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Contemporary foundations of the theory of urban development – case study smart, slow and compact city theory

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ABSTRACT

The issue of the concept of development and urban planning in an optimal manner is as old as cities. It has not yet been established which human activities are to be considered as conscious and planned space development. It is assumed that the beginnings of rational, thoughtful urban planning should be sought at a time when cities began to be treated as a single organism, which should function smoothly, guarantee the safety of its inhabitants through defence functions and provide a higher standard of living. The effect of these assumptions was the logical placement of buildings, transportation systems and infrastructure, as well as recreational areas so that life in the city was something more than just miserable existence. This article overlooks former planning theories such as the theories of location by J.H. von Thunen or A. Weber, as well as the projects of a garden city by E. Howard and Functional Warsaw by J. Chmielewski and S. Syrkus. Instead, it focuses on what is currently, at the beginning of the 21st century, up to date and combines contemporary concepts of sustainability and new technologies, and treats the city as a resource of limited space, buildings, infrastructure and people representing both purchasing power and the labour force. The article, apart from theoretical considerations, focused on realizations of ideas in practice, quoting both sectoral solutions related to the organization of transportation in the city, as well as to projects of entire cities.

KEY WORDS: city development, smart city, slow city, eco city, spatial planning

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1. Introduction

The city is currently seen as a resource of space, buildings, infrastructure and people, representing both the labour force and purchasing power. In managing a modern city, a key role is played by information, because in most cases the spatial development of cities is limited, and the lack of possibility of territorial expansion creates the need for rational use of space in the existing city. The dynamic development of urbanization generates new, previously unknown challenges. At present, more and more people want to travel by private cars, and have greater and easier access to public services of higher quality. All this forces a change in the current thinking about spatial planning, which it is no longer just about a rational, aesthetic design of space, but also about its functionality, and practical and easy management. The newest theories of thinking about the city provide the answer to the modern perception of spatial planning (Rysz, 2013).

2. The smart city theory

The idea of a smart city describes the benefits of the comprehensive use of modern information and communication technologies (ICT). The maximum and best use of the information allows for the smooth functioning of the process of planning and management, as well as decision-making. Smart city model was popularized by Austrian scientists from Vienna University of

Technology and is assumed that an intelligent city is based on six axes (GIFFINGER ET AL., 2007):

1) smart economy – a strong and stable green economy, which is based on knowledge and information, a flexible labour market, and the ability to transform and introduce structural changes,

2) smart mobility – the construction and development of modern transportation network systems, passenger information systems, information systems on getting around the city, multifunctional stops, and traffic restrictions, with an emphasis on public transport,

3) smart environment – gardens designed using the latest technology, and in such a way as to constitute both the habitat of many plants and animals, and sustainable resource management,

4) smart people – a skilled workforce, a tendency to learn throughout life, participation in public life, and openness of mind,

5) smart living - man-serving technology, the use of modern technologies in household management, contact with a medical specialist using an audio-video system, digitization of education, bins that monitor the amount of rubbish, lanterns that allow the charging of a phone battery, high-quality construction development, numerous public buildings, beneficial health conditions, low crime rate, and an environmentally friendly energy networks (smart grid) enabling the transmission on the client to client line,

6) smart governance – energy-efficient buildings, high speed Internet, people who are actively involved in the city management, cooperation with authorities who are involved in solving local problems, providing high quality services to inhabitants, and development strategies.

An intelligent city can be considered a city that invests and operates based on human, social, traditional (infrastructure, transportation networks) and modern resources (ICT networks), environmentally friendly fuels, a high quality of life, and, at the same time, wisely manages natural resources and engages local community in these actions (CARAGLIU ET AL., 2009). KOMNINOS (2002) characterized smart city as creative territory of high learning and innovation which contains of R&D institution, higher education, infrastructure and digital communication technologies, as well as a high level of management efficiency. According to LAZAROIU & ROSICA (2012) opinions, optimisation of new available resources and possible investments have to be performed in order to be able to mark the city as "smart". AZKUNA (2012) says that smart city uses ICT to enhance the interactivity and productivity of urban infrastructure and its constituent components, as well as to raise awareness of the inhabitants. In Australia, the smart city concept focuses on the creative industries and digital media (MURRAY ET AL., 2011). Thus, the Smart City is mainly based on modern technology and knowledge which penetrates every area of life of its inhabitants. In the urban space, it can be observed through modern buildings, street lighting systems, and public transportation system (vehicles and infrastructure ensuring its smooth functioning). These are also modern public spaces filled with modern technology. An example of a smart city is Dutch Amsterdam, where the idea of the city based on the aforementioned axis has been implemented since 2008. The basis of the whole system is a modern telecommunication infrastructure covering the whole city, and ensuring efficient management as well as the integration of new services and functionality (RYSZ, 2013).

