Factors Hindering Smart City Developments in Medium-Sized Cities

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SUMMARY

The global phenomena of growing urbanization and ICT technological advancements enable the digital transformation and renewal of cities embodied in the 'Smart Cities' concept. A myriad of conceptualized models and frameworks have been proposed by multiple stakeholders; however, an easily adaptable, widely applicable and robust smart city model is not yet available, which leaves space for yet untapped fields of research. This article attempts to explore the factors hindering SC developments for European medium-sized cities based on a sample of Hungarian medium-sized cities. The study utilizes Porter's Five Forces Framework from the field of strategic management, which is currently rather neglected in the discussion of 'Smart Cities'. Findings show that the main barriers are 'Knowledge gaps', 'Availability and Quality of Data', 'Vendor Lock-in', 'Biased Approaches' and the 'Lack of Standards'.

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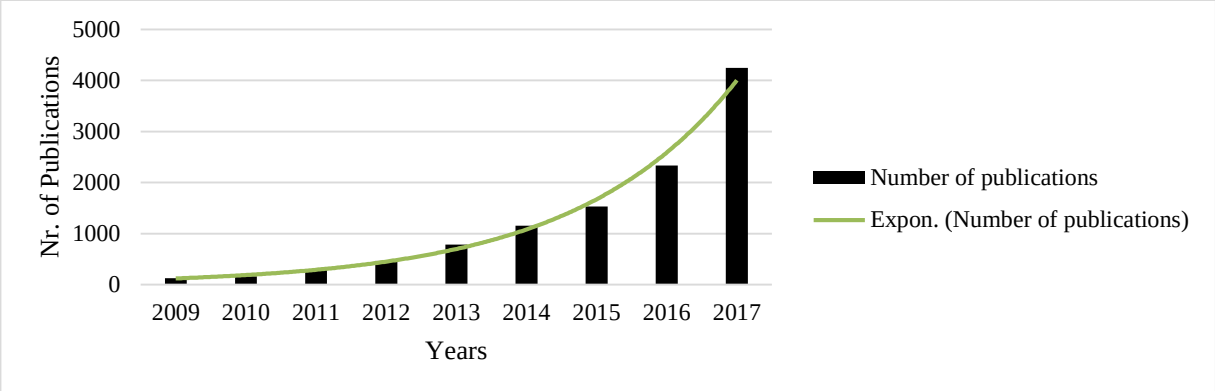
INTRODUCTION

The concept of the Smart City (SC) is not a new phenomenon; however, it started to rapidly gain momentum in the academic literature in the last five years. Based on a Scopus document search[1], the number of publications with the keywords "Smart City" and "Smart Cities" increased from 465 in 2012 to 4247 in 2017. (see Figure 1).



Source: Own edition based on Scopus Database. Search terms are 'Smart City' or 'Smart Cities' in the keywords of all types of documents

Figure 1. Number of publications with keywords Smart City or Smart Cities

[1] *URL, Date of Search: 2018 May 20*

At same time, not only academia considers SC an important topic, but also economic actors have great expectations, from startups to multinational companies, policy makers and governments. Wellington Webb, the former mayor of Denver and past president of the U.S. Conference of Mayors, once said: "The 19th century was a century of empires, the 20th century, a century of nation states. The 21st century will be a century of cities" (Eger 2016).

This popularity can also be expressed in the thriving environment of conferences, expos and other professional events with SC content. The reasons for this unprecedented popularity primarily originate from global urbanization growth trends. Today, humans are considered to be an urban race, as more than half of the globe's population lives in an urban environment. This ratio is predicted to grow to 68.4% by 2050, which means that 6.67 billion people are expected to live in urban areas covering only 2% of the Earth's surface (UN 2018). It is predicted that 27 megacities[2] will be formed by 2025. To put this into context, there were only two megacities in 1950, New York - Newark and Tokyo (UN 2014).

Another way to demonstrate the significance of cities is by looking at their economic weight compared to the number of inhabitants. Only 16% of France's population lives in Paris, but 27% of its national GDP originates from the city. This is even more extreme in less developed countries: for instance, 13% of Congo Democratic Republic's inhabitants live in the capital, while 85% of the GDP comes from there (Hawksworth et al. 2009). Besides economic context, environmental issues are also huge. 75% of the globe's energy consumption and 80% of greenhouse gas emissions are in urban environments. Realizing these trends, the world's governments are planning to invest 35 trillion USD in infrastructure and urban development in the next two decades (UN 2014). This amount exceeds the GDP of China by more than three times in 2016[3].

