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City Development Concepts as a Response to the Current Challenges Cities Face

Koncepcje rozwoju miast jako odpowiedź na współczesne wyzwania ośrodków miejskich

Abstract: Contemporary cities differ in many structural and functional respects. Each of them has its own unique endogenous conditions and various external conditions. For the authors, the starting point was to discuss the common characteristic features and main problems that contemporary cities face. The main aim of the article was to investigate potential regularities between problems/ features of the cities and the implemented city development concepts. To this end, the theoretical concepts of development used by urban centres were analysed and the examples of those implemented. Contemporary cities pursue their goals based on the guidelines resulting, among others, from the following concepts: smart city, green city, accessible city, compact city, resilient city, creative city, 15-minute city. The methods used for the research were literature review and case studies. The analysed

cases confirmed the belief that the municipal authorities must identify and firmly decide which of the existing problems in the urban space have the greatest destructive effect on them. As an element that binds all the concepts of development, a common goal should be indicated i.e. the optimisation of the quality of life of residents. The added value of the paper relates to capturing the relation between the development concepts used by cities and their features/identified problems.

Keywords: city, urban development, development challenges, urban development concepts.

Streszczenie: Współczesne miasta różnią się pod wieloma względami strukturalnymi i funkcjonalnymi. Każde z nich ma unikatowe uwarunkowania endogeniczne oraz różnorodne uwarunkowania zewnętrzne. Dla autorek punktem wyjścia było omówienie wspólnych cech charakterystycznych i głównych problemów, z jakimi mierzą się współczesne miasta. Celem artykułu było zbadanie potencjalnych prawidłowości między problemami i cechami miast a wdrażanymi koncepcjami rozwojowymi. Przeanalizowano teoretyczne koncepcje rozwojowe miast oraz przykłady tych wdrażanych przez ośrodki miejskie. Współczesne miasta dążą do celu w oparciu o wytyczne wynikające m.in. z takich koncepcji, jak: miasta inteligentne, miasta zielone, miasta dostępne, miasta zwarte, miasta odporne, miasta kreatywne, miasta 15-minutowe. Metody zastosowane do badania to: studia literaturowe oraz analiza studium przypadku. Przeanalizowane przypadki utwierdziły w przekonaniu, że władze miejskie muszą określić i zdecydować, które z występujących problemów w przestrzeni miejskiej w największym stopniu wpływają na nią destrukcyjnie. Jako element spajający wszystkie koncepcje rozwoju należy wskazać wspólny cel – optymalizację jakości życia mieszkańców. Wartość dodana artykułu odnosi się do uchwycenia potencjalnych prawidłowości pomiędzy stosowanymi przez miasta koncepcjami rozwoju a ich cechami/zidentyfikowanymi problemami.

Słowa kluczowe: miasto, rozwój miast, wyzwania rozwoju, koncepcje rozwoju miast.

1. Introduction

Cities play a crucial role in modern economy and are a major source of economic activity and innovation, as well as important hubs for international connections and communications. On the one hand, all cities are unique but on the other, they struggle with similar problems such as congestion, air pollution, raising energy costs, increase of population, quality of life, etc. Therefore, cities are trying to achieve the goals and deliver access to safe, inexpensive, accessible and sustainable transport systems for all. Additionally, they also try to improve inclusive and sustainable urbanisation and capacity for participatory lifestyle, decrease the number of deaths and the number of people affected by ill health, and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including those water-related, and also deliver universal access to safe, complete and accessible, green and public spaces (including, older people and those with disabilities). It is also crucial to maintain positive economic, social and environmental links between urban and rural areas by the consolidation of national and regional development planning. The aim is to significantly increase the number of cities approving and applying integrated policies and plans towards inclusion, resource efficiency, adaptation to climate change, resilience to disasters, and developing and implementing general

disaster risk management. It is difficult to achieve all of these at the same time, therefore cities follow their own way of development. Furthermore, individual cities recognise different problems as a priority. The authors considered whether the cities' authorities, when making decisions regarding the implemented development concepts, bear in mind the identified problems. Are city development concepts just an imposed necessity for them or do they respond to their real needs? These issues prompted the authors to investigate the adequacy of the applied development concepts to their needs. In the literature, one can find many studies on individual cities' development concepts, the added value of the research relates to capturing the potential regularities between the development concepts used by cities and their features and/or identified problems.