In Poland, the idea of a smart city has appeared more and more frequently. Local authorities mainly focus on the expansion of the telecommunications network enabling the efficient management of traffic or public transportation.

An example of the most developed smart solutions in Poland is the city of Szczecin's project: "Improving the functioning of urban transport in the Szczecin agglomeration through the use of telematics systems" (http://zditm.szczecin.pl/), which combines both a dynamic passenger information system (i.e. signboards, texting, web page or Bluetooth technology), as well as a fleet management system and vehicle location, video monitoring in vehicles, control of passenger streams, technical vehicle location systems, the Szczecin Agglomeration Card and other related solutions with a comprehensive approach to the management of public transport.

Similar assumptions are included in the project "Construction of the system integrating public transport in the city of Rzeszów and the surrounding area" (http://www.transport.erzeszow.pl) covering the reconstruction of the road system, the construction of bus lanes and Rzeszów Intelligent Transportation System. Similar to Szczecin, the basis is the extended ICT platform connecting the Area Traffic Control System, which allows for the ongoing management of traffic lights and giving priority to public transport, the Public Transport Management, including vehicle location, passenger count, quality control, passenger service (e.g. by verifying the punctuality of vehicles and synchronization of timetables), Passenger Information System (E-info), and an

Electronic Toll Collection System, with the use of an electronic card.

The idea of Smart City does not only consist of creating a functional space of a city, but mainly of the rational management of it, based on the idea of sustainable development and eco-friendly energy management. It is a merger of modern urban planning, architecture, and technology, including information technology (RYSZ, 2013). The priority for local governments wanting their city to become "smart", should be a city development strategy which focuses on the management and implementation of innovation technology. Contemporary users of a smart city do not incur additional costs, they live in a modern city with a high standard, and at the same time, care for future generations and the environment.

3. The slow city theory

The Citta slow movement began in October 1999, when Paolo Saturnini, mayor of Greve-in-Chianti, a Tuscan hill town, organised a meeting with the mayors of three other municipalities (Orvieto, Bra, Positano) in order to define the attributes that might characterise a citta lente – slow city (KNOX & MEYER, 2009). The towns of the citta slow movement have been trying to exploit spaces and flows of urban existence, such as town squares and streetscapes, that facilitate slow living and community development, and also wanted to eschew those features of modern urban places that limit the possibilities of slowness (PARKINS & CRAIG, 2006). This idea is more of a concept and a way of conducting life in the city, rather than its strict planning (RYSZ, 2013). "Slow City" cities are united in the International Association of Cities Citta Slow, whose main objective is the promotion and popularization of the 'good life' culture through research, experimentation, and the use of solutions that relate to the organization for the city, thus preventing globalization and homogenization of cities (http: // cittaslowpolska.com/ international-network-of-cittaslow-cities).

To obtain the status of a "Slow City", the guidelines of the Slow Food organization should be accepted, i.e., the promotion of local natural crops, agricultural products, regional cuisine, and ecology, while working to improve its friendly atmosphere and protection of local environment. In the Slow City movement, the implemented projects include recycling projects, the "after school" program of activities, or information for tourists to help them feel truly "local" experiences.

Technologies focused on improving the quality of the environment and the urban tissue are favoured and the emphasis is placed on the promotion and care of the production of exceptional foods and wines that shape the character of the region. The Slow City movement seeks to promote dialogue and communication between local producers and consumers. Thanks to the ideas of environmental protection, the promotion of sustainable development and the improvement of urban life, the Slow City movement provides incentives for the food production sector, which uses natural and environmentally-friendly techniques. The "Slow City" award will become a quality symbol for smaller, local communities (http://cittaslowpolska.pl/international-network-of-cittaslo-cities). Cities of this kind are not great metropolises or regional capitals. They are strong local communities that have decided to improve the quality of life of its inhabitants. A city that wants to apply for the Slow City status must meet a number of requirements, that are provided in Table 1.

