislation in smart city initiatives regulation

The legal system of Singapore is based on common law, and a large part of regulations are "judge-made" precedents respectively alongside with the statutes. This is due to the fact that Singapore is a former British colony and, thus, was strongly influenced by this country in many aspects.

The changing digital context and the initiatives that are being launched to enforce the new reality of living in Singapore – all this required the transformation of the existing legal system as well. The technological advances are mostly aimed at developing the platforms for self-issuing of the simple documents of technical character and constructing the digital contracts with built-in templates (Poon, 2020). Such upgrades would allow to make legal practices easier, less time-consuming and more efficient in everyday life, leaving the legal professionals with more complicated responsibilities which could not be transferred to AI, like analyzing the context and the terms to provide legal clarifications.

There are several important aspects to be considered along the Singapore's digital law priorities:

- cybersecurity, privacy protection and the collection of data regulations are to be strictly regulated in other to prevent the misconducts both on the part of the governmental structures and on the part of the users with untrustworthy intentions;
- the adaptability and the flexibility of the agile digital law are to be guaranteed by constant monitoring and issuance of the standards to regulate the emerging legal gaps promptly.

Although introducing innovative technological solutions as part of the digitalization to enhance the electronic document management is one of the enablers of the successful reform of the judicial system, one of these enablers has also been the business-approach to exercising such reformation of the previously not so efficient judicial mechanisms. Such approach, regardless of its major drawback (meaning strict media censorship), is to be continued for the further development because otherwise, it may hinder the development of the digital initiatives in the legal field.

The role of the executive power in smart initiatives regulation

Being described as a "beacon of orderliness" Singapore, which used to be one of the chaotic world regions (around half a century ago) stands out not only because of the digital initiatives per se, but rather by the fact how vividly they are implemented in practice.

For instance, responding to the Covid-19 pandemic, NParks and GovTech developed the Safe Distance @ Parks project based upon video analytics system (or VAS) to monitor the overcrowding of the public areas like parks. This technology is being developed further to provide commercial solutions, biometric checks, marine vessels detection and other purposes.

The possible reasons for such rapid development of the digital solutions and making them an integral part of everyday life for the Singaporeans could be explained also by the low level of the bureaucracy and corruption in the country which combined together co-create the prosperous environment for the future developments for the common good.

Digital Government

This pillar of the Singaporean Smart Nation provides the necessary and efficient policies framework and resources to enforce digitalization. Its key stakeholders are the citizens, the businesses and the public officers. The main purposes could be described as follows: developing the transparent, effective and easily accessible mechanism of service delivery, increasing the productivity of the government processes and workers, developing the digitally enabled engagement strategies both for the individuals and the businesses.

The practical implementation of digital smart initiatives by the cases of e-government

The Digital Government strategy is built upon six key points:

- integration of the services (e. g. LifeSG app based on the Service Journey advance and GoBusiness portal);

- development of the integration between policies and technological advances (by constructing digitalization plans and roadmaps);
- developing the necessary infrastructure to harness the digitally transformed processes (e. g. the development of the Authentic Court Order system (or the ACO system) to verify the judicial documents);
- developing the security of the digital systems (by reviewing the best practices and providing guidelines and recommendations for the Singaporean entities);
- innovative approach (e. g. blockchain technologies like OpenCerts platform to verify the educational certificates and introducing robotics such as the SPOT machine for various functions including monitoring and analyzing the data);
- engagement of the citizens to "co-create" the adoption of the digital solutions (e. g. the Singapore Together movement, the SCOPE initiative and the eCanvas system – all designed to guarantee the inclusiveness within the society).

The efficiency of this strategy is being evaluated in accordance with the 14 markers or KPIs, e. g. "Stakeholder Satisfaction" or "Commercial Cloud Migration". All of them could be found in "Digital Government Blueprint", which goes under the notion that the governmental structures of Singapore are to be "digital to the core and serve with the heart" (Smart Nation, 2020). By 2023, the e-payment options integration and pre-filled data fields introduction are expected to reach the 100% rate.