2. Characteristics of contemporary cities and the current challenges they face

Firstly, it should be stated that the global urbanisation rate is 55%, with nearly 4.1 billion people living in urban centres. It should be noted that in 1900 this ratio was only 10%, and moreover, forecasts indicate that in 2050 it will reach 68% (United Nations, 2018). The scale of this phenomenon shows how dynamic changes take place in contemporary cities, caused by demographic, economic, social and spatial factors. As a result of their interaction with different direction, intensity, and frequency, they contribute to the generation of various challenges (Jopek, 2018).

Modern cities are areas consisting of complex subsystems that are interconnected, interpenetrate and interact with each other. Each urban centre has its own unique, individual character which is shaped by the physical structure. The composition and elements of the urban layout create the atmosphere of cities, support the construction of the local community, create favourable conditions for development and new investments, or have a negative impact and destroy the evolution of cities (Lorens & Matyniuk-Pęczek, 2014). Humans play an effective role in creating and shaping relations between the building blocks of the city, initiating changes and ways of using space. The effectiveness and stability of the functioning of the city system is a consequence of human decisions.

The main requirements set for modern cities is the use of more and more intelligent solutions as well as being creative and, above all, introducing competitive solutions supporting the natural environment (Rassia & Pardalos, 2014). However, it should be remembered that cities also face other equally important challenges, such as problems of an economic nature: insufficient budget, ineffective use of EU funds/ subsidies, low dynamics of economic development, rising costs of city maintenance, neglecting the process of promotion and marketing of cities. Difficulties classified as social include: depopulation, but also overpopulation of urban areas, ageing society, civilisation diseases, disproportions in the wealth of inhabitants, lack of

social involvement of inhabitants. The main spatial problems are: suburbanisation, depopulation of districts located in the centres, enclaves of urban development, inefficiency of the transport system, growth of areas that require revitalisation, improvement of spatial order, and the disadvantages of legal regulations in the field of spatial development. Additionally, one should remember about the ecological crisis and environmental challenges: air pollution, soil water, water supply, lowering the groundwater level, high energy consumption of the economy, waste storage and utilisation, space degradation and investment conflicts.

The directions and models of development selected by municipal authorities have a direct impact on the structure and functioning of the individual, which in turn translates into the local community. The key factors for urban development are the quality of urban public transport and the availability of housing, available amenities, technologies, entrepreneurship and resilience to shocks (Duranton & Puga, 2014).

3. City development concepts – literature review

Today's concepts of city development, namely smart city, green city, accessible city, compact city, resilient city, creative city, 15-minute city, are the answer for the ongoing challenges.

Urban centres are identified as complex systems, characterised by a dense network of connections between citizens, businesses and numerous means of transport and communication networks, including services and tools (Mora et al., 2017). The directions of the development of cities and their components change dynamically over time. The currently promoted and implemented concepts for the development of urban centres depend on the dominance of specific development factors (Sikora--Fernandez, 2019). In recent years, leading development concepts include the use of renewable energy sources, reducing pollution and resource consumption, and treating the city as a system, a place for processes, the effect of which is to improve the quality of life in a broad sense.

The elements that connect and constitute one common denominator of contemporary development concepts also include the creation of compact structures in the urban space, complemented by an efficient communication system focused on collective, bicycle and pedestrian transport. An often important common aspect of development concepts is the popularisation of energy-saving solutions used in the process of urban and architectural design (Ogrodnik, 2017).

3.1. Smart cities

Most of the definitions of a smart city focus on the technological aspect, while others additionally take into account socio-economic issues, management, the involvement of many stakeholders in sustainable urban development, increasing

the quality of life and urban welfare. Various approaches are connected by the fact that a city that fits in with this idea fulfills its functions and solves problems with the use of information and communication technologies (ICT) aimed at improving competitiveness, ensuring a more sustainable future through a symbiotic connection of networks of people, companies, technologies, infrastructure, consumption, energy and space. ICT technologies are a tool enabling the integration of various systems operating in the city and stimulate innovative activity in the implementation of urban policy objectives. Smart city strategies and initiatives must include at least one of the following characteristics: smart management, smart people, smart living, smart mobility, smart economy and smart environment. The means by which these goals are achieved include a number of elements, such as technologies, material, financial, organizational, substantive inputs, as well as processes, norms and standards (Manville et al., 2014).

3.2. Accessible cities

In recent years, the leading trend in cities has been to increase their functionality and adapt to the needs of an ageing society. The modern concept of active ageing is based on the belief that people have the right to participate in all aspects of social life according to their abilities, regardless of personal limitations, the answer being the so-called friendliness and accessibility of the city. Accessibility is a universal element that determines the quality of life and belongs to all citizens. It provides safety, comfort and autonomy to pedestrians, cyclists, users of public transport and private means of transport (Mora et al., 2017).

