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Smart City strategies and new urban development policies in the Polish context

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ABSTRACT

In their bid to combine economic growth with efficiency gains, environmental improvements, and more positive images, Polish cities have embraced Smart City (SC) strategies. Normative visions of the Smart City couple advances in ICT with the promise of more inclusive, effective and democratic local governance, but critics of SC urge caution. This study identifies the priority areas of large Polish cities with regard to SC and the extent to which social infrastructure and human capital inform development objectives. Work involved content analysis of official documents and websites profiling SC strategies of six Polish cities (Warsaw, Cracow, Łódź, Wrocław, Poznań and Gdańsk) and their metropolitan areas. This was complemented by targeted interviews and seminars. Moreover, an exploratory study of Gdańsk and Gdynia was also carried out. Our evidence suggests that Polish experience with SC represents gradual processes of adaptation and emergent forms of urban politics that reflect tensions between new and more traditional forms of governance and economic, environmental and social goals. Our results indicate that Institutional change has in fact taken place in terms of participatory governance, digitalization in service provision, addressing social needs and linking SC agendas to wider urban development objectives.

1. Introduction

In its numerous interpretations and political iterations, the 'Smart City' represents a major conceptual shift in the evolution of urban reform movements worldwide. An outgrowth of sustainability doctrine and technological change, the Smart City concept has been in use since the early 1990s (Gibson, Kozmetsky, & Smilor, 1992). However, it has gained wide international notoriety in the last decade thanks to robust commercial promotion, political appropriation and a plethora of urban development projects that target 'smartness' as a social, economic, environmental and urban governance goal. Normative visions of the Smart City (SC), for example as promulgated by the European Union, couple advances in information and communications technologies with the development of social and human capital, holding out not only the promise of more inclusive, effective and democratic local governance, but also an invigorated sense of local citizenship and place attachment. The growing significance of smart cities is evidenced, among other things, by an increasing number of academic and policy-oriented publications as well as European Union enthusiasm for urban innovation with a technological edge (Jucevicius, Patašienė, & Patašius, 2014). However, critics of SC paradigms urge caution and warn that actual implementation could in fact strengthen a one-sided focus on technological and technical aspects of smartness. Chatterton (2019: 2), for one, voices scepticism as to whether "… techno-fixes and smart digital solutions on their own can be urban saviours." As others before him, Chatterton reminds us that it is civic, rather than technological, innovations that are at the heart of genuine change. The frequent interplay between Big Tech interests, elite place-making projects and technology-centred interpretations are one reason why SC paradigms could in fact result in more, not less, technocratic, top-down and neoliberal governance (Shelton, Zook, & Wiig, 2015).

The international debate regarding SC thus confirms a need for balanced assessments of the impacts of SC policies. One of the difficulties in international comparison involves the very different institutional environments and opportunity structures within which SC strategies are developed and implemented. Criteria of success can, and to an extent, must be measured in terms of a priori defined criteria such as those established according to ISO standards (Hajduk, 2018; Huovila, Bosch, & Airaksinen, 2019). However, as the critical debate reveals, SC is by no means merely an issue of technical efficiency or rankings based on quantitative indicators. By the same token, theoretically inspired evaluations of governance and urban innovation similarly tend to

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produce critical generalizations regarding SC implementation based on paradigmatic western examples (Vanolo, 2015). These approaches often neglect local conditions, as well as potential learning processes that can be masked by an overemphasis on compliance to pre-existing norms. As Desdemoustier et al. (2019) have indicated, local appropriations of SC are to a large measure reflections of case-specific logics and cannot be easily grouped according to homogeneous governance modes. Given the highly normative and prescriptive nature of the Smart City paradigm, greater insight is needed regarding specific appropriations and implementation of SC strategies and their significance within local development policies. Given the considerable resources involved as well as the high expectations generated by the Smart City idea, it is important to understand under what conditions, with which tools and according to which criteria SC is implemented in different contexts. We furthermore suggest that a *focus on INSTITUTIONAL CHANGE* can provide context-sensitive criteria for assessing the outcomes of Smart City strategies with regard to local expectations.

In their bid for greater visibility and in hopes of combining economic growth with efficiency gains, environmental improvements, and more positive place images, Polish cities have embraced SC strategies. Their focus on smartness also coincides with a search for new political and economic roles within wider national and European contexts, for example in the form of promotional image politics that target new investment and highly skilled workers (Lackowska, 2014). At the same time, however, the SC strategies of Polish cities also indicate a desire to achieve more responsive governance that reflects local needs (Borkowska & Osborne, 2018; Kola-Bezka, Czupich, & Ignasiak-Szulc, 2016). In order to achieve these goals a considerable shift in governance routines, priorities and mechanisms will be required (Badach & Dymnicka, 2017; Sikora-Fernandez, 2018).

At a general level therefore, the objective of this paper is to investigate how selected Polish cities have appropriated and implemented SC strategies and to shed light on Smart City trajectories that have emerged as part of practical experience. More specifically, we will assess the extent to which Smart City strategies have promoted institutional change in ways that reflect holistic understandings of the SC paradigm. Based on the insights from the critical literature (for example, Angelidou, 2014; Calzada & Cobo, 2015; Kitchin, 2015), our analytical criteria involve qualitative assessments of the relative strategic importance of human capital, local needs and more inclusive governance environments. Do, for example, Polish SC strategies provide space for innovation in the sense of greater citizen participation and a shift away from traditional orientations based on hard locational factors and paternalistic governance (see Wiktorska-Święcka, 2016)? In addressing this question we will also investigate the extent to which learning processes have taken place as a result of experimentation with smart urban policies.

