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## THE ROLE OF STAKEHOLDERS IN SHAPING SMART SOLUTIONS IN POLISH CITIES\*

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**Abstract.** Nowadays, cities are approached as complex systems comprising multiple interactions and interrelations. At present, urbanisation is one of the principal socio-economic global processes. Population concentration and myriad different relations between entities lead to highly complicated lives within the urban space. Therefore, the characteristics features of modern cities refer not only to their physical structures, but also to the network of cyber-relations optimising processes occurring within agglomerations. The aims of public governance in urban space relating to the development of intelligent, sharp solutions regarding life quality improvement are undeniably associated with the application of modern technologies. However, one must also take into consideration the role and impact of various stakeholders affecting the process of smart city development. According to the results, stakeholders' involvement is crucial for good management. It is believed that the greatest role in the implementation of intelligent solutions is played by local self-governments. Their leading function is highlighted at the following stages: project conceptualization, implementation and management. Political entities of a more extensive coverage as well as local communities, economic entities and research institutions also play essential role at the stage of concept development. This study focuses on the importance of individual interest groups in the process of shaping intelligent solutions in the urban space. The study is divided into the following sections: Introduction, Literature Review, Methodology, Research Results, and Conclusions.

**Keywords:** cities; stakeholders; sustainable city; smart city

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## **1. Introduction**

We have been witnesses to a significant growth of the ratio of urbanisation worldwide in recent decades. In February 2007, for the first time in history, urban population outnumbered rural population. In 2018, urban population accounted for 55% of the total population of the world. According to the estimates of the UN, 68% of the global population will be living in urban areas by the year 2050 (United Nation, 2019). In Poland, urban population prevalence has been reported since the 70s, and the urbanisation ratio has been over 60% for several years now (eRegion, 2018).

Progressing city development, even though it remains a symbol of social evolution, poses considerable challenges presented by intensive energy consumption, congested transport networks, water and air pollution, waste, social inequality, and a decrease in the quality of life. What is more, numerous agglomerations are now facing crises due to the shrinking process. This phenomenon involves approximately 370 big centres worldwide, the majority of which are large, old heavy industry centres, which have failed to convert their economies into more modern industry-oriented ones, i.e. focused on biotechnology, IT systems, nanotechnology or dedicated services (Sikora-Fernandez, 2019).

Cities are complex systems featuring multiple connections among citizens, enterprises and numerous transport means and communication networks, including services and tools (Mora et al., 2017). They play a crucial role in combat against environmental pollution, while the implementation of new technologies is perceived as a key factor in reducing emissions of greenhouse gases, pollutants, and improving effectiveness of city operations. The said technologies need to be intelligent, lean, integrated, and cost-effective. They ought to play a major role not only in the field of sustainable development of the environment, but also with respect to citizen wellbeing and financial stability.

For a number of years, the discussion about the directions of development of urban centres has included several concepts changing under the influence of predominant specific developmental factors. Nonetheless, the classic factors of development, simultaneously the basic types of resources (land, work, capital), are insufficient to interpret the contemporary process of city development (Kosiedowski, 2008). Cities may classify these factors (local development factors) in more or less homogeneous groups, some of which are closely interrelated, while others remain unrelated. At the same time, we have a group of factors of a common nature, whereas the occurrence and operation of others may be effected only at some points in time or space (Parysek, 1997). Thus, urban centre management is undergoing considerable changes resultant from sustainable development of cities, and demands and expectations regarding effective resource management.

Nowadays, the objects of city management are not only issues pertaining to the design and planning of estates, districts, buildings, facilities and services, but also to the inclusion of new prospects, such as: digitalization, integration, quality of life, citizens' needs, or bridging the gaps in service accessibility (Axelsson & Granath, 2018; Singgalen et al., 2019). Such demands exert pressure on supervisors and authorities so that urban zone solutions become smart, or at least more effective than they are today.