All of it is to serve the idea: "Live slowly: the other side of modernity" (http://cittaslowpolska.pl/international-network-of-cittaslo-cities). The life and management of such a city, is a way of being, conducting everyday life differently than before, in a slower, less rapid way, not focused on productivity. At the same time, it is more humane, ecologically correct and loyal to present and future generations, showing respect to what is local, in an increasingly global world. The very word "slow" in the name means slow, lazy, which is highlighted by the logo of the Citta slow movement, which presents a city in a snail shell. It can therefore be assumed that the functioning in the Slow city, as well as its management, is synonymous to the recognition of the totality of local resources, material and immaterial, landscape, both natural and urban, as well as the natural environment, historical property, artistic and cultural events, including those that apply to wine and gastronomic activities to strengthen or rebuild urban identity, violated repeatedly by the changes in the last decades (RYSZ, 2013). A Polish example which fits the Slow City trend is the only Mazury health resort – the city of Gołdap (http://uzdrowiskogoldap.pl/). The city is characterized by both the health resort as well as sports and recreation facilities. It is an attractive place for people who want to find peace and tranquillity, but also for passionate athletes. Interestingly, the Silesian city of Kalety, which is in a forested area of Silesia, also holds the status of a "slow" city (http://kalety.pl/).

Table 1. Requirements for the Slow City movement candidates

Category	Requirements
Legislation regarding environmental protection	a) air quality control system and a public consultation on air quality conditions. b) a handbook of water management system along with guidelines on distribution and control c) the use of promotion plans and distribution of new plans and composting techniques, as well as the promotion of home composting, d) a system for controlling light pollution and the associated intervention plan, e) motivation and rewards for the development of alternative sources of energy, f) the smog pollution control and intervention plan, g) reduction of graffiti and undesirable placement of posters, h) the application of EMAS or ISO 9001; ISO 14000 and SA 8000, i) the participation in the project Agenda 21.
Political infrastructure	a) the creation of public green areas with benches and places to play, b) the presence of open pavements without architectural barriers, c) access and accessibility of public spaces for the disabled, d) the existing infrastructure should favour alternative mobility, e) generally accessible public toilets, f) the presence of places to sit and rest, not only in historical centres, but throughout the city, g) the opening hours of various municipal offices should be standardized, h) a Public Relations office at the Town Hall, i) a "Call Centre" (Hotline Centre) for residents who want to express remarks on "the quality of life "there should be a schedule for opening and closing stores, institutions, harmonized with the needs of residents and serving the commercial benefits of the city.
Urban quality	a) plans for the restoration of historical centres and/or works of cultural or historic value, b) the use of plans for the elimination of loud alarm systems, at the same time the introduction of adequate programmes to protect property against theft, c) encouragement to use public bins for recycling, d) rubbish containers taken out and disposal according to the agreed schedule, e) promotion and distribution of programs of greening private and public space with plants that smell good and those that improve the environment, f) the existence and application of network development plans based on the Internet for residents in every city, g) development in the implementation of promotion plans increasing the use of environmentally friendly building materials, h) the existence of programmes to increase the status and availability of historical centres.
Local products	a) the annual inventory of typical products, b) programmes for improving the value of and protecting local cultural events, c) plans for the development of natural markets and local products located in interesting and valuable places, d) education programmes teaching about taste, e) quality improvement programmes through the control of the city's restaurants and school canteens, f) educational programmes about organic production, g) the definition of products according to the Presidia programme (http://www.wici.info/modules.php?name=News&file=print&sid=3308), h) the development of organic agriculture and certificates of product quality, i) programmes for improving the awarded values of nutritional and gastronomic traditions, j) initiatives encouraging the protection of products and crafts of the region.
Hospitality	a) the existence of a regulatory body which will ensure that local companies are honest in their labelling, and that there is no unfair advertising. b) international labelling c) tour guide training plans for tourist information centres, d) the existence of well-marked hiking trails with information and descriptions, e) the existence of a city guide within the framework of the "Slow" movement f) the implementation of pricing rules of the tourist menu, g) the presence of guarded car parks in areas close to the city centre, h) a policy which makes the city hospitable and invites guests to participate in the events and celebrations, i) the existence of plans for the development of initiatives that enhance the city's Slow City range.

Knowledge	a) a publicly available document, which lists the Slow City services,
	b) the presence of the Slow City logo on city's official documents and images (letter heads, etc.)
	c) the existence of a programme that distributes information about the activities of the movement,
	d) a website dedicated to the Slow City movement programmes implemented in the city,
	e) the promotion of programmes that facilitate family life, such as leisure activities, services provided at home for the elderly and chronically ill,
	f) the existence of economic programs to promote the development of Slow City requirements and plans for their improvement,
	g) the presence of articles about Slow City initiatives on the municipal notice board and distribution of information, also in the national media,
	h) programmes for the development of initiatives with cooperation of local leaders and the development of local companies relating to the application of the requirements of the Slow City movement.