The concept of a friendly city was created independently of the idea of a smart city, although they have common elements and assumptions. The World Health Organization has published guidelines for creating elderly-friendly cities (in line with the idea of universal design – also for people with disabilities). These are:
- spaces and buildings,
- transport, housing,
- social participation,
- mutual respect and social activity,
- employment,
- communication and information,
- social assistance,
- health care (Tota, 2017).

3.3. Green cities

Another current concept of urban development – a green city – is based on the understanding of the ecosystem damage caused by urbanisation and the mechanisms influencing the deterioration of living conditions. In addition, it is essential to find

a balance between negative environmental effects and better results for the development of people and the urban tissue. An indispensable tool to achieve harmony is education in the field of ecology and environment as a public good (Keane & Davies 2020).

Green cities focus on the relation between built-up areas and areas with natural functions. The priority is a high percentage of urban space as biologically active and open areas. The advantage of this concept is its beneficial effect on the functioning of nature and its importance in creating living conditions for the inhabitants of urbanised areas (Solarek, 2011).

Moreover, the functioning of green cities is associated with economic benefits, namely creating jobs, reducing poverty and improving the equality and quality of life through mechanisms, such as improving road safety and the cohesion of the local community. Urban development based on the concept of a green city is a long--term approach favouring economic savings as well as mitigating and adapting to the effects of climate change in many sectors of the economy (Ahmed, 2013).

3.4. Compact cities

The main goal of the compact city concept is a higher level of intensity of space use and an increase in population density. Its priority is also to increase the intensity of social life, cultural and economic activity, and to define the form of the city, manifested by its size and a structure that enables the benefits of sustainable development (Burgess, 2002). Its importance has grown over the last twenty years. Compact cities are based on:
- high density of built-up areas,
- high development intensity factor,
- diversity and interpenetration of functions performed by a given area,
- communication accessibility taking into account various means of transport, including walking,
- availability of a plethora of services.

Considerations that fit the trend of the idea of a compact city are combined with the issues associated with a sustainable city and a smart city. Among the most frequently emphasised advantages are the economic and social savings as well as environmental, while the most frequently mentioned pejorative factor is the limitation of open areas (Zakrzewska-Półtorak, 2018).

3.5. Resilient cities

An example of a concept under development is that of a resilient city, which seems particularly up-to-date in the face of the effects of the COVID-19 pandemic, which affected all areas of the functioning of cities, namely social, economic, cultural and spatial. The OECD defines resilient cities as centres that have the capacity

to overcome the present, to rebuild the past, and to prepare for future economic, environmental, social and institutional shocks. Resilient cities are equated with sustainable development, prosperity and inclusive growth. Their resilience is measured by factors of an economic, social, institutional and environmental nature (OECD, 2022).

Factors contributing to building urban resilience include: the diversity of sectors of economic activity, dynamic economic growth, conditions favouring innovative activity, society with access to employment, education, services, skills training, social integration, social initiatives, the level of security, citizens enjoying a healthy life, transparency of leadership and management, strategic and integrated government governance, public sector competence, a high-quality ecosystem, efficient infrastructure, adequate natural resources and a coherent land management policy (OECD, 2022).

3.6. Creative cities

It is also worth mentioning the well-established concept of a creative city, the assumption of which is to use the potential resulting from creativity, which in turn allows to build a competitive advantage. Creativity in this approach is understood as a creative attitude, a mental process leading to the emergence of new ideas, associations and connections with already existing concepts (Sadowski, 2020). Creative cities are characterised by:
- a policy framework that promotes creative attitudes,
- uniqueness, diversity,
- openness and tolerance,
- entrepreneurship and innovation,
- strategic leadership and vision,
- landscape and infrastructure conducive to learning and talent development,
- communication, accessibility, networking,
- adequate quality of life,
- professionalism and efficiency (Landry, 2008).

The assessment of the potential of a creative city is based on, i.e. the number and quality of cultural institutions, tourist attractiveness, the city's brand, the attractiveness of historical and contemporary buildings and structures, the quality of public services, the state of the natural environment, the level of development of the creative industry and the attractiveness of the urban centre as a place of residence (Rogowska-Sawicz, 2013).

3.7. 15-minute cities

In a globally connected world and increasingly smart cities, the need for living in a physical neighbourhood where human interaction takes place is increasing.