Technologies, and especially information and communication technologies (ICT), are regarded as the major factors facilitating transformation, whereas the cities themselves are perceived today as centres of technological innovation (Yigitcanlar et al., 2018). Still, the smart city concept covers much more than the technological sector solutions, viewed as a way of receiving better quality urban services and more effective administration (Angelidou, 2017; Anthopoulos, 2015). The operations of intelligent urban mobility, effective methods of water

and energy supply, good waste management, or the provision of high quality services in public benefit institutions is, on the one hand, possible thanks to state-of-the-art technologies and, on the other hand, shaped by the influence of urban centre stakeholders. Typically, the implementation of the smart city idea is regarded as the task of public authorities. However, representatives of economic bodies often attempt to create intelligent realities to pursue their business objectives. Representatives of the world of science, trying to create multidimensional inter-operational open-access solutions so that local communities can actively develop smart public spaces, also have a crucial effect on smart city development (Korzeb, Gołuchowski, & Weichbroth, 2015).

The application of such solutions while catering for social issues, such as welfare, cultural offer or life quality, requires a new, holistic approach to city management, the one which will combine the bottom-up governance with the top down governance, allowing engagement of a variety of stakeholders (city users, such as: city dwellers, enterprises, non-governmental organisations etc.). Therefore, the smart city concept comprises the creation and use of relations and connections between human and social capital and information and communication technologies with a view to attaining sustainable economic growth of the city and improvement of the quality of life of its inhabitants.

The aims of public governance in urban space relating to the development of intelligent, sharp solutions regarding life quality improvement are undeniably associated with the application of modern technologies. However, one must also take into consideration the role and impact of various stakeholders affecting the process of smart city development. This study focuses on the importance of individual interest groups in the process of shaping intelligent solutions in the urban space. The study is divided into the following sections: Introduction, Literature Review, Methodology, Research Results, and Conclusions.

## **2. Literature review**

Nowadays, cities are approached as complex systems comprising multiple interactions and interrelations. At present, urbanisation is one of the principal socio-economic global processes. Population concentration and myriad different relations between entities lead to highly complicated lives within the urban space. Therefore, the characteristics features of modern cities refer not only to their physical structures, but also to the network of cyber-relations optimising processes occurring within agglomerations.

A concept most closely resembling the idea of smart cities is the concept of sustainable development in its broader sense. The idea of sustainable development derives from ecological economics, and its major premise is to warn against increasing exploitation of natural resources in an environment under the pressure of economic process intensification. In accordance with the most well-known definition of the World Commission on Environment and Development (WCED), known as the Brundtland Commission, sustainable development “meets the needs of the present without compromising the ability of future generations to meet their own needs.” (Brundtland, 1987). This implies that “sustainable development” has a broad dimension and refers to more than just environmental aspects; it pertains to economic, social and spatial components in the context of city operations. Its main objective is to ensure high environmental, economic, social, and spatial standards to the present and future city users following the the principle of intra- and intergenerational justice (Rogall, 2010). This means that the condition of continuous sustainable development is its close interaction with three subsystems: spatial (considering the environmental aspect), economic and social; which in turns translates into development management expressed by suitable spatial development creating the conditions necessary for proper use of the potential found in the city (Markowski, 2008).

Along the idea of sustainable development, technological progress, an increase in environmental awareness, and the development of knowledge-based economy, came a number of models of urban space management. Every model aims at a rational use of resources involving the ecological, social and economic space. One of such ideas is smart growth which, with reference to cities, incorporates spatial development oriented at a reduction of costs

related to city expansion. Technologically advanced cities committed to resource saving have been distinguished for some time now. Such centres are referred to as smart cities. Even though the concept of a smart city originated in the year 1994, it had not been an object of substantial scientific or economic interest until the year 2010.

The beginnings of the concept are of technological nature. In its initial phase, smart city used to refer to the application of modern technologies, above all, in the field of information and communication, in the high density space of a city. Then, it was noted that effective collection and management of information could improve operations in various measurable city areas, from waterworks and heating systems to public transportation. At the same time, IT tools started to be implemented in company management, becoming a source of knowledge and experience for managers.

Considerable interest in the concept has been generated also by the actions and regulations of the European Union. With the development of *Europe 2020: A strategy for smart, sustainable and inclusive growth*, research oriented at knowledge- and innovation-based economy became promoted and environmentally-friendly, effective and more competitive economy started to be supported.

The *smart city* concept in the EU instruments was primarily involved with energy sector development and climate purposes. The current focus is also on the use of digital technologies to promote increasing effectiveness, improve living conditions, propagate resource saving and social activation.