In this paper we analyze Smart City trajectories of selected Polish cities at three interconnected levels. Firstly, we review the SC debate in the Polish context, identifying main messages regarding potentials and problems of SC strategies. In a second step, and based on content analysis of relevant sources, we characterize the priorities and strategic elements of SC strategies in the central cities and metropolitan areas of Gdańsk, Kraków, Łódź, Poznań, Warsaw and Wrocław. As a result of this more general analysis, we then focus on the Gdańsk-Gdynia-Sopot Metropolitan Area and more specifically on the cities of Gdańsk and Gdynia which have both received ISO 37120 smart certification. While by no means representative of all Polish cities involved in SC, they serve as instructive case studies of SC governance trajectories as well as of positive and negative experiences associated with SC implementation. To an extent, we also scrutinize the role of the European Union as a provider of incentives for SC projects and a promoter of urban governance innovation. In terms of methodology our research is primarily qualitative and is based on literature review, evidence derived from strategic documents produced by local governments as well as the observations of practitioners and experts as captured in surveys, interviews and seminar settings.

Taking into consideration the numerous caveats associated with analysis of the Smart City as an urban policy tool, we suggest that Polish experience with SC reflects a gradual process of adaptation. Our evidence thus supports the idea that SC in the Polish case can be understood as an emergent form of urban politics that reflects tensions between new and more traditional forms of governance and economic, environmental and social goals. Our results indicate that institutional change has in fact taken place in terms of participatory governance, progress in digitalizing public service provision, addressing social needs and linking SC agendas to wider urban development objectives.

2. Contextualizing the Smart City

2.1. Normative aspects of the debate

In contemporary discussion, SC is touted not only as a local solution to the challenges of highly competitive urban development, global climate change and strengthening urban resilience, but also as a holistic platform for more inclusive and democratic decision-making (de Filippi, Coscia, & Guido, 2019). Increasingly, the role of smart technologies is evaluated based on their usability by citizens and their potential to increase interpersonal relations, participation and inclusion at the community level. The shift towards community-based and people-centred smart urban development goes hand in hand with the opportunities generated by the advent of the 'platform society' (Dijck, Poell, & Waal, 2018) which potentially empowers more direct cooperation between political actors, public authorities and different citizen groups (Falco & Kleinhans, 2018). One major narrative in the evolution of Smart City strategies has thus been towards a more comprehensive understanding that links sustainability goals with those of social development and local democracy (Caragliu, Del Bo, & Nijkamp, 2011; Cohen, 2015; Marsal-Llacuna, Colomer-Llinàs, & Meléndez-Frigola, 2015). As Hollands (2008: 307) argues, moreover, the aim of SC strategy is the "utilization of networked infrastructures to improve economic and political efficiency and enable socio, cultural and urban development."

SC strategies entail both 'hard' and 'soft' development factors; following Angelidou (2014), smart cities target the efficiency and technological advancement of physical infrastructures or tangible resources (i.e. transport, water, waste, energy) as well as soft intangible capital (i.e. social and human capital, knowledge, inclusion, participation, social innovation and equity). Lee, Hancock, and Hu (2014) highlight the need to link information technologies to the integration of citizen knowledge and an expansion of the role of civil society participation. Romão, Kourtit, Neuts, and Nijkamp (2018) see a further strength in Smart City strategies in developing places as urban attractions.

These normative understandings of the Smart City have gradually informed the EU's urban agenda which was initially prompted by possibilities of rapid progress in achieving renewable energy strategies, sustainable energy economies and international climate targets (Sikora-Fernandez, 2018). More recent EU appropriations of the Smart City have evolved into supporting information and communication infrastructures as a means to promote development in terms of economic growth, transportation, environmental sustainability, social goals, quality of life and more effective management (European Parliament, 2014). For example, the European Commission presently defines the Smart City concept as an integral development strategy that not only employs digital technology to increase productivity, improve living conditions, reduce costs, save resources and, at the same time, increase civic involvement in governance processes (Ferrara, 2015; Sikora-Fernandez, 2018). Moreover, a 2014 study commissioned by the EU's Directorate General for Internal Policies indicates that, ideally, Smart Cities should involve multi-stakeholder, municipally-based partnerships in which local governments, residents, social and business partners and other groups are the main creators and users of SC initiatives (European

Union, 2014; Fernandez-Anez, Fernández-Güell, & Giffinger, 2018).

