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PRESENT TRENDS AND PROSPECTS OF SMART CITY DEVELOPMENT

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Abstract

The Smart City paradigm, which emerged when two megatrends – urbanization and digitalization – combined, marks the transition to digital management of modern cities. This article analyzes current trends and perspectives on the development of the smart city, which include: city brain, efficient digital governance, smart health care, smart social security, smart employment, etc. The purpose of the study is to identify the specifics and develop the concept of Smart City development. The object of the study is the concept of Smart City development as a complex social and economic phenomenon. The subject of the study is the formation of the concept of Smart City development. Methodology of the article – methods of system analysis and synthesis, structural and functional. Results of the study: approaches, trends and prospects of Smart City development. The article also shows that the infrastructure of a smart city is made up of digital technology and information and communication techniques. The author marks, that smart city is not something fantastic, it is the reality of the modern world, where technology penetrates all areas. This concept provides for the integration of information and communication technologies, including IoT (Internet of Things), to effectively manage the city's infrastructure (transport, security, healthcare, utilities, etc.). Today, many megacities are overpopulated. In these conditions, it is not always possible to effectively cope with such tasks as ensuring security, garbage collection, efficient use of utility resources, etc. That is why cities are increasingly implementing information systems to collect and transmit data to management representatives, and to establish feedback between citizens and the administration. The sources for obtaining this data can be various sensors, sensors, video cameras, etc. The concept of a smart city involves focusing on the safety of citizens, as a high level of security is a sign of a high quality of life. The technologies used to reduce crime allow the authorities to respond effectively to threats and control the actions of law enforcement officers. The article emphasizes that the evolving digital revolution makes it possible to use digital and information and communication technologies in city management, thereby improving the quality of life.

Keywords: Smart City, digital management, city brain, digital governance, smart health care, smart social security, smart employment.

Introduction

The smart city concept involves the introduction of hundreds of new technologies – from movement monitoring to data transmission through light. The concept of smart city is being implemented in megacities around the world – New York, Singapore, Barcelona, Tokyo, Amsterdam, and dozens of others. But the interpretation of this concept may differ from country to country and from organization to organization.

For example, IBM, which is considered one of the main developers of solutions for the "smart city", defines it through three key qualities – equipped, united and intelligent. The European Parliament believes that a "smart city" is one that seeks to solve public problems through infocommunication resources. Such cities are strategically important for combating poverty, inequality and unemployment and effective management of energy flows, according to the EU. Modern specialists often describe a smart city as an "innovative city" that comprehensively implements solutions for the benefit of the environment and residents.

Despite the difference in definitions, a more or less common vision of the concept still exists in the world. Among the basic characteristics of smart cities are sustainability and environmental sustainability, public participation in management, efficient use of data, the desire to improve the quality of services and quality of life.

No more than 20 countries in the world are working on developments for the smart city. China is the leader in terms of the number of its own inventions. But the U. S. has the largest territorial coverage: American inventors' patent documents include 24 different jurisdictions. They are followed by Great Britain, South Korea, Norway, India and Japan.

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Telecommunications giants have taken the technological lead in smart cities in most countries. In the non-Chinese segment, Samsung is in first place by the number of patent families (a group of publications related to one invention). It is followed by the American Cisco, which specializes in the development of network equipment.

Among Chinese companies, Huawei and Xiaomi stand out. In general, the PRC players are poorly represented in other countries, but these two giants are confidently aimed at territorial expansion.