The dynamic clustering of people, built environment, resources, capital and infrastructure poses new and even unknown challenges, therefore placing an enormous amount of stress on existing urban systems, creating a great demand for new ways and new approaches from researchers, policy makers, governments, company executives and the civil society itself.

LITERATURE REVIEW

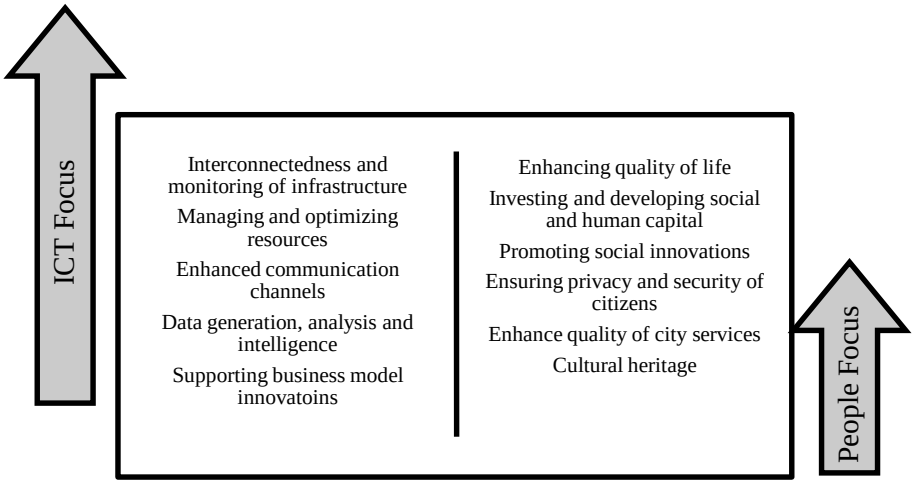
There is no evidence for clear origins of the smart city concept in the scientific literature. Some say that its roots date back to the 'cybernetically planned cities' of the 1960s (Gabrys 2014), while some aspects of it have been present in proposals for networked cities since the 1980s. It is claimed the concept was introduced in 1994 (Dameri & Cocchia 2013). Despite the fact that Smart City is a buzzword, gaining increasingly high attention from multiple stakeholders of the urban development ecosystem, and although it has been present in the literature for quite a time, there is no clear and consistent understanding of its meaning. There are many definitions available, proposed by different stakeholders. Two types of focuses can be differentiated: (1) approaches that put the focus on technological advances (ICT mainly) and (2) approaches that highlight the role of the people and their quality of life (see Figure 2).

From the ICT point of view, five different approaches can be identified: (1) interconnectedness and monitoring of the infrastructure, (2) managing and optimizing resources, (3) enhancing communication channels and bringing different urban actors closer to each other, (4) data generation, analytics and deploying intelligence solutions (research about 'Big Data' in the urban context is more and more popular), and (5) supporting business model innovations (Hall 2000; Washburn et al. 2010; Harrison et al. 2010; Nam & Pardo 2011; Barrionuevo et al. 2012; Zygiaris 2013; Marsal-Llacuna et al. 2014; Albino et al. 2015).

Definitions focusing more on people are primarily concerned about five aspects, which are: (1) enhancing the quality of life of citizens (this seems to be the most widely used term when explaining the ultimate goal of Smart Cities), (2) investment and development of social capital and human capital, (3) promoting social innovations such as increased participation of citizens in governance, (4) enhancing the quality of city services and (5) promoting and preserving cultural heritage (Hall 2000; Caragliu et al. 2009; Giffinger et al. 2010; Thuzar 2011; Albino et al. 2015).

[2] *According to the United Nations, megacities are "cities with more than 10 million inhabitants".*

[3] *Source: World Bank, URL: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?end=2017&locations=CN&name_desc=false&start=2017&view=bar*