As the above suggests, perhaps the most comprehensive and rigorous set of criteria for successful implementation of SC strategies focuses on linking new technologies to the strengthening of social capital and participatory governance (Meijer & Bolivar, 2016). Here again, different models vie for relevance in bridging the gap between theory and practice and towards a better understanding of the principal drivers of effective implementation. One model has been proposed by Castelnovo, Misuraca and Savoldelli (2016) which reflects a citizen-centric approach to smart governance, focusing on 'community-building and management'. Other models privilege the roles of stakeholders that represent political actors (government institutions and political parties), society at large (civil society experts and institutions), economic actors (public bodies and private companies) and knowledge production (universities and research centres) (Fernandez-Anez et al., 2018). Yet other conceptualizations of smart governance emphasize a societal approach in which procedural and redistributive justice, socioeconomic equality and public participation are the main objective of SC planning initiatives (Lara, Costa, Furlani, & Yigitcanlar, 2016). In this context, Komninos (2016) emphasizes that the SC paradigm requires strategic policies and leadership that integrate bottom-up initiatives within a broader coherent vision for the future. The problem is not the implementation of ready-made smart city solutions, but the learning of innovations facilitated by new technologies and participatory planning modes (Yigitcanlar & Kamruzzaman, 2018).

2.2. Smartness and critical questions

A concept so rich in normative assumptions and prescriptive content obviously lends itself to extensive criticism. The key critical question boils down to one of equity: who are the beneficiaries of SC strategies, do local citizens gain more from SC investments than economic and political actors (Bunnell, 2015; Kummitha & Crutzen, 2017)? Moreover, increased concentration of power in the hands of a small group of political and business elites could lead to an emphasis on complex technological solutions, even if they do not meet the needs of residents (Blanco, 2015). Consequently, criticism of Smart City strategies points to the danger of extreme dependence on technology and corporate interests (Kitchin, 2015; Yigitcanlar & Kamruzzaman, 2018). Hollands (2015:2) argues that business-led development of smart cities favours a 'corporate vision of smartness' and the dominance of economic logics over political and social issues. Urban development is thus threatened by the search for profit, as it is more and more often assumed that, like business, cities also have to generate revenues (Grossi & Pianezz, 2017). Therefore, the SC concept, particularly in developing countries, can be perceived as a business model that limits residents' needs to the exigencies of market logics (Chakrabarty, 2018; Datta, 2015), leading in extreme cases to a form of modern colonialism (Atkinson & Bridge, 2005).

Furthermore, the literature regarding civil society involvement in SC strategies indicates highly differential patterns as community consciousness is closely linked to social factors and well as political opportunity structures that facilitate participation (Badach & Dymnicka, 2017). Oftentimes, competition for SC project funds takes place within highly competitive environments and, as Engelbert, van Zoonen, and Hirzalla (2019) document for the European case, the participation of community stakeholders is intentionally marginalized. Similarly, Borkowska and Osborne (2018) observe that the role of civil society appears undervalued due to narrow understandings of smartness that limit social inclusion and learning processes. It is noteworthy that private actors lobbying for the implementation of SC solutions are more often than not highly influential but non-elected urban planning actors (Grossi & Pianezz, 2017; Vanolo, 2014). In this way, the utopia of SC driven by international business transforms the 'political subjectivity of citizens' into consumers (Vanolo, 2015:35) and reduces the Smart City to a branding and marketing tool within a context of competition among cities (Shelton et al., 2015; Söderström, Paasche, & Klauser, 2014).

The rich critical, normative and theoretical debate surrounding the Smart City paradigm would seem to offer many points of departure for the investigation of specific cases of SC implementation. And yet the critical research background has its limitations and we find considerable conceptual shortcomings that inhibit making sense of local SC agendas. Kitchen (2015: 132) criticizes "the use of canonical examples and one-size fits all narratives" and instead argues for greater understanding regarding the unfolding of specific SC initiatives. The need for a more contextually sensitive approach to the scrutiny of Smart City strategies is particularly evident in the case of cities that have undergone rapid political, social and economic and systemic transformations within the space of only a few decades. Attention should be directed in the first instance to what SC strategies actually do to change existing routines and not only to the fulfilment of a priori defined criteria.

2.3. Methodological approach

We have sought to uncover evidence of institutional change in the deployment of SC strategies in Polish cities via qualitative indictors: 1) changes in development priorities, 2) evidence of change in governance practices and in connection with the first two, 3) evidence of learning processes. Research involved three levels of analysis. Firstly, it involved a review of the main SC governance issues addressed in the Polish debate and assessments of the current state of play regarding SC implementation. Following from this, we elaborated a general characterization of SC priority areas of selected Polish cities (Warsaw, Kraków, Łódź, Wrocław, Poznań and Gdańsk) and their metropolitan areas. Here, different types of SC initiative (e.g. economy, governance, living, people-centred) were identified based on broad categories suggested by Giffinger et al. (2007). The objective was to determine the relative weight of 'hard' (infrastructure) vis à vis 'soft' (social) development orientations. Metropolitan areas were included in order to link SC initiatives to wider regional concerns and the issue of intermunicipal cooperation. Finally, research involved a more detailed study of SC implementation in Gdańsk and Gdynia. Much of our research involved review research and qualitative content analysis of relevant websites and official documents. This was accompanied by interviews with experts and stakeholders knowledgeable of SC initiatives in all six cities and city regions. Follow-up interviews were conducted in 2019 and 2020 in order to update information regarding TriCity. Finally, insights were considered from 2 project seminars that involved academics, stakeholders and policy experts and focused on links between participatory governance and smartness. These were: the EUrbanities Multiplier Conference held at the Jagellonian University of Krakow (14–15 August 2018) and the 'Urban Cultural Change' conference (29–30 November 2018) at the University of Gdańsk.