Analysis of the latest research and publications

In the present research we rely on the work of Katharine Willis, Alessandro Aurigi *"Digital and Smart Cities*" (2018), which shows how technologies shape our cities, starting the discussion to open up a more holistic and citizen- centered understanding of how technology shapes urban change through the way it is imagined, used, implemented and developed in a societal context. By drawing together a range of currently quite disparate discussions, the aim is to enable the reader to take their own critical position within the topic, the book of Katharine S. Willis, Alessandro Aurigi "*The Routledge Companion to Smart Cities"* (2020), *The Routledge Companion to Smart Cities* explores the question of what it means for a city to be 'smart', raises some of the tensions emerging in smart city developments and considers the implications for future ways of inhabiting and understanding the urban condition. The volume draws together a critical and cross-disciplinary overview of the emerging topic of smart cities and explores it from a range of theoretical and empirical viewpoints, the work of *Simon Marvin, Andrés Luque-Ayala, Colin McFarlane "*Smart Urbanism. Utopian vision or false dawn?" (2015), in which Smart urbanism is being represented as the response to almost every facet of the contemporary urban question. This book explores this common conception of the problematic of smart urbanism and critically address what new capabilities are being created by whom and with what exclusions; how these are being developed – and contested; where is this happening both within and between cities; and, with what sorts of social and material consequences. The aim of the book is to identify and convene a currently fragmented and disconnected group of researchers, commentators, developers and users from both within and outside the mainstream SU discourse, including several of those that adopt a more critical perspective, to assess 'what' problems of the city smartness can address. Also we used the works of domestic authors, such as Voronkova V., & Nikitenko V. (2022). "*Creative City as a Factor of Digital Society Development"*, which summarizes the study of the phenomenon of the creative city as a factor of digital society development in that it aims to solve the problems of the city as a complex social, economic, cultural phenomenon of XXI century digital era and others.

Methodology of the research

Agile methodology as the theoretical basis of the digital society, which makes it possible to radically reconsider the mission, functions, legitimacy, and tools of the creative city. Agile methodology as the theoretical basis of the digital society is based on the general methodology of systems and system analysis and synthesis.

Main Material

1. ***Create a "city brain" to stimulate new wisdom.*** "City brain" is the inevitable product of smart city development to the advanced stage, the core element of the new smart city, and the innovative model of smart city construction. Use cloud computing, big data, Internet of Things, artificial intelligence, blockchain, digital twins and other new generation information technologies to promote the convergence and integration of urban data resources and global operational situation awareness, optimize and reengineer business processes, and improve urban management capabilities, A comprehensive platform for optimizing industrial structure and innovative management model. Through the construction of "city brain", the most reasonable distribution and planning of all data in Shangrao will be realized, the city's public resources will be optimized through data resources, the city's full capacity and work efficiency will be improved, and the various service areas of livelihood, social management and industrial development will be optimized and integrated. It has higher requirements for data fusion and analysis, cross-sectoral and cross-departmental management coordination mechanism, urban operation sign monitoring and rapid emergency response, etc., and basically realizes the "diversified coordination" of urban management, "high-quality and efficient" public services and people's livelihoods. Serving the good situation of "inclusive and convenient" and industrial development of "intelligence and efficiency enhancement", establishing a city of urban governance combined with effective joint management in peacetime and wartime, creating a green, low-carbon, environmentally friendly,

high-quality and livable city, and forming a wisdom-led high-end manufacturing industry. The industrial service city will be embedded in a perception city that coordinates intensive security and intelligence.

Construction of new high-level smart cities. Accelerate the creation of "urban brain" to expand the high-level construction capabilities of a new type of smart city, realize the concept of "governing with numbers, building a city with wisdom", innovate the management mechanism, improve the management system, and create a new model of joint management between different departments. Accelerate the promotion of intelligent support for new digital infrastructure, provide new smart cities with all kinds of functions such as sensing, description, feedback and forecasting, and create a series of typical applications in the industry that make full use of 5G, big data, cloud computing, artificial intelligence, blockchain and other digital technologies to enhance the ability of social management and provide services to people's livelihoods.

2. ***Create an efficient and collaborative digital government***

Improve the core capabilities to support digital government. Improve the top-level design, intensively build the government affairs network, government affairs cloud and large data centers, and accelerate the construction of an integrated digital government infrastructure system. Coordinate the construction of the city's government cloud, improve the city's "one network" architecture, increase the capacity of the government cloud, promote the integration and interconnection of the e-government extranet with 5G, the Internet of Things, blockchain, etc., improve the service level of the cloud platform, and create security for digital government, stable and reliable cloud computing resources. Coordinate the construction of the city's government cloud data recovery service system, and establish safe and reliable recovery capabilities for government cloud covers. Regularly and systematically conduct training on digital government business opportunities and data processing skills.