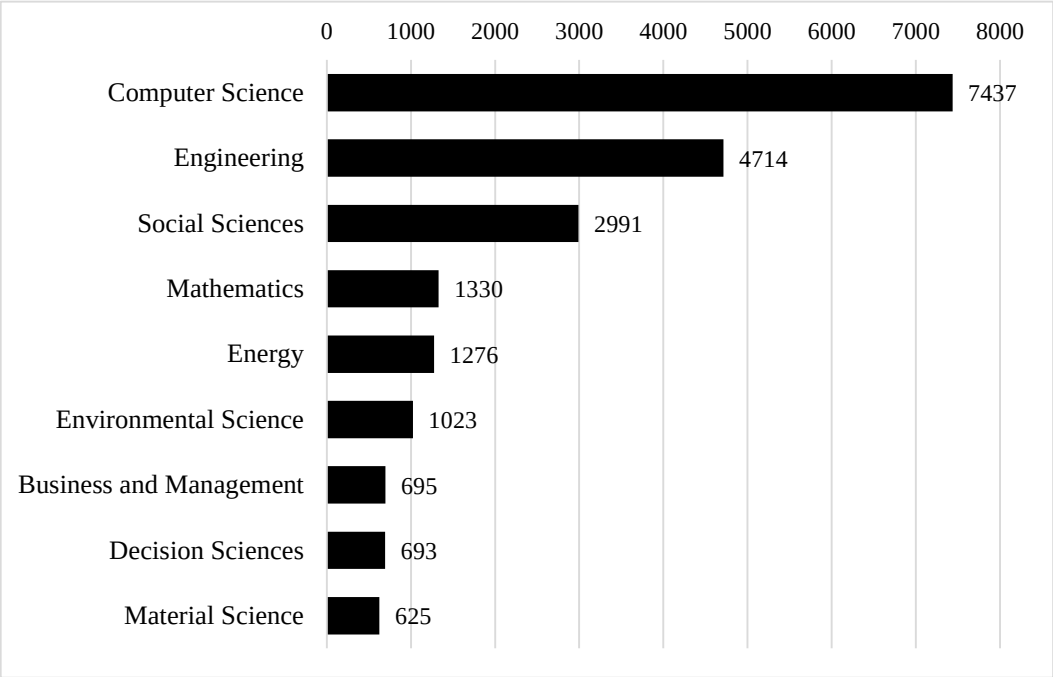


Source: Own edition based on Bibri & Krogstie (2017) and Albino et al. (2015)

Figure 2. Main focus areas of Smart City definitions

This technological dominance is also confirmed by the share of different subject areas of publications with keywords Smart City and Smart Cities: in the specific searching criteria, Computer Science and Engineering documents were four times as frequent as those in Social Sciences. The share of Business and Management publications is only marginal (see Figure 3).

It must be said that environmental and sustainability goals are also often occurring elements of the definitions; however, they are lacking the proper interpretation and context in most of the cases. Table 1 gives a quick overview of these definitions, with the interpretations suggested by the authors.



Source: Own edition based on Scopus Database. Search terms are the keywords 'Smart City' and 'Smart Cities' in all types of documents.

Figure 3. Distribution of publications from different academic fields

Table 1
Existing definition of Smart Cities with the author's interpretation

Interpretations of definitions	Author	Date
Use ICT to interconnect different domains to maximize the quality of life of citizens	Silva et al.	2018
Use ICT to optimize existing infrastructure, connect economic actors and deliver better services to citizens	Marsal-Llacuna et al.	2015
Use ICT to enhance and interconnect infrastructure, optimize resources and apply good management to deliver superior services to citizens	Kitchin	2014
Enhance the quality of life of citizens by social-economic and environmental factors, taking into account the local specifics of cities.	Neirotti et al.	2014
Network of technologies for sustainability, attractiveness and security	Lazaroiu & Roscia	2012
Use ICT technology for social and environmental purposes	Lombardi et al.	2012
Use ICT technology and optimize resources in an intelligent way for social and environmental purposes	Barrionuevo et al.	2012
Resilience to maximize quality of life for citizens	Guan	2012
Use ICT technology and highly efficient governance for quality of life for citizens and for the economy	Gabriel Cretu	2012
Optimizing available capital (e.g. human, social) by strategies for enhancing social, economic and environmental dimensions	Kourtit & Nijkamp	2012
High productivity and output oriented management for sustainability purposes	Kourtit et al.	2012
Excellent performance in the dimensions of environment, interconnectedness, ICT technology deployment, innovation and education.	Zygiaris	2012
Territories with excellent conditions for education and innovation, supported by technologies and good management	Komninos	2011
Availability to generate and to be attractive to talented people	Thite	2011
Optimize resources; invest in local capital and infrastructure to maximize quality of life and have sustainable economic development. Existence of targets for these activities	Thuzar	2011
Infrastructure for collective intelligence	Harrison et al.	2010
Use ICT technology to make services and infrastructure intelligent, interconnected and efficient	Washburn et al.	2010
Use ICT technology and optimize resources to maximize quality of life for citizens	Chen	2010
Invest in local capital and infrastructure to maximize quality of life and have sustainable economic development, together with civil participation and good management	Caragliu et al.	2009
Use ICT technology to be resilient in social and economic dimensions, relying on interconnectedness for maximizing quality of life for citizens	Eger	2009
Territories with excellent conditions for innovation and education supported by ICT technology for interconnectedness	Hollands	2008
Measure performance in specific domains, with civil participation and interconnectedness	Giffinger et al.	2007
Manage and optimize infrastructure for citizens	Hall	2000
Maximize citizens' quality of life by ICT technology	Mahizhnan	1999