We argue that this exploratory research design is valuable in complementing existing analyses based on quantitative indicators of smartness (e.g. Hajduk, 2016a; Szczech, 2014). It has also been seldom applied to the Polish case which is in a state of rapid flux. However, we also recognize the limitations of our study as resources did not permit highly detailed investigation of all cities involved or more intensive case study project-based analysis. Moreover, follow-up research could sharpen the focus by more explicit inclusion of quantitative indicators of smartness.

3. Polish framings of the Smart City

3.1. Smart cities in Poland: critical points of debate

Discussion now shifts from conceptual parameters of the Smart City debate to Polish experience in the application of SC strategies. In many ways the Smart City paradigm speaks to the aspirations of Poland's cities as they seek more dynamic economic futures and a greater political

role. The Smart City enjoys high visibility in the Polish context and its advocates constitute a vast international network of state and local governments, large high-tech firms, start-ups, planning consultants, NGOs and other actors. Major SC events take place in Poland on a yearly basis such as the Smart Metropolia Congress in Gdańsk and the Smart City Forum in Warsaw, giving evidence of the sustained attractiveness of SC as a simultaneously local and global paradigm. Commensurate with this strategic interest in SC strategies, a rich, highly informative and generally critical Polish research background has emerged as well.

Critical debate reflects awareness that most Polish cities lack long-term experience in the use of forceful and sophisticated planning tools (Węcławowicz, 2016). Along these lines, Gontar, Gontar, Pamuła, and Gontar (2013) enumerate potentials but considerable technological and financial challenges facing Polish cities in terms of the development of projects such as smart grids and smart tourism. Major digitally smart projects have indeed been undertaken in Poland's largest cities in the areas of sustainable energy, transport management, e-government measures, etc., but as Sikora-Fernandez (2018) observes, without coherent and comprehensive strategies. Similarly to Cohen's (2015) three-phase model of SC development in which there is a progression from technological, administrative and finally participatory approaches, Budziewicz-Guźlecka and Drab-Kurowska (2017) conclude that Polish SC strategies are still generally administrative in nature, particularly with regard to e-government and e-services. Sobol's (2017) analysis based on Giffinger indicators of smartness indicate that large Polish cities lag in most areas behind cities such as Glasgow and Stockholm, and that conservative governance traditions and a lack of transparency frustrate progress in achieving greater citizen involvement.

Other studies point to a narrow strategic focus in urban development policies. Cabria et al. (2018: 16-17) conclude that infrastructural improvements are high on the list of priorities of political leaders in Central and Eastern Europe rather than more sophisticated digital, circular economy or other smart solutions indicating "low awareness of Polish mayors about the emerging urban sustainability challenges in the country and the EU." Badach & Dymnicka (2017: 6-7), for example, state that in general terms Poland urban policies are too narrowly focused on management of infrastructure and spatial resources. Background economic conditions are also mentioned in the literature as a concern. Przywojska, Podgórniak-Krzykacz, and Wiktorowicz (2019) point to the relative lack of competitiveness of Polish cities as an explanation for the prioritization of economic development and social issues at the expense of environmental goals. The work of Roman (2018), Sikora-Fernandez (2018) and Śleszyński (2018) suggests, moreover, that the achievement of smartness in the broadest sense will require economic growth, knowledge and innovation generation and sufficient financial capital.

What emerges from the Polish debate is a consensus view that Polish cities understand SC as a strategy for simultaneously addressing economic, fiscal, efficiency and sustainability issues. Lackowska (2014) confirms that Polish cities have eagerly embarked on Smart City strategies as means to develop greater political agency as well as economic opportunities. However, there is a substantial gap between SC ambitions and actual governance capacities and practices (Roman, 2018). From the literature we can conclude that the main barriers to Polish SC development include a lack of adequate financial resources, top-down governance cultures, insufficient human resources and knowledge and a traditional focus on physical investment and infrastructure. Furthermore, a relative lack of technological skills has been identified as a major barrier for decision-making and rational use of resources (Sikora-Fernandez & Stawasz, 2016).

Gorzelak and Smętkowski (2018) suggest that difficulties in SC post-socialist countries rather than any inherent lack of understanding. Moreover, Polish cities are implementing SC strategies largely within a political vacuum. While the EU is an important provider of financial support and a facilitator of strategy development, there are as yet no forceful national framework policies for urban development. Metropolitan area cooperation is partly mandated (in the case of EU-funded Integrated Territorial Investments), but only rudimentary governance arrangements are available (Kaczmarek & Kociuba, 2017; Krukowska & Lackowska, 2017). As a result, the Smart City in the Polish context is by and large an experiment in creating new urban policies and greater 'actorness' within a highly competitive environment. Difficulties notwithstanding, there are numerous indications that SC initiatives are starting to make an appreciable difference in local development policies. Hajduk (2016b) has documented progress in the SC trajectories of mid-size Polish towns while specific cities such as Gdansk (Caceres, 2018), Kraków (Noworól, 2018) and Wrocław (Bednarska-Olejniczak, Olejniczak, & Svobodová, 2019). Moreover, Hajduk's (2016a) statistical analysis of SC performance based on ISO 37120 specifications designates high scores to large, mid-size and small cities alike, indicating considerable local capacities for policy adaptation.