4. The eco city theory

Since Sir Ebenezer Howard has started the "garden city" movement with the publication of his *Garden Cities of Tomorrow* in Britain 1898, urban planning in the form of garden cities in which human lives coexist with the nature has shaped the development of cities in Europe and also in other continents. In recent decades, there has been a growing awareness of making our environment not only beautiful but also sustainable. Many countries are developing the "eco-cities" instead of "garden cities" (FOOK & GANG, 2010). The theory of a self-sustained city of the future was born as a response to the growing population of modern metropolises and to fight growing pollution. The very term eco city is relatively new, but is based on the concept that has existed for a long time (ROSELAND, 1997).

Determinants of an ecological city define various aspects and can be found in the materials of the Regional Centre for Eco-energy (http://www.rce.oodr.pl/sort.php3?dzial=wstep_do_oze &kategoria=ekologiczne_miasta&on=tak). A city should be designed with the thought of people's comfort, to make everything close, including the possibility of the complete elimination of vehicles with combustion engines or with the assumption to introduce alternative, environmentally friendly public transport, cycling and walking routes. It is important to blur boundaries between areas with one specific function, i.e., the centre - a place of work, or the suburbs -a place of residence and recreation. Urban centres should be expanded upwards rather than in breadth, thereby reducing expansion and urban sprawl. In addition, architecture should be combined with the specific features of each region. Energy requirements should be covered only by natural determinants of climate and renewable energy sources, while recycling should be properly popularized. It is also important to reduce the average consumption of fresh water and increase the use of filtered rainwater and seawater for its production, as well as the reduction of greenhouse gas emissions, waste water treatment or bio-gas recovery. Healthy food should come from organic farming, located close to potential consumers, and mini fields should take up every possible open space, including gardens, parks and roofs. An important element is the aspect of working conditions in the Eco city, which assumes that working conditions are to meet international criteria, with fair and decent salaries, which is aimed at improving the living conditions of the population.

These assumptions require the commitment of considerable financial resources in order to be implemented. Today, one of the best known projects is the Masdar, which is a totally ecological city that is being built in the desert, approximately 17 km from the capital of the United Arab Emirates, whose construction costs are estimated at 20 trillion dollars (http://www.masdar.ae/en /#Masdar).

Modern projects of eco cities contain analogies to the solutions of the past, i.e., the layout of narrow streets and dense development to provide shade and save land, the location of buildings in an appropriate manner in relation to the cardinal directions, to optimize natural air conditioning and heating of homes, and the use of rainwater. Ecological cities have to combine the urban experience of the past and the use of modern technology (RYSZ, 2013). Examples of Polish towns that refer to the eco theory are the winners of Eco-city competition of 2013 in the category of environmentally friendly construction: Ełk, awarded for its rational and systematic approach to improving energy efficiency, the competence of the energy team in the municipal council and the construction of a technology park, and Płońsk, awarded for the innovation and

multiple actions in the field of thermo-modernization (Węcławowicz-Bilska, 2014).

5. Comparison of selected theories

It is not easy to compare the theory of a Smart City and Eco City with the Slow City theory, because the first two are focused primarily on the technical aspects of the functioning of a city, and only secondly on shaping the required ecological attitudes of residents. In contrast, the Slow City theory focuses on local products, tradition and things which are associated with the culture of a city or region. At the same time, the Slow City status is reserved for smaller settlement units rather than large cities or metropolises. It is the contemporary big cities that should focus on being smart and eco, because smaller towns are inherently greener and cleaner. In small towns, it is rarely possible to speak of high population density, smog or traffic problems. It may therefore be assumed that the desired direction for the development and functioning of big cities of the future are definitely the theories of Smart and Eco Cities, because they should have a favourable impact on a city's image and make it a friendlier place to live. In contrast, smaller towns should protect what is local i.e. strive to become slow.

In order to compare the Smart City, Slow City and Eco City theories, and to evaluate them, it was necessary to establish the criteria under which they would be examined. Eventually, twelve aspects considered relevant were selected. The selected criteria, although they may raise some doubts, are justified in the general pursuit of care and concern for the environment and promoting sustainable development, taking into account the efforts to improve the quality of life while maintaining biodiversity, social equity and richness of natural resources (Gerwin, 2008).

The conducted comparison consists of the verification whether a criterion has been met in a particular theory. If there was a connection between the theory and the criterion, a "+" was used in the appropriate matrix cell. A detailed listing is presented in Table 2.