Source: Own edition based on Albino et al., (2015, pp. 6–8) supplemented with Kitchin (2014) and Neirotti et al. (2014)

The most commonly occurring words in the definitions are Information, Infrastructure, Sustainable, Life, Social and Capital, while phrases are 'Quality of life', 'Social capital', 'Sustainable economic', 'Economic development', 'Using new technologies' and 'Investment in Human' (own analysis). The strong connection between the deployment of advanced ICT solutions and social innovations – included in these proposed definitions – confirm the new innovation paradigms characterized by Balaton et al. (2016).

The most important purpose of all of this research is the outline of an easily adoptable, widely acceptable and

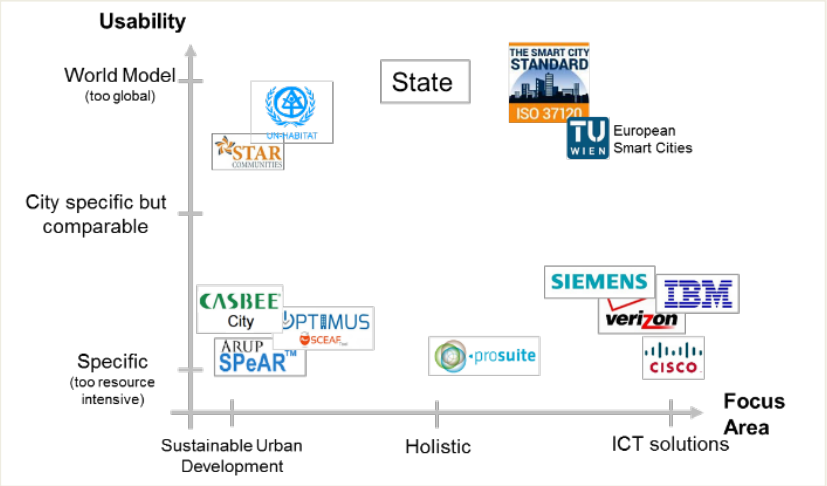
strong smart city model. This was the key challenge for academic endeavours in recent years, but the gap is still vacant, there is no such model at the moment. Bibri & Krogstie (2017) identified at least 19 existing gaps in the research within the field of smart sustainable cities, e.g. "There is a need for integrated models for spurring the practice of the development and deployment of smart sustainable cities" (p. 204) and "There is no comprehensive model for merging the informational and physical landscapes of smart sustainable cities" (p. 203).

Besides definitions, the 'Smartness' of cities are measured by their performance in specific domains that identified by researchers. These assessments are similar to strategic assessments and audits, enabling benchmarking, comparisons and justifying urban strategies. As with the definitions, these models are also heterogeneous and none of them has become a standard, which actually leaves cities exposed to the uncontrolled influence of promoters of these models. Approaches that are city specific but comparable and holistic approaches are missing from the canvas of the models. The following graph illustrates the existing gaps in the research (and market viable solutions) in the field of SC models.

Besides the different approaches, geographical discrepancies are also present in Smart Cities research, policy maker's attitude, company strategies and actual implementations as well. In this matter, this paper focuses on the European Union's context. Narrowing down the field to the EU illustrates well the problem with 'world models' or multinational companies using global strategies, while each city is different. The EU is already very highly urbanized (75%), the weight of megacities is rather low, and medium-sized cities dominate the urban landscape. For the sake of clarity, here the author adopts the definition of Giffinger et al, (2007) of medium-sized cities as those being between 100,000 and 500,000 inhabitants.