3.2. *Characterizing Smart City priorities - 'hard' versus 'soft'*

The critical points raised by the Polish debate urge more circumspect assessment of the Smart City as a source of urban governance innovation. Indeed, the international literature frequently raises the issue of technocratic urban management styles and the lack of bottom-up approaches (Calzada & Cobo, 2015). Following on the evidence provided by the research background, we now direct attention to six large Polish cities and their metropolitan areas in order to characterize in general terms major SC priorities and, specifically, the relative significance of socially oriented objectives and participatory mechanisms. Here we must add that these metropolitan regions are not administratively defined but exist rather as functional urban areas (FUAs).[1] Cooperation within FUAs is significant for SC strategies due to national mandates requiring Integrated Territorial Investments between different municipalities (see Krukowska & Lackowska, 2017).[2] Our analysis reveals a multitude of different projects associated with SC and thus reflects a serious commitment in terms of resources.

The content analysis of strategic documents produced by the six cities and their metropolitan areas indicates an emphasis on 'hard' development factors and physical infrastructure investments in the areas of transport, energy and ICT. This general pattern reflects the importance of areas such as sustainable transportation as well as the maximization of EU opportunity structures in terms of investment. Large infrastructures are privileged by the EU for environmental and economic reasons and thus involve more generous funding for cities strapped for resources. The emphasis on smart specialization (S3) measures in the area of ITC development was also greatly influenced by EU conditionality in accessing Cohesion Funds for urban development, taking into consideration the development concerns of the respective regions. As indicated in Table 1, hard infrastructure projects are also planned regionally, reflecting intermunicipal cooperation requirements mandated by EU policy. By and large, the spectrum of projects funded within the framework of locally/regionally defined Smart City strategies are quite similar in the six urban areas under consideration. In terms of prioritization within strategies, transportation is by far the central area of focus, followed by energy efficiency and ICT. Efficiency gains in public service provision were inferred through their digitalization as indicated in official municipal websites (Tables 2-3).

Despite the importance of 'hard' investment priorities, there are interesting trends that can be observed with regard to more holistic SC implementation are the result of delayed structural changes typical for

[2] This refers to a requirement established by the Polish government in 2015 which mandates ITIs for regional capitals, thus necessitating intermunicipal cooperation. ITIs are strategies and specific actions that serve territorial de- velopment aims shared by different settlements.

Table 1
References to hard and soft smart city initiatives in strategies and the context in which they are mentioned in six largest Polish cities and their metropolitan areas (functional urban areas).

Cities and their metropolitan areas	Hard infrastructure/tangible resources				Soft skills/intangible capital			
	Energy	Transportation	Water and waste	ICT	Education	Health	Social care	Participation (e-governance)
Warsaw		X						
Warsaw Metro	X	X						X
Krakow				X				
Krakow Metro	X	X						
Łódź	X	X		X				
Łódź Metro	X	X						
Wrocław		X						
Wrocław Metro	X	X		X				
Poznań	X	X	X	X	X		X	X
Poznań Metro	X	X		X				
Gdańsk	X	X	X	X	X			X
Gdańsk Metro		X		X				

Source: authors' own elaborations based on the analysis of six central city and metropolitan area strategies. FUA definition based on Statistics Poland criteria (see footnote 1).

implementation. To begin with, local SC strategies promote socially oriented (or 'soft') initiatives such as education or participation as well as fund a plethora of smaller projects targeted at mobility, smart specialization and new urban digital applications. If we focus on smaller projects, we can identify more specific local orientations. For example, in the strategy of Warsaw city, SC initiatives include shared mobility and the expansion of city bike networks, while in the Warsaw Metro priorities focus on smart grid, knowledge-sharing, the use of participatory civic budgets, and digitalization. Wrocław city prioritizes areas such as e-services, smart-creative industries, smart specialization, smart migration and smart integration. In Wrocław Metro, we found an emphasis on smart culture, smartphone applications and smart specialization. These results are corroborated by Bednarska-Olejniczak et al. (2019) who indicate that Smart City Wrocław's initiatives primarily target mobility, governance objectives, green spaces and recreation and foresee downscaled uses of ICT.

Additional insights can be gleaned from websites and social media platforms; these tend to focus on visible and image-enhancing SC projects and thus promotional vehicles for investment and attracting skilled knowledge-economy workers. The most active websites are maintained by Gdańsk and Wrocław, but many other internet sources (often linked to property development and investment groups) promote smartness in these cities as an urban image in more general terms. The review of websites shows reveals that highlighting citizen needs, e-governance and smart living components are highly popular. The publicity element of people-centred and place-based projects is demonstrated, for example, by Wrocław's website presence, which gives evidence of a multifaceted approach.[3] The website draws attention to the 2018 City Expo in China where Wrocław received, for the third time, Green and Smart City Awards for fifteen projects that used intelligent 'urban space' solutions for improving and greening the local quality of life.[4] Some of these projects have involved open data, intelligent transport systems, detection of parking vacancies, intelligent lighting in a model housing estate, and water supply monitoring systems (Smart City Wrocław, 2018).