The smart city idea has become popular not only on the institutional and social grounds, but also in the academia, who began exploring its various dimensions and dependencies (Letaifa, 2015). Some researchers view it as a remedy for all ills related to rapid urbanisation and the only effective way to achieve sustainable development of cities. Its target is to ensure optimum quality of life in the city (Bakıcı, Almirall, & Wareham, 2013). Cocchia observes that the initiatives such as the Kyoto Protocol, IBM Intellident Plant and the “Europe 2020” strategy have significantly contributed to the development and implementation of intelligent solutions within the urban space (Cocchia, 2014).

Considering the particular interest in the smart city concept, a number of centres and institutions have pointed out the lack of unequivocal definition of a smart city, whereas numerous cities aspire to be deemed as smart ones (Hollands, 2008).

Komninos has made an attempt to define a smart city identifying it as a territory of high learning capabilities and level of innovation, possessing research and development institutions, higher education, digital infrastructure, communication technologies and a high level of management efficiency (Komninos, 2002, p. 1). Lazaroïu and Roscia (Lazaroïu & Roscia, 2012, p. 327) underline that for a city to be called smart, it needs an optimisation of all available and new resources and possible investment. To attain this goal, advanced information and communication technologies are required, above all in the fields of energy, technical infrastructure, public safety, waste management and transport (Sikora-Fernandez, 2013).

The analysis of literature shows two superior approaches to the smart city discussion – the technological approach (TDM) and human capital concepts (HDM). Letaifa (2015) and Colldahl, Frey and Kelemen (2013) claim that there are three elements conditioning smart city existence: technology, people and institutions (Letaifa, 2015; Colldahl, Frey, & Kelemen, 2013). Nonetheless, the reviewed literature does not show significant references to institutions, apart from their effectiveness when it comes to technology and HR administration and exerting impact on people to develop smart cities (Kummitha & Crutzen, 2017). The technological approach to smart cities focuses on technical and environmental aspects of city management and highlights the use and importance of modern technologies in the everyday urban life. As a result, innovative systems of transport and green and efficient systems of energy are created and logistic processes are optimised. The authors investigating this aspect of city operations consider state-of-the-art technologies to be the method to boost service efficiency, improve life quality and reduce impact in the environment. In addition to modern technologies, special attention in the

development of smart cities is paid to human capital, education and creativity (Galán-García, Aguilera-Venegas, & Rodríguez-Cielos, 2014). Neirotti et al. (2014) describe smart cities as a means to enhance the quality of life of their inhabitants (Neirotti et al., 2014). This stream of literature refers to smart cities as urban innovations based on ICT, which aim at using physical and social facilities, natural resources and knowledge to revive economies, environmental effectiveness and public and social services. Lombardi views the social aspect of smart city development through a suitable level of safety and preservation of one's cultural identity. He refers to these elements as the "soft factors" of smart city development (Lombardi et al., 2011, p.4). According to the approach presented by Correia and Wünstel, a smart city is capable of combining the physical and human capitals and develop better services and infrastructure. This allows technology, information and political image to be compiled in an organised city improvement programme (Correia & Wünstel, 2018). One of the most quoted definitions in the field is that presented by Caragliu, Del Bo and Nijkamp, which holds that a city is smart when investment in human capital, information and communication technologies, transport, and infrastructure is carried out through wise and sustainable participatory management (Caragliu, Del Bo, & Nijkamp, 2009) (See Table 1).