On the policy level, the European Union adopted an approach with six pillars in 2015[5] (European Economic and Social Committee), which resembles the four pillars outline (Giffinger et al,, 2010) and since then the number of studies and projects has grown rapidly. As a rising topic with vast areas of research potential, the author believes that it is yet an untapped field, and synthesizing methodological components, models, reasoning and concepts from enterprise strategic management theories and applying them to SC model research would bring great added value to the discussion.

This paper is intended to move this unsettled field forward with the experimentation and application of currently neglected scientific methodologies. Furthermore, current discussion rarely takes into consideration the diverse backgrounds of cities, their history, local conditions, environment, etc. This essay attempts to explore the factors hindering SC developments for European medium-sized cities, based on a sample of Hungarian medium-sized cities utilizing Porter's Five Forces Framework.



Source: Own edition based on the SmartCEPS project's[4] working documents (2017)

Figure 4. Mapping of existing Smart and Sustainable City frameworks and models

[4] *See: https://smartceps.com/ (Documents are unpublished)*

[5] *Opinion of the European Economic and Social Committee on 'Smart cities as drivers for development of a new European industrial policy' (own-initiative opinion) (2015/C 383/05)*

Table 2
Overview of sampled cities

City	Inhabitants	GDP/capita (EUR)	Industry tax per capita (EUR)	Higher education degree holders
IX District of Budapest	59,000	52,459	198	33.5%
XI District of Budapest	152,620	34,108	168	38.2%
VIII District of Budapest	76,811	19,298	156	25.3%
XVII District of Budapest	87,793	2,213	203	19.6%
XVIII District of Budapest	101,738	8,167	234	19.3%
Kaposvár	63,186	2,826	107	19%
Debrecen	203,059	5,016	136	22.2%
Győr	129,568	24,422	406	20.8%

Source: Own edition, based on data derived from TEIR database. Data extracted on 2018.04.28. Available here: https://www.teir.hu/its/

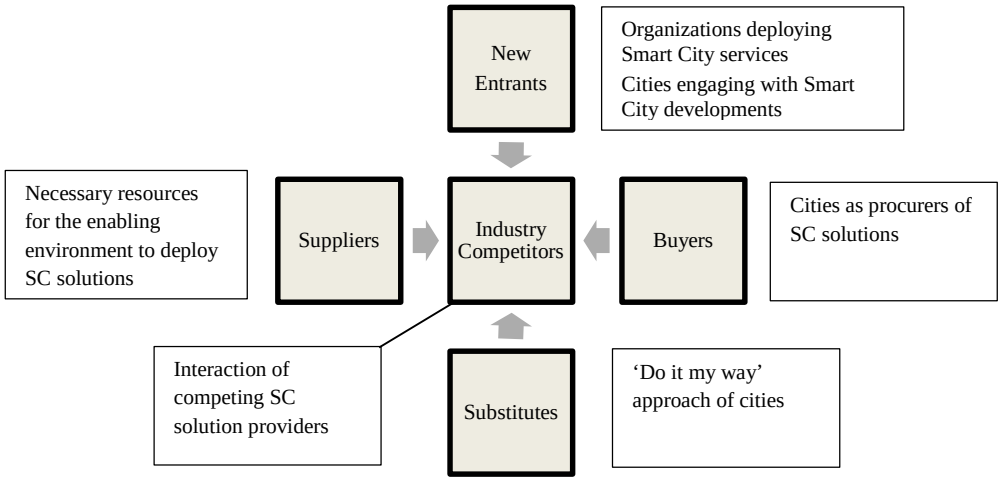
METHODOLOGY

For experimentation of strategic management methodologies, the author utilizes the Porter Five Forces Framework to deepen our knowledge about European medium-sized cities regarding Smart City deployments and experience. The primary source of information is two focus groups with 15 people in total with 3 hour sessions in both cases. Senior representatives from Hungarian municipalities and public authorities responsible for Smart City developments in Hungary were invited. In focus of the questions was their attitude towards Smart Developments and experience with completed or ongoing projects. An interview with a representative of smaller Romanian settlements was also conducted. Table 2 describes the sampled cities or city districts. In focus groups insights were also gained from two consulting companies and two Smart City clusters, representing primarily suppliers and solution providers of SC services. Having a diverse sample is important because SC development affects multiple stakeholders and, as defined by many authors (Yin et al. 2015), participatory governance and social innovations are core parts of the whole concept.