Many similar smart solutions have also been showcased on the internet for Gdańsk, Kraków, Poznań and Warsaw as part of more general promotional activities. Special mention should be made of Gdańsk's annual Smart Metropolia conferences which develop different thematic areas of urban sustainability, innovation and governance.[5] These web-based sources reveal a wide variety of projects that cover many different areas, such as new online services, systems that allow citizens to intervene in emergencies, living lab projects, intelligent transport systems, parking and car-sharing and city bike systems. In addition to city-specific advertising of SC activities, Poland's Smart City Forum is an unabashed promotional venue that networks Polish urban elites with their counterparts worldwide, international business, technology advocates and other experts.[6] Here again, the smart 'brand' is seen to enhance local prestige and attractiveness.

A final point to make is that in all six cities we find a move towards a more strategic and long-term engagement with the Smart City as documented, for example, by the '2030 strategies' of Gdansk 2030, Krakow and Warsaw. We can also detect a trend towards linking SC to more participatory and collaborative forms of planning.[7] In addition, the role of urban activism in the form of citizen's or civil society movements is making an impact in the cities under study.[8] While the overall role of activism within SC strategies is as yet limited, they intersect in important ways, such as in transportation, sustainable mobility and green space planning. Indeed, it must be mentioned that the incorporation of a greater participatory element to SC is occurring in several other Polish cities, such as Lublin (pop. 340,000), which received Polish ISO 37120 certification in 2019. In addition to civic and 'green' budgeting, the city has introduced civil panels as part of its Smart Lublin strategy (see City of Lublin, 2013).[9]

3.3. *Smart City implementation in Gdańsk and Gdynia*

In order to contextualize further the significance of Smart City strategies in the Polish case we now focus on the cities of Gdańsk (pop. 468,000) and Gdynia (pop. 246,000), cities that pride themselves on their openness and civic cultures. It must be added that the regional context is significant as well, as the Gdańsk-Gdynia-Sopot agglomeration, otherwise known as TriCity (pop. 1,131,000), has been a pioneer of governance innovation in Poland. The city of Sopot was the first in Poland to establish participatory budgeting (Budżet Obywatelski) as a

[3] Wrocław website: https://www.wroclaw.pl/smartcity/.

[4] See the Website Kocham Wrocław (I love Wroclaw): https://kochamwroclaw.pl/wroclaw-nagrodzony-smart-city-expo-chinach/.

[5] See, for example, the official conference website at http://smartmetropolia.pl.

(*footnote continued*)

[6] Smart City Forum website: http://en.smartcityforum.pl/.

[7] Interviews with two experts on Wrocław's development strategies, Gdańsk, 28.06.2017 (ID 1), interview with two experts and planning advisors regarding Krakow's development strategies, Kraków, 15.09.2017 (ID 2)

[8] Interview with planning expert and civil society urban activist, Kraków, 15.09.2017 (ID 3).

[9] For a detailed description of the strategy, see https://hub.beesmart.city/city-portraits/smart-lublin-a-smart-city-with-a-social-dimension.

Table 2
Projects related to smart city concepts in Poland: public management (e-governance).

Categories	Warsaw	Cracow	Łódź	Wrocław	Poznań	Gdańsk
Management	• Open access to municipal services 24/7 • Management of schools • Open data	• Land information system • Order and waste in city app • Car-sharing		• Virtual citizens advisor • Real estate market • Mobile assistant – app • Individual license plates • City council software • Land information system • Public administration services for residents • Electronic document management in city hall • Queue system • Sign language interpreter • One phone number to city hall • Open data • Public telecommunication net	• Public admin. services for residents • Electronic document management in city hall • Open data • Electronic system of booking visits • Open data • Land information system • System of grants proceeding • Operational and strategic risk managing system • Web survey	• Map of city order • City apps • ISO 37120 standard • Land information system • Integration of urban telecommunication subsystems for better managing • System for management in education • Public administration services for residents • Open data • System for planning of city's budget • Queue system

Table 3
Projects related to smart city concepts in Poland: social areas.
Source: own elaboration based on official websites.

Categories	Warsaw	Cracow	Łódź	Wrocław	Poznań	Gdańsk
Education				• Explain Everything for schools • Scholarships for university students • School in the city (in public institutions) • Integrated system of education management • Telecommunications connections among schools Promotion of programming	• Recruitment to schools	• Smart apps by students • Support in ICT solutions for public sector by universities
People	• Support for senior citizens • Civic budget • Web portal of volunteering	• Civic budget • Guide for disabled - app	• Civic budget • Electronic search of dead people in cemeteries • Web system for dialog • Tele-care	• Support for NGO's • City guide • Support for senior citizens • City blogs • Public consultations web portal • Civic budget	• Civic budget • Web system for dialog • Addresses in city • Electronic job exchange • Electronic search of dead people in cemeteries Warnings system	• Civic budget
Living (place)	• System of notification about events • Internet hot-spots	• Green places and events in city – app • Internet hot-spots	• Internet hot-spots • City guide	• Regeneration of trade streets • Events and leisure time in city • Cultural events • Co-operatives and self-made buildings • Health events • Urban events card • Internet hot-spots	• Green places – app • Churches in city • City guide • Airport guide • Smart zoo • Exchange of handbooks • E-books from city's libraries • Internet hot-spots	• Adoption of animals • Cultural events • Conventions in the city – app • Internet hot-spots

formal planning instrument (Gerwin & Grabkowska, 2012). Moreover, as official representatives point out, Pomorskie, the region where Gdańsk and Gdynia are located, was one of the first in Poland to engage in smart specialization in areas such as ICT, eco-effectiveness and medical technologies.[10] And indeed, the fact that ISO 37120 certification was obtained by both cities - Gdynia was in fact the first Polish city to do so - suggests a desire to stand out among other large Polish cities as a recognizable brand of urban smartness. There can be no doubt that the two cities follow national and global trends in understanding SC as a tool for attracting investment and creating positive place identities. Hence, Gdańsk and Gdynia prominently feature the Smart City in their 'corporate images' and internet presence.