Promote digital transformation of services and governance. Upgrade and improve the design of the new version of "Ganfutong Shangrao Branch Office", improve the innovative application of functions, optimize intelligent services, and fully integrate high-frequency services with tight demand, which are convenient for people and enterprises. Strengthen the construction of functions and in-depth promotion and application of the "Ganzhengtong" general government office platform, accelerate the digital transformation of government, and strengthen the city's inter-level, inter-regional, inter-agency, inter-business and cross-industry communication. – Systematic coordination and communication, as well as the implementation of "one network coordination" of government operations. Focus on economic regulation, market supervision, public services, social management, environmental protection and other functions, and rely on the "city brain" to realize the "one network management" of global management. Build a comprehensive "blockchain + credit service" credit evaluation platform and strive to achieve results in specific application scenarios in the fields of society, public affairs, finance, business and modern circulation in Shangrao.

3. ***Increasing the level of social digital governance***

Strengthen digital environmental management. Promote integrated environmental monitoring of "air and land" and strengthen intensive information exchange from departments such as environmental protection, natural resources, water resources, forestry, and meteorology. Relying on the provincial environmental protection big data platform and the city's "Digital Environmental Protection" project, actively promote the open exchange of environmental data, fully support the integration of mountains, rivers, forests, fields, lakes and grass communities, and realize the "one map" of management, analysis and decision-making. Establish a big data service platform for natural resources in Shangrao, integrate natural resource data in Shangrao, strengthen land space planning and use control, effectively play the role of carbon sequestration in forests, grasslands, wetlands, oceans, soils and permafrost, and increase the incremental carbon sequestration of the ecosystem. Help Shangrao achieve carbon peak and carbon neutrality.

By 2025, the integration level of the city's digital economy and the real economy will be greatly improved, the development of digital industrialization will reach a new level, the industrial digital transformation system will be fully optimized, and the development model of "digital-industrial integration" with multi-party participation and mutual benefit will continue to innovate. Key areas have entered a new stage of high-quality development as a whole, "industry-city integration" has accelerated development, "city brain" and "industrial brain" are important, the digital transformation of government,

society and enterprises continues to create new ideas, and the city's digital economy has entered the global stage. The first phalanx of the province, the overall level remains in the forefront of the province, the establishment of a new high district for digital economy innovation and development in Jiangxi, and a demonstration area for digital economy innovation and development in the central and western regions. Strive to increase the added value of the digital economy to 180 billion yuan by 2025, which is more than the provincial average in the region's GDP.

Coordinate the layout of digital economy development. Establish a "one core, one circle, and multiple points" digital economy development field to realize a new digital economy structure in which counties (cities, districts) are divided and deployed, and municipal departments are deeply involved and integrated; create "one county, one industry" and "one collection of digital economic applications" of "industry-city integration" and "digital industry integration" of "one industry chain", "one chain, one cloud", "industry-city integration" and "digital industry integration", forming counties (cities, districts) competing for first place, municipal departments competing for success, innovative application results emerging one after another, and development quality. A constantly improving new ecology of the digital economy. By 2025, a series of excellent 5G+, industrial Internet, big data, artificial intelligence, digital villages, digital agriculture, digital medicine, digital tourism, smart cities and other high-quality digital economy development and application demonstration scenarios will be formed, striving to create a national digital economy demonstration platform.

The scale of major industries continued to grow. By 2025, new technologies such as cloud computing, big data, Internet of Things, mobile Internet, artificial intelligence, blockchain, virtual reality, and basic databases will drive the rapid development of the digital economy, as well as the big data industry and cultural entertainment industry. A number of industrial agglomerations with complete industrial chains and strong innovation capabilities will be formed; the operating income of the electronic information production industry above a certain size will exceed 60 billion yuan, and the operating income of the software and information service industry will exceed 150 billion yuan. The added value of the major digital economy industries exceeds 25.2 billion yuan, accounting for 7 % of GDP, creating a number of national and provincial pilot demonstrations and typical cases at the industry level.