The indicator 'Inhabitants' is a key data for segmenting cities. Giffinger et al. (2007) and others also use population size to create categories for research, while multinational companies use the same method to segment cities in their strategic assessments and business models, e.g. based on observation of Cisco SC projects, the company considers its target segment as cities with at least 250,000 inhabitants. GDP/capita suggests the city's role in the economy and the presence of multinational companies, which is a key driver for SC endeavours. The previously described geographical concentration of resources is clearly shown by this data; deviation is quite large between territories, especially outside of the capital. Industry tax per capita is used with the assumption that it is a good indicator to measure the discretionary income of local governments that can be spent on SC initiatives. Considering the fact that investment can be financed from non-local sources, e.g. the European Regional Fund, central governmental sources or corporate investments, it is difficult to measure the financial capability of a city. Indicators like FDI flows, realized corporate investments or awarded subsidies are also possible metrics for measuring incomes of cities and predicting their financial capacities to invest in Smart City developments. The proportion of inhabitants holding college or university degrees is an indicator for measuring the available social capital, which was identified as a key driver factor.

PORTER'S FIVE FORCES FRAMEWORK

For empirical research about these cities, the author applies the Porter's Five Forces Framework to examine their maturity to deploying SC technologies, strategies and other initiatives and identify what are barriers that hinder them from becoming more mature. The scope of this analysis is highly focused on the solution providers entering this specific segment of 'medium-sized' cities. The five-factor model describes industrial structure as a determinant of profitability in the industry (Balaton & Hortoványi 2018). In this context the model is interpreted as a tool to identify barriers and enabling factors of 'Smart Cities' developments through the different drivers and channels of resources, stakeholders and transactions. This framework is a vehicle to structure and show empirical evidence found during qualitative research for the better understanding of hindering factors in medium-sized cities.



Source: Porter (1980)

Figure 5. Application of Porter's Five Forces Model on Smart Cities

Bargaining Power of Suppliers

Companies and organizations engaged in deploying 'Smart City' solutions are considered to be part of 'emerging industries', where employees face complex problems that can be solved only by higher and more general knowledge which fosters high-level innovation (Boda 2017). The most important inputs for these actions are experts and specialists with knowledge, an appropriate skillset and competences for solving problems and also for implementing the planned solutions. In sample cities these resources are not easily accessible, but of course capital regions are in a better position compared to cities in the country side, where human resources are harder to access. Talent and social capital is concentrated in Budapest, and primarily in the for-profit sector, so there is a huge demand for specialists and experts that can manage SC developments in smaller settlements, create knowledge within public bodies, etc.

Currently this topic is being neglected in Hungarian higher educational courses; however, examples abroad can be found, e.g. University College London (UCL) – MSc in Smart Cities and Urban Analytics (United Kingdom-London), Universidad Ramon Llull (URL) – Postgrado en Smart City (Spain-Barcelona), Aalborg University (AAU) – Master's Programme in Sustainable Cities (Denmark-Aalborg). SC experts have diverse competencies including engineering, economics and sustainability (García & Sisto 2015), so people coming from one specific sector and creating SC strategies for municipalities tends to result in a biased analysis: one of the cities in the sample has an energy-orientated strategy due to the background of the people responsible for the assessment. These biased analytics are a serious issue that probably originates from a lack of standards and the lack of governmental thresholds for creating such strategic documents.

Data is a key resource just as important as humans. Data is required in quantity, excellent quality, and must be up to date, accessible and relieable. In sampled cities 'Data issues' are uniformly considered to be barriers of deploying SC services. Data available from statistical offices is usually outdated and highly inaccurate. Bad data distorts whole strategies, and this is a very relevant issue nowadays, so policymakers are encouraged to address this phenomenon. The few existing Hungarian studies also indicate how data availability can distort analysis (Nagy et al. 2016). The utilization of big data is welcomed in sample cities; however, the maturity of the data industry is quite low yet in Hungary and companies are focusing on Business Intelligence, and not on urban clients. Also, data about the cities is in many cases in the hand of external owners and providers, who are usually reluctant to provide data and offer limited cooperation with many mistakes. During interviews, it was mentioned that personal connections to these data owners (utility companies in many cases) or specific requests from higher political circles usually dissolve this barrier. It is clear that the policy framework for such requests and data provision is not adequately addressed by policymakers.

Bargaining Power of Buyers

In this context, SC solution providers are 'selling' their products and services to municipalities. For the sake of simplifying this special interaction between the sample cities and companies, the author narrows down the scope of the framework to 'switching costs', 'backward integration', and 'buyer information about supplier products'.