Moscow case
The role of the legislation in smart city initiatives regulation
The key document that creates benchmarks in the digital development of the city of Moscow is the Smart City 2030 strategy. This is a comprehensive document describing the main goals, principles and mechanisms for the development of Moscow within the concept of a smart city. An important part of this document is the section on the analysis of risks associated with the new strategy for the development of Russia's main city.

It is also important to point out that the development of Moscow as a smart city is influenced by many federal laws and other documents that are adopted throughout Russia.

The main document at the federal level is the Digital Economy national project, which is designed to digitize the economic and social sphere of Russian society until 2024. Among the main initiatives of this project are:

1. The initiative to modernize the personnel system of the digital economy of Russia;
2. Implementation of new bills regulating the digital environment of the state;
3. Development of infrastructure to increase the availability of digital services;
4. Digitization of public administration and maintenance of cybersecurity;
5. Initiative to implement AI in national digitalization and support domestic developments in the field of AI (National Projects RF, 2021).

Each of these initiatives has received the status of a federal project and has a direct impact on the development of Moscow as a smart city.

The role of the executive power in smart initiatives regulation

The main driver of digitalization in Moscow and Russia as a whole is the Ministry of Digital Development, Communications and Mass Media of the Russian Federation. This Ministry has created the Federal State Information System for Informatization Coordination, which acts as a link between various government bodies in integrating the latest digital solutions into its operational activities.

Another successful experience of creating special state authorities to initiate innovative growth in Russia is the Agency for Strategic Initiatives. This agency is a non-profit organization created by the Government of Russia to develop innovations in the socio-economic life of the country. Many of the projects of this organization are aimed at the digitalization of Moscow and combine a number of relevant ministries and stakeholders in their work (ASI, 2022).

The role of technologies in education and their current level

At the moment, in Moscow, the most significant progress in the technological development of education is observed in school education. In particular, the Moscow Electronic School initiative is actively developing, aimed at improving the quality of school education through the digitalization of educational materials, the creation of digital laboratories, the publication of various lesson scenarios in the public domain, and a system for monitoring schoolchildren's progress.

Also, digitalization tools are used in Moscow to improve the special training of high school students. This helps future students to decide on a specialty and get the best training in the profile. In addition, an important initiative is the School of New Technologies, an educational platform that provides an opportunity to improve digital competencies for both students and teachers.

Since 2020, The Digital University program has been launched, which will help provide grants to NGOs working in the field of digitalization of education, as well as create special centers for the digitalization of higher educational institutions both in Moscow and in other cities of Russia (Interfax.ru, 2022).

The role of Big Data in energy sector

One of the key documents regulating the strategy for the development of Moscow's energy industry is Decree № 451-PP on the approval of the state program of the city of Moscow "Development of utility infrastructure and energy saving". The goals of this city program include such aspects of the energy sector as improving the reliability of the energy system, reducing equipment wear and tear, predicting the load on production facilities, improving the city's energy infrastructure, reducing the cost of electricity, and others (The Open Budget of Moscow, 2021).

To achieve these goals, city authorities and industry experts are developing solutions based on Big Data technology. In particular, the best solutions for the Moscow energy system could be:

1. The use of cloud storage for the systematization and use of big data in the energy sector;
2. Practical implementation of virtual networks, neural networks and complex algorithms for digitalizing the work of energy networks and predicting accidents;
3. Implementation of the best practices for verification and analysis of big data in production (Digital Energy, 2022).

The practical implementation of digital smart initiatives by the cases of e-government

In 2021, the transition of the state system for coordinating digital initiatives to cloud storage was announced. Unlike the experience of Singapore, in which the government announced the transfer of government data to private cloud storage systems, Russian data will be stored in the government cloud platform. This feature is characteristic of the key trends in Russia's modern policy - import substitution and protectionism of its own technologies. GosCloud, developed in Russia, will help the Russian authorities in performing computing operations and maintaining cybersecurity (Tadviser.ru, 2021).