Industrial digital transformation has yielded results. By 2025, the digital economy and the real economy will be integrated and developed, and new Internet technologies will comprehensively and fully transform traditional industries, promote the digitalization of manufacturing, services, agriculture and other industries, improve the overall productivity of production factors, and fully reflect the impact of digital technology on the economy. With the strengthening, superposition, and multiplication of development, the digital transformation of enterprises has achieved remarkable results. The penetration rate of digital research and design tools has reached more than 85 %, the numerical control rate of key processes in key areas has reached more than 65 %, and the penetration rate of industrial Internet platforms has reached 35 %. The proportion of e-commerce applications has reached 60 %, and the number of pilot enterprises that meet industrial information security standards has reached more than 5. The industrial Internet has achieved positive results in promoting the digital transformation of traditional industries, and has established 3 national industrial Internet demonstrations, 10 provincial demonstrations, and industrial Internet demonstration bases. The number of enterprises on the cloud platform exceeds 10,000, and the number of enterprise equipment connected to the Internet reaches more than 100,000 units/sets. The level of digitalization of agricultural production is 45 %, online retail trade in agricultural products accounts for 15 % of the total volume of agricultural product transactions, and two national pilot digital villages have been built. The digital transformation of the service industry is accelerating, service content and models are continuously improving, new formats and models are constantly emerging, digital life is fully popularized, online retail sales exceed 30 billion yuan, and cross-border e-commerce imports and exports reach 1 billion yuan. More than 90 % of Shangrao's global logistics information is interconnected, and five pilot demonstrations of digital logistics applications have been cultivated.

Digital governance has reached a new level. Remarkable results have been achieved in the construction of digital government, and a number of key applications such as "one-stop online service", "one-stop online unified management", "Ganfutong" and "Jiangzhengtong" have been comprehensively established, and it has become a reference

demonstration site for digital governance in the province. Through the establishment of Shangrao to pilot a new type of smart city in the province, the upgrading of the regional management system and management capabilities has been basically realized. In view of the implementation of the "14th Five-Year" Digital Economy Development Plan and the continued promotion of the "No. 1 Project" of the digital economy, the main direction of the development of digital industrialization, industrial digitalization and digital governance is to promote "industrial brain" and "urban brain". With construction as the starting point, introduce comprehensive, multi-level digital economy development and performance supervision of major projects and promotion mechanism, implement a new model of online inspection and supervision in the entire life cycle of digital economy development projects, and use supervision and supervision to encourage real work and create a new development ecology. Establish a pilot digital governance zone for the national digital economy by 2025.

Based on the existing location advantages of Shangrao City, industrial advantages, and resource advantages, build a "one core, one circle, and multiple points" development map. Focusing on the development of "big industry", "big agriculture", "big tourism" and "urban brain", actively promote digital industrialization, industrial digitalization and digital governance, promote the deep integration of the digital economy and the real economy, and help enterprises digitally transform and improve the quality and efficiency of growth, enhance innovation and smart city development, and create a new digital economic development model with "one lead Build" urban Promote the deep integration of big data, artificial intelligence, blockchain and other technologies with public administration, combine them with the construction of new smart cities, promote technology integration, business integration and data integration, and realize cross-system, cross-agency and cross-business collaborative management and services Good social situation perception, unimpeded communication channels, assistance in decision-making and administration, and convenience for the masses. Promote public service data exchange, business cooperation and process reengineering, implement online and offline functions that complement each other, facilitate reform and innovation of public administration models, and provide comprehensive and accurate information services for efficient economic activity.

4. ***Smart medical care***

Based on a single province-wide "Gantung Code", health information and inspection data from relevant agencies are collected across the province. Encourage physical medical institutions to develop online hospitals, integrate online and offline medical resources, promote medical alliances, and provide efficient, convenient, and intelligent diagnostic and treatment services. Creation of online health consultations, health management, sorting of online consultations, follow-up tracking, etc. A new model of health care. Establish a provincial, municipal, and county platform for comprehensive management and supervision of telemedicine to realize interregional and hierarchical telemedicine services. Promote the use of medical robots, large medical equipment, bio-3D printing, wearable devices and other products. Explore artificial intelligence-assisted diagnosis based on big data of medical images to improve the accuracy of telemedicine diagnosis and treatment. Establish more than 10 benchmarks for Internet hospitals by 2025 and achieve full telemedicine coverage across the region.