Table 2. Evaluation of the Smart City, Slow City and Eco City theories

Criterion	Smart City	Slow City	Eco City
Care for the environment	+	+	+
Saving and caring for natural resources	+	+	+
Recycling / reclamation of recyclable materials	+	+	+
Justice and social equality	+	+	+
Use of modern technologies	+	+	+
Care and preservation of local values and traditions		+	
Food production in organic farming		+	+
Connection of the theory with sustainable development	+	+	+
Promoting sustainable transport	+	+	+
Sustainable management of water resources	+	+	+
Promoting a specific and hospitable lifestyle characterizing a given city		+	
Implementation of theories (at least partially) in Poland	+	+	+

As seen in the above compilation, all three selected theories have a lot in common. Differences associated with the attention to local values and traditions and the promotion of a specific life style result from the fact that the Slow City theory refers to small cities, with many years of history, whose main goal is to protect what is local. The theories of Smart City and Eco City refer mainly to newly designed cities and therefore there may not be any references to the care and attention to preserving traditions. At the same time, it is much easier to introduce these theories in emerging cities because it is naturally easier to build from scratch than to renovate. When building a city from scratch, it is possible to determine the work schedule. The construction of a step-by-step complex network of infrastructure and buildings is easier than rebuilding. In the already existing cities, it is much more complicated to introduce technologies associated with the ideas of the Smart City and Eco City. Just look at what is happening around you, the reconstruction of a road, renovation or construction of a modern electrical energy network, and sewerage or

telecommunications network is much more expensive and energy consuming. It is caused by the necessity of manoeuvring between the existing infrastructure, as well as buildings, small architecture and valuable recreational areas.

The introduction of these theories requires adapting them to Polish reality and strategic objectives of cities. It is not just that the cities could say about themselves that they are Smart, Eco or Slow, because they take some action. It is important that these actions make sense, that there is a schedule of their implementation, and there are also municipal resources secured for this purpose in the budget. A simple rationale may be a prosaic example of rational water and sewage management. The construction of a modern sewage treatment plant would not make sense in the absence of efficient and extensive water and sewage system. Similarly, a modern passenger information system is pointless if the fleet of buses consists of dilapidated and technologically obsolete vehicles, which cannot keep to the established timetable. Any achievement is based on the rational approach to something, according to the saying that small steps lead forward to the goal. An example of small Smart and Eco steps can be the Czerwionka-Leszczyny municipality, which installed modern systems of road and street lighting consisting of lamps powered by renewable energy.

It is equally important to follow examples of countries and cities where these theories and ideas have already been verified. The application of conclusions reached by others will allow us to avoid repeating the mistakes of the past. The cost of certain projects does not mean their implementation should be immediately resigned from. On the contrary, striving to raise additional funds, e.g., from EU funds and pursuing a policy of reducing expenditures will allow a city to gain the reputation of a modern, thriving and environmentally friendly place to live. It is important that Polish cities do not close off to the ideas of Smart Cities, Slow Cities and Eco Cities and take appropriate actions.

Top-down or bottom-up initiatives are necessary to initiate the project. It is important for the authorities and local governments to cooperate with the community. The answer to the needs of residents, as well as cooperation of residents through an open dialogue with officials is the key to success. At the same time, it is important to break through typical Polish scepticism and reluctance to new, breakthrough ideas and initiatives. Starting with smaller projects, we can move to a higher level, which takes into account the design and construction of new settlements, neighbourhoods and cities, as well as a change of people's lifestyle.

6. Summary

The three selected theories of cities differ from the cities that we historically know. Undoubtedly, cities still remain settlement units, which group mainly people employed in non-agricultural occupations (Bury et al., 1993). But today they face totally new challenges. In the past, a city competed with other cities in terms of providing better defensive functions. In the period of industrialization, they constituted the base for resources and location. Currently, a city turns into a company having development, marketing and promotion strategies. It becomes a supplier who provides its resources such as land, human capital and infrastructure on the market.

The three selected theories go even further, because they deviate from the traditional city and, at the same time, interfere with the style of life of its residents by imposing certain rules of individual behaviour, e.g., related to the management of natural resources, or waste management. It is partly due to the ecology trend and care for the environment and sustainable development. In addition, you can seek a competitive element and a domestic and international reputation. Innovative eco ideas are popular, and their implementation arouses the interest of both the project and the city.

A comparison of theories in a synthetic way shows what is important in each theory. The success of the implementation of projects and assumptions of any of the ideas depends on the cooperation of society, local governments and local businesses. What is important is both the dialogue and the attitudes of each of these entities. The implemented concepts must be proportional to the needs and awareness of local communities, which is undeniably the most important feature of a city.

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