The Electronic Government of Moscow uses an extensive technical and technological base to prevent and solve crimes. More than 135,000 CCTV cameras have been installed in the city, supplying local authorities with millions of records of various criminal and administrative offenses. The online face recognition system is actively developing. Yet although the CCTV system has been inspired by the Singapore smart city governance, and was, a definite success in

terms of increasing security levels, it has also been a failure because there are no efficient legal mechanisms for such surveillance activity regarding personal data and privacy protection in Russia for the moment being.

In recent years, projects have appeared in Moscow to resolve municipal issues in the format of referendums using blockchain technology. At the moment, the mos.ru website is the key platform for the eGovernment of Moscow. Within the framework of this portal, 43 websites of the executive authorities of the capital of Russia are interconnected, the user of this website can get access to all electronic services of the Government in an extremely short time. The Unified Mobile Platform application was also created - it allows Moscow residents to receive public services using a smartphone. Also, in order to simplify access to information services of the city of Moscow, a unified contact center was created, which unites all dispatching and public utilities of the city.

Another important initiative of the Electronic Government of Moscow is the Our City portal, which allows Muscovites to establish two-way communication with the city authorities regarding the improvement of living conditions in the city, publish information about problems and violations in homes and urban spaces. Complementing this platform is the Active Citizen initiative, aimed at even deeper participation of Moscow residents in transforming the city in a positive direction.

The creation of the Electronic Budget of the City of Moscow, which made it possible to digitize all the financial documentation necessary for the functioning of the Moscow Government is worth mentioning as well. This has made it possible to significantly increase the speed of work of all authorities in the capital of Russia.

Among the active initiatives of the Electronic Government of Moscow, which are currently under development, testing, and implementation, we can list such projects as:
1. Optimization of public services using artificial intelligence, as well as personification and predictive provision of public services;
2. Creation of a unified API for commercial organizations in the city of Moscow;
3. Implementation of Digital Democracy projects that allow citizens to participate in various elections in electronic format;
4. Creation of a digital identity of a citizen, the so-called "digital diary" of a person (Mos.ru, 2022).

Summary of the findings

After carefully considering all the mentioned above aspects, the answer on the assumption that has been made could be given. Overall, a very strong basis for practical implementation of the strategic advances in Singapore could not be realized in Moscow due to the practical complications (lack of infrastructure and transparency).

Parameter	Mimetic isomorphism from Singapore
The role of the legislation in smart city initiatives regulation	Smart City 2030 Moscow Strategy is a comprehensive document that includes many best practices and initiatives from dozens of foreign countries, including Singapore.
The role of the executive power in smart initiatives regulation	Moscow is copying the experience of Singapore in creating separate government bodies capable of effectively coordinating various departments in digitalization issues.
The role of technologies in education and their current level	There is certain resemblance in establishing the platforms and upgrading the classrooms. Many Moscow educational initiatives, especially the Moscow Electronic School, have much in common with their counterparts in Singapore. However, Singapore's initiatives are now much more advanced and reach a broader category of students, providing more opportunities.
The role of Big Data in energy sector	Not detected on the level of the governmental projects, yet there is mimetic isomorphism when it comes to the inner digital transformation of the corporations in industry. Promising initiatives for the introduction of big data in the energy sector of Moscow almost completely coincide with those in Singapore, however, at the moment, Moscow projects are only in development or at the testing stage.

| The practical implementation of digital smart initiatives by the cases of e-government | Most of Moscow's initiatives to create e-government have their 'twins' in Singapore, in particular, the creation of a single portal of public services with a mobile application and personalization, portals for feedback and cooperation between citizens and the state, the creation of "digital twins" and resources to help local businesses in digital transformation. |

Table №1 of original compilation for the purposes of this paper

Parameter	Authentic path of Moscow
The role of the legislation in smart city initiatives regulation	Moscow goes its own way in terms of supporting national manufacturers of equipment and technologies, as well as in the use of Russian big data storage systems.
The role of the executive power in smart initiatives regulation	Federal bills and initiatives have a significant impact on the digitalization of Moscow.
The role of technologies in education and their current level	The authorities of Moscow are much more focused on the digitalization of school education than on the digitalization of higher education.
The role of Big Data in energy sector	Moscow's energy initiatives are more focused on energy savings and optimizing the operation of existing equipment, while Singapore is focused on developing green energy and achieving ZeroCO2 city status.
The practical implementation of digital smart initiatives by the cases of e-government	Moscow has chosen state-owned cloud storage to create electronic data centers, while the Singapore authorities have chosen to use digital solutions from commercial companies.