Switching costs are a key issue in SC development, not only in Hungary but all over Europe. Vendor lock-in is the phenomenon in which suppliers deploy technologies to cities (e.g. CCTV, energy grids, broadband networks, etc.), which are long lasting, capital intensive, and knowledge intensive, so that switching to another vender would incur very high costs. This issue is very serious, considering that

there are still no standards, reliability of technology is a question and developments are rapid, so cities can be locked into out-dated and inefficient technologies. This also makes decision makers suspicions of suppliers and they are very hard to convince about deploying SC solutions. Vendors usually neglect to detail exactly how the proposed technologies can be integrated with existing systems in complex municipal environments. Only smaller projects are easily adopted, where smaller investments are required.

Backward integration is interpreted in this context as the cities taking control in their own hands. This is the make-or-buy decision: do-it-yourself or hire an external smart city expert. The study reveals, that the standard choice for Medium Hungarian cities, like Győr or the XI District in Budapest is to give the job to an external party. The buyer may also do the work themselves by setting up a staff or project team of local experts. One scenario is that the city establishes a publicly owned company, foundation or an internal office in its administration to do the job. This happened in Debrecen, for example, and signs are indicating that Budapest also plans to establish a competence centre company for this purpose. As we examine practical choices of cities, there can be an exponential trend noticed. According to our observation, the higher the city, the higher the chance that it will deploy its own capacities to deal with managerial and professional issues of Smart City Developments.

Another important issue is buyer information about supplier solutions. Decision makers in cities are not experts on every field in which suppliers approach them, so they need special channels and methods to present the value proposition for the city. These solutions are usually technological and hard to understand, city- specific challenges are rarely referenced, and there are concerns about transparency of the added value. Taking into account that the multinational companies in Hungary rarely commit resources to innovation in the country, rather mainly in their headquarters (Boda 2017), Hungarian cities have inferior conditions for having these ICT solutions adjusted to their local needs by solution providers. Also, vendors often neglect to explain how the financing and operating models are meant to work until much later on. Another interesting finding is that just like companies and scientific researchers, each city has its own 'definition' for Smart Cities, so in many cases their developments are biased and they do not continue developing because their perception is that they are already 'smart'.

It is also worth mentioning that if decision makers, e.g. the budgetary council, mayor or central government, have incentives for keeping down expenses or avoiding indebtedness, they will be more price sensitive to SC solutions. Take for example Hungary, where local governments can only be involved in debt generation if they are given permission from central government; this is a rather strict incentive for them (Lentner 2014). It is also a barrier that governments actually favour specific multinational supplier companies, therefore reducing the freedom of choice for cities in Hungary and in Romania as well. This was mentioned by multiple respondents. Furthermore, the districts of Budapest have authority to some extent, but they are limited in their actions by the Mayor's Office. Generally, in other countries, keeping to the budget is a standard as we are talking about public money and the general public expenditure climate is yet to recover after the economic difficulties of the European Union.

New Entrants

Press releases on new entrants to the Hungarian Smart city market are daily phenomenon. From start-ups to large companies, including public and private market actors, a wide range of entities are becoming more and more engaged in the industry. The motivation and market driving force originate from a wide range of aspects. It seems that the overall benefits that companies perceive go beyond market barriers. In sample cities, supplier salespeople are daily approaching departments about SC technology solutions.

Economies of scale is a special attribute which differentiate medium-sized cities from larger ones, especially from megacities, which are in the focus of the largest and most competent multinational SC solution providers (e.g. IBM, Cisco). Smaller cities are neglected in the moment, mainly because of profitability and the shortage of local knowledge and capacities. This puts pressure on small and medium-sized cities. The above-mentioned barriers also reduce the attractiveness of smaller cities for larger suppliers. They have to rely on less innovative and less competent service providers. Product differentiation means that established firms have brand identification and customer loyalties, which stem from past advertising, customer service, product differences or simply being first into the industry (McNeill 2015). This differentiation creates high barriers for new entrants to spend heavily and overcome existing loyalties and increases vendor lock-in. Cities rely on external expertise on choosing their suppliers and personal connections or political incentives play significant role in the process. This aspect coincides with 'access to distribution channels'. Lobbying activities are very important; however, they distort strategical approaches and widen the already existing gaps between actual needs and implemented solutions, so policy guidance and political will to intervene is very desirable.