It was our aim here to investigate both SC implementation patterns and institutional change in urban governance practices associated with SC implementation. Our evidence, which can only be presented here in summary form, suggests that the following shifts have occurred regarding the implementation of SC strategies:

- Similar patterns of major infrastructural investments on the one hand and diverse user-oriented, demand-driven initiatives and applications (as indicated in Tables 1-3),
- A 'blending' of agendas where SC is linked to other urban and regional development initiatives that target sustainability, mobility and environmental issues,
- A strengthening of public sector roles with regard to the investment into and application of smart technologies,
- A greater focus on cooperative and more inclusive governance as well as greater influence of urban activism in sustainability issues,
- And in relation to the above points, learning processes promoted by European and national networks and information exchange.

Hard infrastructure projects have indeed been the major SC focus in terms of investment volumes in these two cities; the largest are moreover regional in scope and entail coordination with neighbouring municipalities. The reasoning is clear: these projects serve to develop sustainable infrastructures and energy-saving technologies. As a major Baltic port, moreover, Gdynia has a vested interest in sustainable and technologically advanced logistics investments that integrate its 'Smart Port' into regional and national transportation networks.[11] By the same token, local SC strategies are understood broadly as improving the quality of life and effectiveness of city management through the increased employment of user-friendlier technologies and applications. In terms of digital technologies, many of these are targeted at improving governance capacities and during the past three years Gdańsk and Gdynia have prioritized effective management, communication and greater community involvement. In the case of Gdańsk, there are open data projects (Open Gdansk) and an online platform used by city government to coordinate and control expenses in real time. Furthermore, Gdańsk Lab can be mentioned as a tool that that links different city departments with the mayor's office of Gdańsk using digital technologies.

Another important result of our research was that there is now greater political sensitivity to the potential vicissitudes of SC-inspired development. Moreover, official representatives as well as interviewed experts suggested that lessons had been learned from mistakes, such as in the case of the initial malfunctioning of Gdańsk-Sopot-Gdynia's intelligent transport system (Tristar) which involved an initial 40 Million Euro investment.[12] The two cities have understood that potential political conflict and financial risks can emerge with regard to the use of expensive technologies.[13] Taking the anxieties of many citizens regarding new technologies and the leverage of large international firms seriously, Smart City strategies are no longer billed as independent urban development programmes but are rather subsumed into existing plans.[14] In the two cities, large international corporations now offer their products on equal footing with Polish companies and local start-ups. Currently, all projects undergo closer public scrutiny and are assessed in terms of their appropriateness in serving local needs. Another indicator of institutional change is that of regional cooperation. In the past, different interests of the core cities and suburban communities have made cooperation difficult.[15] However, attempts to construct 'territorial dialog' between stakeholders through participatory planning are developing.[16] Progress here is certainly due in part to the conditions of ITI funding for large territorial investments which in the case of the Gdańsk-Gdynia-Sopot region are significantly influenced by SC agendas. Smart approaches have been appropriated in regional transit solutions, sustainable mobility, thermo-modernization programmes, energy, etc. (see Gajewski, 2018).

Learning processes are evident in the development of a holistic implementation of SC. Change in governance styles is indicated by consultations, e-governance technologies, the use of civic budgets and individual initiatives that both address residents' needs as well as promote participation. It has also become more difficult to separate SC targeted initiatives from other strategic development and governance objectives. Gdańsk's and Gdynia's Smart City initiatives dovetail with a number of sustainability and efficiency objectives pursued locally and in a regional context. In addition, SC is also contributing to improve urban governance functions and initiatives that predate the emergence of SC strategies in their present form (see Grabkowska, 2015). Representatives of the two cities claim, perhaps unsurprisingly, that their local governments are committed to linking smartness to facilitating the involvement of residents in decision-making processes.[17] In this way, SC agendas contribute to more accessible and effective application of participatory and deliberative mechanisms such as civic budgets and citizens assemblies. In the case of Gdańsk, citizen assemblies includes citizen representatives from of all districts and that meets twice yearly to discuss the resolution of issues considered most urgent (Gerwin, 2018).[18] The first one was organized in 2014 as a bottom-up initiative of local activists and effective lobbying by the organizers led to recognition of these assemblies as a decision-making tool. Consequently, Gdańsk City Council has begun experimenting with digital tools such as Decidim (decdim.org) which are open-source platforms for organizing participatory and deliberative decision-making processes. The observation of Badach and Dymnicka (2017) that increasingly popular forms of public participation instruments, such as civic budgets, can improve the future development of Polish SC strategies is supported by our observations and participative governance is more and more

[1] See the Statistics Poland website for definitions, https://stat.gov.pl/en/regional-statistics/regional-surveys/urban-audit/larger-urban-zones-luz/, accessed 20 December 2019.