**Table 1.** Examples of smart city definition

Source	Definition of smart city
Hall et al. (2000)	An urban centre of the future, made safe, secure environmentally green, and efficient because all structures—whether for power, water, transportation, etc. are designed, constructed, and maintained making use of advanced, integrated materials, sensors, electronics, and networks which are interfaced with computerized systems comprised of databases, tracking, and decision-making algorithms. (Hall et al., 2000)
Thite (2011)	Creative or smart city experiments [ ... ] aimed at nurturing a creative economy through investment in quality of life which in turn attracts knowledge workers to live and work in smart cities. The nexus of competitive advantage has [ ... ] shifted to those regions that can generate, retain, and attract the best talent. (Thite, 2011)
Caragliu et al. (2011)	A city that is smart when investments in human and social capital and traditional transport and modern ICT infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance. (Caragliu, del Bo, & Nijkamp, 2011)
Nam, Pardo (2011)	A smart city infuses information into its physical infrastructure to improve conveniences, facilitate mobility, add efficiencies, conserve energy, improve the quality of air and water, identify problems and fix them quickly, recover rapidly from disasters, collect data to make better decisions, deploy resources effectively, and share data to enable collaboration across entities and domains.
Lombardi et al. (2012)	The identified clusters are: smart governance (related to participation); smart human capital (related to people); smart environment (related to national resources); smart living (related to the quality of life); and smart economy (related to competitiveness). (Lombardi, Giordano, Farouh, & Yousef, 2012)
Bakici et al. (2012)	Smart city as a high-tech intensive and advanced city that connects people, information and city elements using new technologies in order to create a sustainable, greener city, competitive and innovative commerce, and an increased life quality. (Bakici et al., 2013)
Townsend (2013)	[...] define smart cities as places where information technology is combined with infrastructure, architecture, everyday objects, and even our bodies to address social, economic, and environmental problems. (Townsend, 2013)
Scholl, AlAwadhi (2015)	smart city (definition) is a programmatic term that summarizes the creation, integration, combination, development, and effective leverage of resources and assets towards innovation, attractiveness, competitiveness, sustainability, and livability of an urban space facilitated and accelerated by the ubiquitous use of advanced information and communication technologies with local governments playing key investigating roles in this process. (H.J. Scholl & AlAwadhi, 2015)
Lara et al. (2016)	A community that systematically promotes the overall wellbeing for all of its members, and flexible enough to proactively and sustainably become an increasingly better place to live, work and play. (Lara, Moreira Da Costa, Furlani, & Yigitcanlar, 2016)

Source: own research



Moreover, smart city development necessitates management which stimulates innovation and creativeness, develops cooperation with interested parties, for their participation in the process of public managements is an indispensable element of the smart city concept.

Creating a smart city is a complex operations of organisational, social and IT nature. One of the key success factors of its realization is a proper analysis of stakeholders. It should be noted that they will constitute a very diverse group. The theory of the stakeholders, the foundations of which were developed in the 70s by R.E. Friedman, refers directly to the issue of strategic corporate management. The most crucial assumption is to acknowledge that every company is surrounded by numerous subjects which have a stake (hence the name stakeholders) in the methods and results of its operations. The said stakeholders interact with the company, and with one another, and may exert a real impact on the decision-making process (Friedman & Miles, 2002). The analysed theory presupposes that there is a need to establish and maintain relations not only with the buyers, but also with other entities, such as suppliers, subcontractors, opinion-making bodies, journalists, employees etc. Despite the evident relationship between the theory of stakeholders and private bodies, it has been successfully adopted in public sector research. Its applications can be easily found in the works of Freeman (Freeman, 1984), and others (eg. Axelsson, Melin, & Lindgren, 2013; Flak & Nordheim, 2006; Kamal, Weerakkody, & Irani, 2011; Pardo & Scholl, 2002; Scholl, 2004). The above researchers suggest that, in spite of the presence of certain challenges regarding the theory transfer between the sectors, the public sphere may take advantage of the stakeholder theory. The abilities clearly outnumber the challenges and the argument in favour of the theory's practical application in the public sector focuses on the fact that the operations of public institutions involve many interested parties (Janssen & Cresswell, 2005; Schneider, 2002).

Given the urban centres, stakeholders must be understood in a broad sense. They are the city dwellers, in the first place, but also economic entities operating within a given territory, tourists, municipal officers, local authorities, representatives of city auxiliary bodies, heads of municipal companies, and many others. The interests of various groups may be divergent or even contradictory at times. The solution involving the inclusion of stakeholders in the process of decision-making with respect to the directions of local authorities' activities, allow partner's personal interest in the performed operations. The application of such an instrument improves the efficiency of actions. Partners included in the implementation of urban undertakings are more convinced of their validity. The profitability is also augmented, for there is oftentimes a financial assembly associated with investment performance, which results in lesser financial means engaged. Such a solution may be more advantageous for yet another reason. The involvement of later users of given objects, equipment or networks in their creation boosts one's chance to maximise profits, for the chance of investment meeting the needs is also enhanced (Kudłacz, 2014).

The analysis of source literature demonstrates that every study stresses the role of the stakeholders, both public and private ones, involved in the process of smart city development (Angelidou, 2017; Silva, Khan, & Han, 2018; Stratigea, Papadopoulou, & Panagiotopoulou, 2015). Furthermore, there are claims that smart city stakeholders are often viewed as creative partners in the planning and performance of the "smart" idea (Linders, 2012). However, we must note that there are relatively few studies concentrating directly on the role of various entities in the development of the concept.