It is the quality of life that fulfills a deep desire for community and place identity (Abdelfattaha et al., 2022). The 15-minute city model assumes providing all residents with: access to their daily needs, i.e. work, housing, food, health, education, culture and leisure within a 15-minute walk or bike ride. Paris is the most famous example of a city that aims to fulfill the assumptions of this model (Moreno et al., 2021).

The 15-minute city concept addresses human needs and environmental sensitivity. To meet such needs, it is necessary to strengthen interpersonal interactions and interactions between elements of the urban fabric, i.e. residential areas, technical infrastructure, services, and recreational areas. The main benefits of a 15-minute city include improving the health and quality of life of residents, increasing urban integration, and stimulating the local economy. In addition, these cities are more environmentally-friendly, which contributes to lower emissions from car transport, the number of trees, vegetation and green spaces increases, which also reduces the urban heat island effect and the risk of flooding and improves biodiversity (Allam et al., 2022).

4. City development concepts – case study

Contemporary cities are looking for different methods and paths of development, depending on the nature of the problems they face, as well as their strengths and opportunities to use their individual potential. Regardless of the adopted strategy and action plan, the common denominator of modern urban development concepts is to ensure a high quality of life for their residents.

Table 1 presents selected concepts that are based on access to green areas, rational use of resources, improvement of health, integration of residents and their large-scale inclusion in the process of urban development, accessibility and attractiveness of walking, cycling and using urban public transport, as well as smart infrastructure, digitalisation, the use of AI and cybersecurity.

Table 1. Case studies of contemporary urban development concepts

Concept	City	Description	Other examples
Green planning of public spaces	Freetown (Sierra Leone)	The city is struggling with a huge environmental crisis. As a response to the problems of biodiversity loss, soil erosion, air pollution and the deficit of vegetation and high temperatures, the city authorities chose the direction of development consisting in the dynamic greening of urban space – planting one million trees within a few years. The activities are to help stop the negative effects of environmental degradation and improve the quality of life of the inhabitants.	Lisbon (Portugal), Shiraz (Iran)

Health communities	Chicago (USA)	The city wants to fight unhealthy habits, late diagnosis of diseases and the lack of preventive measures, therefore it is implementing a plan whose aim is equal access to health care and maximisation of the quality of health and life. The priority is also to develop the partnership, awareness and involvement of residents, increase the availability of healthy food, and provide infrastructure encouraging to go on foot.	Cascais (Portugal), Nice (France), Louisville (USA)
15-minute city	Paris (France)	The ineffective fight against increased car traffic, inefficiency of infrastructure and insufficient road capacity, as well as the reduced quality of the natural environment forced the search for other solutions ensuring comfortable living conditions in the city. Paris decided to transform itself by reducing CO_2 emissions, prioritising pedestrians and cyclists and decentralising the city. The idea of a 15-minute city is based on four aspects: proximity, diversity, density and omnipresence of essential places and services. Paris' ambitious plan envisages the deployment of bicycle lanes on every street in the city, eliminating 60,000 parking spaces. The city transforms decommissioned road infrastructure into green spaces.	Portland (USA), Stockholm (Sweden), Melbourne (Australia)
Mobility: Intelligent, sustainable and as-a-service	Los Angeles (USA)	Attempts to increase capacity for omnipresent cars are ineffective, which is why Los Angeles has opted for the development of sustainable and intelligent mobility solutions. The city creates and supports the electrification of transport. The urban mobility plan assumes the availability of urban transport and meeting the needs of users. The city is implementing compressed natural gas (CNG) buses and emission-free electric buses. Los Angeles is targeting a fully electric bus fleet by 2030.	Shenzhen (China), Copenhagen (Denmark)
Inclusive city	Medellin (Columbia)	The priority of integrating cities is building development based on reducing inequalities. It is important to include them through access to infrastructure, housing and workplaces. Approximately 20 years ago, Medellin struggled with a high level of crime, exclusion and enormous economic disproportions in parts of society. The city chose the direction of development based on the planning approach. It revitalised the space in cooperation with the inhabitants. The cable car and escalator connecting the poor neighbourhoods located on the hilltops with the city centre are symbols of profound urban changes. The emphasis on education should not be forgotten, either. Access was created to educational points in every district of the city.	Quito (Ecuador), Nagareyama (Japan)