[10] Interviews with representatives of the Department of Regional Programmes in Development Office of Pomorskie Region, Gdansk, June 2018 (ID 8).

[11] See the Port of Gdynia website https://www.port.gdynia.pl/en/about-port/development-strategy?showall=1&limitstart=, access 13 September 2019.

[12] Interview with a representative of the Department of Regional Programmes in Development Office of Pomorskie Region (June 2018).

[13] Interview with Representative of a Planning Advocacy NGO from Sopot, Gdansk 07.11.2019 (ID 11).

[14] Interview ID 11 and Interview with a representative of Gdansk City Council (Department of Social Development), Gdansk 28.0.2020 (ID 12).

[15] Interview with planning research expert, Gdansk, 21.09.2017 (ID 4).

[16] Statement by the Vice-Vojewod of Pomorska, RSA Research Network on Smart City-Regional Governance for Sustainability, Gdansk, 22.09.2017.

[17] This point was made by local representatives and experts during the project conference 'Urban Cultural Change: Smartness, Sustainability, Inclusion' (see footnote 9) as well as in an interview on 28 February 2020 with a representative of Gdańsk City Council (Department of Social Development).

[18] See https://medium.com/@gdansk/civic-panel-residents-decide-e844590e88ec.

implemented as examples from Gdańsk and Gdynia demonstrate.

We also argue that moves towards integration of SC objectives with broader goals of democratic governance and sustainability represents another important case of learning through experimentation. Institutional change in SC implementation has been promoted by co-operation and knowledge-sharing networks targeted at social innovation and the use of platform technologies such as URBACT and EUROCITIES.[19] These and other networks allow for situated learning and the integration of stakeholder, scientific and community-based knowledge regarding the management of urban issues. They have also contributed to a greater understanding of the possible drawbacks of smart urban policy and the avoidance of costly mistakes. Collaborative governance supported by networked learning processes thus promises significant potential for the realization of SC governance objectives even under more difficult local conditions. This is not solely the case in the TriCity context, In Wrocław, for example, Bednarska-Olejniczak, Olejniczak & Svobodová (2019, 25) argue that a learning process has taken place in terms of: "… a clear evolution of the degree and scope of [SC strategy] can be observed—from single, simple, and unconnected solutions, to the separation of governance as one of the priorities of strategic activities and including the participation in its scope". Wrocław has, for example, established an Office for Social Participation that carries out and coordinates all activities in the scope of social participation of the city's residents.

4. Concluding observations

After completing a comprehensive and international comparative taxonomy of SC policy domains, Neirotti, De Marco, Cagliano, Mangano, and Scorrano (2014) concluded that instead of reflecting unique global understandings, individual SC trajectories are largely products of local contexts. As this was our point of departure, we eschewed an overly normative approach. At the same time we share the view of Giffinger and Lü (2015), Fernandez-Anez et al. (2018) and others that regardless of its specific contours the Smart City must target citizen involvement and citizen knowledge in its governance practices. What then can we conclude based on our findings? If we take, for ex- ample, Cohen's evolutionary model as a yardstick, Polish cities cannot yet be fully considered 'smart' in the most comprehensive sense of the term. As Budziewicz-Guźlecka and Drab-Kurowska (2017) suggest, Polish cities will reach the '3.0' stage of smartness when the role of citizens in managing smart solutions has achieved sufficient im- portance. Similarly, Hajduk (2016b) argues that preconditions for urban smartness are defined by adequate intellectual resources, well- functioning local institutions, high-quality infrastructure and good city planning.

With this study we have focused attention on Polish experience and its ramifications for understanding SC not as a monolithic paradigm but as an expression of gradual change in urban governance goals and practices. The study confirms that Polish cities appear to be partly successful in the implementation of SC strategies. Institutional change has taken place in terms of (intermunicipal) regional cooperation, increased digitalization in service provision and in meeting citizen needs. The results of this research indicate how Smart City principles might develop into more forceful planning instruments as a result of long-term learning processes. Ironically perhaps, limitations often seen as obstacles to effective SC implementation, particularly a relative lack of resources, experience and technical capacity, also encourage cities to more carefully consider the pros and cons of implementing smart solutions. Indeed, as Angelidou (2015) has pointed out, time lags in developing smart strategies could also partly work as an advantage in terms of avoiding costly mistakes made elsewhere and focusing on demand-driven rather than entrepreneurial supply-driven approaches. In an increasingly globalized world of competing cities, a balance between business interests and innovations, technological change, local government responsibilities and citizen needs is key to maintaining sustainable development and improving the quality of life in cities. Overall, our research as well as the broader Polish debate signal potential for gradual change and innovation. As a final note, it bears mentioning that international comparisons of institutional learning and change with regard to the concrete implementation of the Smart City paradigm, particularly with a view to participatory governance, would be highly useful in 'demystifying' tech-centred understandings of urban smartness.

[19] Comment by representative of Gdańsk City Council (see footnote 10): reference is to the URBACT networks Civic-Estate (https://urbact.eu/civic-estate) and Boostinno (https://urbact.eu/boostinno).

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