Table №2 of original compilation for the purposes of this paper

Discussion

Singapore is one of the best practices of digitalization worldwide, definitely worth emulating, yet there are still some areas for improvement. One of such areas is bridging digital divides (Sun &

Zainal, 2022). The main strengths of the Singaporean approach lie within an effective mechanism of the implementation of the digital initiatives and embracing innovative solutions.

The research question explored in this paper was whether there is an isomorphism between Moscow and Singapore when it comes to smart city initiatives or Moscow rather follows its own path.

Overall, highly efficient Singaporean mechanisms are an inspiration for Moscow, yet the practical implementation is limited due to the technological limitations and the lack of focus on innovative projects in the area.

The generalizability of the results is limited by the fact that only specific sectors were studied and it is beyond the scope of this research to evaluate the long-term implications and efficacy of the initiatives studied due to the fact that many of them are in their beginning stage and are yet to produce the results available for precise evaluation.

The practical significance of this research paper dwells on the prospective implementation of the smart city initiatives in the less tech-savvy environments and the transformation of the existing best practices in a way so that they fit different socio-economic environments.

For further implementation of the smart city initiatives in Moscow the following recommendations could be drawn:
- focusing on building up the necessary infrastructure to enhance the educational environment;
- developing the sufficient and efficient regulatory mechanism for implementation of the smart city initiatives, especially in energy sector;
- promoting the values associated with the smart city governance so that they become more widespread and popular among the population.

As an idea for future research the personal data protection strategies efficiency could be studied within the scope of smart cities, as now the process does not seem to be very well established in Moscow in comparison with the European standards, for example.

Conclusions

The research question explored in this article goes as follows: is there an isomorphism between Moscow and Singapore when it comes to smart city initiatives or does Moscow rather follow its own path? In order to find the right answer, the following assumption has been made: through the lenses of institutional isomorphism (DiMaggio and Powell, 1983) the similarities between two smart cities could be explained with the help of the apparatus of neo-institutional theory.

The following hypotheses have been formulated:
1. There is general similarity between Moscow and Singapore in smart city governance, which are caused by the natural life cycle of the development of the digitalization processes.
2. This resemblance goes only up to a certain extent, which is limited by the extent of the technical and infrastructural sophistication of the digital systems.

These hypotheses have been explored by comparing the Singapore and Moscow cases through five parameters introduced by the authors based upon the scientific literature on smart cities:
- the role of the legislation in smart city initiatives regulation;
- the role of the executive power in smart initiatives regulation;
- the role of digitalization in education and their current level;
- the role of Big Data in energy sector;
- the practical implementation of digital smart initiatives by the cases of e-government.

In the due course of this research, it has been identified that our hypotheses have been proven to be viable, thus, there is mimetic isomorphism between Moscow and Singapore cases on the side of Moscow in certain sectors of societal life when it comes to the developing stage of the digitalization. Our assumption could also be proven by the findings of this research in part of the governmental structures' development.

Therefore, we can conclude that the Moscow authorities largely relied on the experience of Singapore in creating their own vision of a Smart City. In particular, the impact of Singapore's success in creating specific projects in the field of open digital government, educational initiatives, transforming the executive branch to achieve digital development, and creating strategic documents for digitalization is especially noticeable.

Nevertheless, it is worth noting that Moscow is currently lagging behind both Singapore and many other world megacities in many areas, and some initiatives (e. g. CCTV surveillance) even though righteously implemented, comprise not only success in terms of increasing security in public places, but also failure as well as there is no effective legal mechanism of personal data and privacy protection in Russia. Also, some spheres of digitalization are similar enough for most cities in the world, so it would be unfair to note the copying of basic principles in industries such as energy.

Acknowledgments

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