Digital city	Espoo (Finland)	Digital cities, instead of focusing on attracting investors, try to attract human talents. Their main asset is creativity. Espoo is an entrepreneurial ecosystem with a well-established innovation and technology centre, strong research institutes and small and medium-sized enterprises. Espoo City Council declares that their goal is not to be the most sustainable or the most intelligent city. The overriding goal is to be the actual most intelligent society. In Espoo, the city is treated as a service to the citizens. The role of the service is also manifested by experimenting and testing new solutions.	New York City (USA), Porto (Portugal)
Circular city	Seul (South Korea)	Units referred to as circular cities are based on sharing, reusing, restoring and strive to reduce the amount of waste generated. Seoul launched the Sharing City Seoul initiative in 2013. Its main assumption was to support entrepreneurs who follow the policy of the circular economy with their activities. The unique nature of the project implies the sharing and combination of public and private resources. The city authorities have created a database of platforms that follow the trend of the sharing economy.	Glasgow (Scotland), Cape Town (South Africa), Lappeenranta (Finland), Hong Kong
Smart and sustainable buildings and infrastructures	Singapore	Singapore has adopted the ambitious target that by 2042, 80% of its buildings will be green. The initiative provides for an increase in the level of environmental friendliness of buildings (including the existing ones), the use of intelligent systems to optimise energy consumption and more efficient use of resources. The city has introduced a system of environmental certification of buildings – the Green Mark. Since 2018, approximately 94 million km^2 (1/3 of the total gross area of the building stock) has met the standards of the Green Mark certificate.	Adelaide (Australia), Fukuoka (Japan)
Mass participation city	Leuven (Belgium)	Contemporary cities compete with each other, trying to attract human capital. The basic tool of this competition is to improve the quality of life and increase the level of satisfaction of the inhabitants. In 2019, the Leuven Co-Create project was launched in Leuven, focusing on open government policy and calling on citizens to become actively involved in mass city-building by submitting ideas to improve lives. As a result, over 3,000 applications were submitted, a total of approximately 223,000 applications were submitted, and approximately 100,000 were used in the development plans.	Mexico City (Mexico), San Diego (USA)

City operation through artificial intelligence	Cascais (Portugal)	Rapid response to events in the urban space is no longer sufficient for residents and users of space, going a step further, they expect to anticipate and counteract events that disrupt the functioning of cities. Cascais has developed numerous intelligent services for the residents, but these have not been synchronised. In 2018, the city commissioned the development of a city platform that made the integrated management of different systems a reality. As a result, the quality, efficiency and effectiveness as well as savings in services have increased.	Vienna (Austria), Calgary (Canada), Hong Kong
Cybersecurity and privacy awareness in the city	Tel Aviv (Israel)	Commonly used e-services form interrelated systems where, at the time of data migration, there is a risk of user data leakage. Tel Aviv is strongly committed to increasing the awareness of the importance of data and security in cyberspace – demonstrations of intelligent solutions, conferences and courses on cybersecurity, and creates conditions for dialogue between the scientific community, private enterprises and public administration.	Tokyo (Japan), Toronto (Canada)
Surveillance and predictive policing through AI	Kanagawa (Japan)	The city, striving to ensure extraordinary safety during a mass event (the Olympic Games), decided to introduce solutions based on artificial intelligence, which were implemented in order to create and analyse patterns of behaviour of criminals and circumstances characterising crimes.	Singapore, Rio de Janeiro (Brazil)

Source: (*Urban future with a purpose*, 2021).

5. Conclusion

Cities play a crucial role as a place of life and must meet the expectations of their residents, drive the local economy, and are a place of connectivity, creativity and innovation. Modern cities are intended to create better, more sustainable urban centres, with a higher quality of life, and places where the traditional networks and services are made more proficient with the use of digital and telecommunication technologies, to the advantage of its inhabitants and businesses. The conducted analysis confirmed the need for, and the importance of, city development concepts as the response to the current challenges and problems. The research confirmed that the discussed concepts aim at solving different urban problems (pollution, lack of modern infrastructure, congestion, over-development, accessibility, impoverished green areas, ICT technology, AI, etc.), and enabled to group them. The implemented concepts allowed to examine the effects of the implemented solutions for a wider

audience. There is no one correct and proper way for improving cities, but the developed solutions (during the implementation of these concepts by some cities) can be used by other cities at the stage of planning and implementing activities aimed to improve their functioning. However, for it to succeed, it needs aware and committed people.

Therefore, this study is the starting point for further research, which may concern relations between the problems identified in cities and the applied development concepts, and may provide a useful approach for local authorities.

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