5. ***Smart social services***

Establish a unified information platform for public social security services in the city and realize integrated management and integration of multiple channels such as physical halls, online platforms, mobile terminals, self-service terminals, and consultation phones. Promote electronic social security cards, support inter-business, inter-regional and inter-agency applications of social security cards, and realize "one card for each person, one card for many purposes, and universal use throughout the province". By 2025, the coverage rate of electronic social security cards will reach 70 %.

6. ***Smart employment***

Fully rely on the province's e-government infrastructure, human resources and social information resources to build the city's human resource map, city human resource data pool, big data analysis platform and intelligent service platform, and gradually implement accurate city employment services, scientific decision-making and intelligent supervision, and convenience of sharing.

Conclusion

The article reveals the fact, that smart city is one that harnesses the potential of technology and innovation, along with other resources, to more effectively promote sustainable development and ultimately improve the quality of life for its citizens. The idea is that smart cities are not just a political tool, but tangible facts. It is in everyone's

hands to actively cooperate to make our cities sustainable for new generations, and to improve our quality of life together.

The Internet of Things (IoT), big data, mobile applications, and Industry 4.0, among others, can make cities more efficient if we know how to use them wisely. In this sense, the city can manage technology to improve people's lives and, in particular, to achieve the following benefits: to contribute to a better environment, to save costs for its citizens, to optimize public services, to improve transparency in the management of administrations, to be able to retain companies and attract talent, to improve communication with citizens etc.

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СУЧАСНІ ТЕНДЕНЦІЇ ТА ПЕРСПЕКТИВИ РОЗВИТКУ РОЗУМНОГО МІСТА

Анотація

Парадигма Smart City, яка виникла в результаті поєднання двох мегатрендів – урбанізації та цифровізації, знаменує перехід до цифрового управління сучасними містами. У даній статті проаналізовано сучасні тенденції та перспективи розвитку розумного міста, які включають: міський мозок, ефективне цифрове управління, розумну охорону здоров'я, розумне соціальне забезпечення, розумне працевлаштування тощо. Мета дослідження – виявити специфіку та розробити концепцію розвитку Smart City. Об'єктом дослідження є концепція розвитку Smart City як складного соціально-економічного явища. Предметом дослідження є формування концепції розвитку Smart City. Методологія статті – методи системного аналізу та синтезу, структурно-функціонального аналізу. Результати дослідження: підходи, тенденції та перспективи розвитку Smart City. У статті показано, що інфраструктура розумного міста складається з цифрових технологій та інформаційно-комунікаційних технологій. Автор зазначає, що розумне місто – це не щось фантастичне, це реальність сучасного світу, де технології проникають у всі сфери. Ця концепція передбачає інтеграцію інформаційно-комунікаційних технологій, у тому числі IoT (Інтернет речей), для ефективного управління інфраструктурою міста (транспорт, безпека, охорона здоров'я,

комунальні послуги тощо). Сьогодні багато мегаполісів перенаселені. У цих умовах не завжди вдається ефективно справлятися з такими завданнями, як забезпечення безпеки, вивіз сміття, ефективне використання комунальних ресурсів тощо. Тому міста все частіше впроваджують інформаційні системи для збору та передачі даних представникам керівництва, а також щоб налагодити зворотний зв'язок між громадянами та адміністрацією. Джерелами для отримання цих даних можуть бути різні датчики, датчики, відеокамери і т.п. Концепція розумного міста передбачає акцент на безпеку громадян, оскільки високий рівень безпеки є ознакою високої якості життя. Технології, які використовуються для зниження злочинності, дозволяють владі ефективно реагувати на загрози та контролювати дії правоохоронців. У статті підкреслюється, що цифрова революція, що розвивається, дає змогу використовувати цифрові та інформаційно-комунікаційні технології в управлінні містом, тим самим покращуючи якість життя.

Ключові слова: розумне місто, цифрове управління, розум міста, цифрове управління, розумна охорона здоров'я, розумне соціальне забезпечення, розумна зайнятість.

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