### **3. Research methodology**

The subject of the research are Polish cities with a population of 100,000 to 500,000 people, carrying out undertakings aimed at the development of a smart urban space. In addition, they include various interest groups, more or less involved with the said urban activities.

The main objective of the study is to determine the groups of stakeholders having the greatest impact on the implementation of intelligent solutions in the Polish city space. The analysis will lead to the emergence of a group with which the governing bodies should develop a special mode of cooperation.

The research problem, the solving of which will meet the research objective, is to find an answer to the following question: Which group of stakeholders is of utmost importance at individual stages of intelligent solution implementation in the urban space?

The research process was conducted in two principal stages. The first step was to select Polish medium-sized cities implementing intelligent solutions. This was performed on the basis of data recorded by the Central Statistical Office (GUS) and the method of a diagnostic survey using the questionnaire tool. Out of 34 urban centres with a population of 100,000 to 500,000 people, 29 cities declaring to be implementing intelligent solutions in their space were qualified for the study. The group included 6 Polish cities which are listed at “europeansmartcities 3.0”, i.e. Białystok, Bydgoszcz, Kielce, Rzeszów, Suwałki and Szczecin (“europeansmartcities 3.0,” 2018). Next, the structures of entities directly or indirectly interested in city development were identified in accordance with the source literature. With the application of the questionnaire, municipal officers were asked about the importance of individual groups of stakeholders in the process of development of a smart city space. The results obtained constituted the foundation on which the groups of interest with at least a medium impact on the performance of smart city project were distinguished.

The second major step of the research process was to assign the qualified stakeholders to individual groups of interest, i.e. local authorities, local community, political entities and organisations, financial institutions, involved economic entities, research bodies and higher education institutions, the media, and twin cities and institutions. Following the aggregation of various bodies, the respondents were once again asked about the role of individual sets. This time, the process of intelligent solution implementation was split into five stages (concept and design, funding, implementation, management, solution transfer) and respondents were asked to indicate the importance of the groups of stakeholders at a given stage of project implementation.

Here, it should be pointed out that the methodology applied is directly related to a part of research conducted as part of the three-year **ASCIMER** (Assessing Smart City Initiatives for the Mediterranean Region) project supported by the European Investment Bank (*Assessment methodology for smart city projects. Application to the Mediterranean Region*, 2017).

It should be also remembered that researches conducted by means of questionnaire survey have certain disadvantages. First of all, the respondents did not have a chance to ask the author in the case of doubts. Moreover, the respondents being aware that their city is being assessed, could choose answers that would give better marks to their city.

#### 4. Results

The identification of the stakeholders is key to the understanding of their role in the Smart City. In the course of the research, respondents were asked to determine the role of individual entities in the development of intelligent urban space. The impact was assessed with the application of a five-level Likert scale, where 1 signifies a very low and 5 a very high impact. The results of the analysis are presented in the Table 2 below.

**Table 2.** Type of stakeholders

Type of stakeholders	Min. value	Max. value	Average value
Managing bodies (President, Mayor)	1	5	4.48
City Council	3	5	4.42
Investors	2	5	4.03
International organisations	2	5	4.01
Institutional stakeholders	3	5	4.00
Local Professional Associations	2	5	4.00
Local business	1	5	3.97
Local community	2	5	3.94
Municipal enterprises	1	5	3.84
Individual stakeholders	2	5	3.84
Twin cities	0	5	3.84
Governmental bodies	1	5	3.81
Higher education institutions	3	5	3.81
Neighbouring local authorities	1	4	3.68
Research and development units	2	5	3.58
Local politicians	1	5	3.58
Local investors	1	5	3.58
Marketing agencies	2	5	3.52
Social media (blogs, websites etc.)	1	5	3.48
Administrative staff	1	5	3.42
Schools	1	5	3.39
Associations and foundations	1	5	3.35
Local non-governmental organisations	0	5	3.30
Accreditation bodies and control bodies	1	5	3.29
Governmental bodies	0	5	3.26
Intermediate bodies helping obtain EU funds	1	5	3.26
Loan guarantee funds	1	5	3.15
Political parties	1	5	3.10
Advisory (consulting) bodies	1	4	3.03
Credit unions (SKOK)	1	5	3.03
Sponsors	0	5	3.00
The Press	1	5	2.97
Companies helping receive subsidies from various funds	0	5	2.97
Rating companies (companies providing ratings for local authorities)	0	5	2.81
Local banks	1	5	2.74
Control bodies (State Labour Inspection (PIP), Sanitary Inspectorate (SANEPID), Revenue etc.)	1	4	2.65
Outsourcing companies (e.g. cleaning, property protection, etc.)	0	5	2.65
Training companies	0	4	2.61
Subcontractors	1	5	2.58
The TV	0	5	2.48
Cultural institutions	0	4	2.45
Providers of products and services	0	5	2.39
Religious centres	1	4	2.35
Insurance providers	0	4	2.06
The Radio	0	5	1.87

Source: own research



In the opinion of the respondents, there is a relatively large number of interest groups which have a minimum medium effect on the development of intelligent solutions in the city. By far, the greatest importance is being ascribed to local authorities, i.e. City Mayors, Municipal Councils. What is more, of crucial importance are international organisations and local investors, local business and individual stakeholders. All of the listed groups have at least a large influence on the development of a smart space (grade 4 and higher). Such a distribution may result from the fact that it is the local authorities affecting city development who are responsible for strategy design and implementation. International organisations, such as the European Union, have been supporting innovative initiatives aimed at the creation of intelligent and sustainable space of human activity. The great importance of economic entities in the process of smart solution development is, in turn, associated with the possession of suitable means and appropriate tools. Technological and organisational solutions employed in the private sector may be successfully used in the public space.

28 types of stakeholders were qualified to the next research stage. The groups with an average low and very low impact were rejected (grade 3 and below). The remaining stakeholders were assigned to larger groups in accordance with their specificity and further analysed. See Table 3 below.

**Table 3.** Groups of stakeholders

Group of stakeholders	Type of stakeholders	Min. value	Max. value	Average value
Research & Development Institutions	Higher education institutions	3	5	3.81
	Research and development units	2	5	3.58
	Schools	1	5	3.39
	Accreditation bodies and control bodies	1	5	3.29
	Advisory (consulting) bodies	1	4	3.03
Local authorities	Managing bodies (President, Mayor)	1	5	4.48
	City Council	3	5	4.42
	Local politicians	1	5	3.58
	Administrative staff	1	5	3.42
Country-wide political bodies	Governmental bodies	0	5	3.81
	International organisations	1	5	4.01
	Political parties	1	5	3.26
	Governmental institutions	1	5	3.10
Financial Institutions	Credit unions (SKOK)	1	5	3.26
	Intermediate bodies helping obtain EU funds	1	5	3.15
	Loan guarantee funds	1	5	3.03
The Media	Marketing agencies	2	5	3.52
	Social media (blogs, websites etc.)	1	5	3.48
Local community	Individual stakeholders	2	5	4.00
	Local community	2	5	3.94
	Local Professional Associations	2	5	3.84
	Associations and foundations	1	5	3.35
Economic entities	Local investors	1	5	4.03
	Local business	1	5	4.00
	Institutional stakeholders	3	5	3.97
	Investors	2	5	3.84
	Sponsors	0	5	3.58
	Municipal enterprises	1	5	3.00

Source: own research

The next step was to establish the involvement of individual groups of stakeholders in the projects aimed at implementation of smart solutions in the urban space. As part of the aforementioned ASCIMER, a framework model of management of the projects of this sort was developed. The model is universal and can be applied in many other researches in the field of smart city. It represents individual steps undertaken in the process of management and the degree of involvement of individual groups of stakeholders. The process of development of projects shaping the smart urban space was divided into five stages:

1. Concept and design
2. Funding
3. Performance
4. Management
5. Solution transfer

Stakeholders' involvement is crucial for good management at all of the said stages. It is believed that the greatest role in the implementation of intelligent solutions is played by local self-governments. Their leading function is highlighted at the following stages: project conceptualization, implementation and management. Political entities of a more extensive coverage as well as local communities, economic entities and research institutions also play essential role at the stage of concept development. According to the respondents, the pivotal role in funding is assumed by financial institutions providing support and loan guarantees. The group of stakeholders included in the set "twin cities and institutions" has the largest impact in the sphere of intelligent solutions. Also local authorities taken on a dominant position here. The transfer may be in multiple directions, it may relate to various solutions, relatively easy to implement in another city. See Table 4 below.

**Table 4.** Importance of stakeholders in smart city projects development process

	Groups of Stakeholders							
	Society	Local self-government (provincial authorities)	Political entities and organisations	Financial institutions	Involved economic entities	Research and higher education institutions	The Media	Twin cities and institutions
Concept and design	3.81	4.56	4.13	3.03	3.87	3.87	2.52	3.71
Funding	3.68	3.76	3.91	4.87	3.94	1,9	1.81	3.29
Implementation	2.58	4.26	2.61	3	4.01	3.39	2.29	2.39
Management	1.29	4.16	1.98	2.12	3.61	3.39	1.97	1.35
Solution transfer	2.16	3.81	3.56	3.54	3.77	3.71	2.94	4.04
Average value	2.70	4.11	3.24	3.31	3.84	3.25	2.31	2.96

Source: own research

The role of local communities is particularly interesting, for all implemented solutions are not only to effectively manage urban centres but, first and foremost, to create a friendly environment which guarantees high quality of life of its inhabitants. Projects allowing swift communication, free access to drinking water, breathing fresh air, effective handling of various civic matters in municipal councils or relaxing in the urban greens, are oriented, in principle, at local communities. Local communities were regarded as more important than the media, who play a minor role at every stage of project realisation, only.

## 5. Conclusions

Cities featuring undesired phenomena such as heavy traffic, air pollution, acoustic disturbances, landscape degradation, or excessive and chaotic growth, are considered to be unfriendly not only to humans, but also to the operations of business entities. The priority of local authorities' actions should be, above all, to increase effectiveness of urban centre operations. In the pursuit of being termed a smart city, local governments are compelled to follow certain politics of resource management. The role of local authorities is highlighted also in

the present study, focusing on the significance of the stakeholders in the process of implementing intelligent solutions in Polish cities. Additionally, the results obtained in the course of the analysis seem to confirm the outcomes of the studies conducted as part of the ASCIMER project and regarding the smart city concept in the cities of the Mediterranean region. The central role of local authorities in the development of the smart city idea has been underlined by other authors (Bolívar, 2016; Jiménez, Solanas, & Falcone, 2014; Simonofski, Vallé, Serral, & Wautelet, 2019). It should be emphasised that intelligent space is created mostly for the city dwellers. The results of the study demonstrate that the potential of the inhabitants of Polish cities is exploited to a very limited extent. To release this potential constitutes one of the challenges because, as indicated by good practices and other research, participatory management is one of the absolute conditions for ensuring full implementation of the smart city concept (Berntzen & Johannessen, 2016; Bertot, Jaeger, & McClure, 2008; Hudson-Smith, Evans, & Batty, 2005; Kim & Schachter, 2013). Moreover, source literature shows studies identifying factors affecting the construction of the strategy of citizens' involvement in the management process. The significance of local communities in the implementation of the smart city idea is further highlighted due to the more frequently appreciated role of soft city management factors. In addition to state-of-the-art technologies, local identity and knowledge are of profound importance and should be the practical foundations of intelligent cities and the source of city values (Sepasgozar, Hawken, Sargolzaei, & Foroozanfa, 2019). Despite the declared performance of projects shaping intelligent space, Polish cities are still in the early phase of development. To quote the authors of the report entitled "Intelligent solutions in Your city!", most actions of local self-governments in Poland continue to focus on the most indispensable investment in hard infrastructure (such as road maintenance) ("The Polish City of the Future: Intelligent Solutions in Your City!," 2018). Sadly, it makes it hard to catch up with the smart urban centres of Scandinavia, Austria, Italy, Holland or the United Kingdom. Therefore, to materialize the concept of smart cities in Poland on the basis of more than mere infrastructure modernization or modern technology implementation, presents a serious challenge to Poland. A critical issue in every project is and will be the local community and its major importance in the development of intelligent space. One of the latest national initiatives was a subsidy competition announced by the Ministry of Development in July 2017, targeted at local authorities and entitled "Human Smart Cities. Intelligent cities co-created by their inhabitants". Perhaps, in a few years' time, thanks to such actions Polish cities will become 'smarter' (and more innovative) and, consequently, climb up the international rankings.

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