Industry Rivalry

Global market size is expected to significantly grow in the coming years (from 529.55 billion USD in 2017 to 1944.67 billion USD in 2023), with a Compound Annual Growth Rate of 24.21% (Orbis Research, 2018). In a rapid industry growth climate, market share competition is more volatile and financial and managerial resources are consumed by the expansion of the industry. Competing

firms have to keep up with each other and the industry as well. Very high growth rates are usually the result of increasing penetration or sales to new consumers and repeating sales to existing ones. In the Smart City solutions deployment market both are true, which partly explains high growth rates: ever more cities are requiring such services. The market growth phase itself leaves room for all businesses to grow.

The ability of consumers to differentiate market products from each other by tangible specifications has a high influence on rivalry. If products are highly diverse, then competitors have some kind of protection from rivalry, because consumers value those differences and choose based on them. This creates layers of insulation against competitive warfare because buyers have preferences and loyalties to particular sellers. On the other hand, if they perceive that products on the market are similar, that will enhance industry rivalry. Based on our observations in the Smart City market, we assume that service providers, especially multinational companies (e.g. T-Systems) are trying to use their leverage on governments and deliver their solutions in all the value chain. This is of course sometimes carried out by subcontractors, but the behavioural pattern is similar in several cities. The director of a municipality company in one of the sample cities mentioned that a successfully implemented public Wi-Fi solution by a smaller company was forcefully removed and implemented again by a multinational company with political support. From the point of view of consulting companies and other less technology related service providers, we can see that consultancies see very great potential in Smart Cities but they are not yet prepared and confident to enter the market; however, leaving it out of their portfolio is a sign of weakness on the market.

This also coincides with 'corporate stakes'. Rivalry in an industry can be intense if a portion of companies have high stakes in being successful. For example, diversified firms are forced to show success in particular industries to catch up with trends and market leaders. As megacities are estimated to be located in developing markets, leading multinational companies have to establish a strong position on these markets to build up global prestige and technological credibility. These expansionary companies are willing to sacrifice profitability in short terms to reach out their potential market share. The Hungarian market is also part of the 'greenfield' areas for expansion. As Smart City developments in Europe gain more and more public attention (Bibri & Krogstie 2017), smaller consultancy firms also have stakes at offering relevant services, even with little competence. Connections and political lobbying are also key attributes of successful consulting companies on the market.

The ease of understanding a product has an important effect on rivalry. Easier understanding of the product means a higher risk of competition. The Smart City concept is not yet well known to city officials and even if they are familiar with the theme and have projects or concepts, that does not mean that their way of perception is correct or optimal in case of city development. This area of research, including business models (as there are no standards yet), is a soft field, therefore the author considers it hard to interpret, which lowers the risk of industry rivalry.

Substitutes

I differentiate two types of substitute cases. First one is when cities build their own capacities to deal with Smart City developments. They hire experts and specialists, or found a public company, owned by the municipality and assign every single related issue to this organization. It is not limited to be a company, it can be a project organization, a development agency, a department or a foundation as well. In Debrecen, a public company deals with investment promotion, enterprise development and smart city, called EDC (Debrecen Város- és Gazdaságfejlesztési Központ). In an other sample city, the responsibilities are assigned to a local development agency. Nevertheless, these centres are providing important capacities and targets for knowledge spill overs, but often fail to attract the fitting experts and operate under reduced scope without the appropriate authorization.

CONCLUSIONS

Applying the Five Forces Framework to identify barriers that hinder the deployment of Smart City solutions and better understand the special needs of medium-sized cities in the complex interactions of multiple stakeholders brought some novel insight to the discussion. The author believes the further utilization of corporate strategic management methodological components, models, reasoning and concepts can move forward the discussion on Smart City model development and the understanding of the complex environment of these actions. It is clear that the specific needs of each city have not yet been addressed by solution providers and that this also a neglected field in scientific research. As every company, cities are also unique entities, and thus global strategies of multinational suppliers and global models of smart cities assessment are not suitable for them. Eventually these 'local needs' are the needs of the citizens, so new types of approaches are needed for business models of solution provider companies as well, to demonstrate the added value of their service in context with the local population. The results achieved by this methodology were supported primarily by qualitative research techniques, including interviews and focus group exercises. Table 3 highlights some of the key identified barriers that hinder the development of SC solutions and undermine its ever growing maturity.

Table 3
Summary of identified barriers

	Industry Competition	New Entrants	Buyers	Substitutes	Suppliers
Identified barriers	Cherry-picked suppliers are favoured by governments Corruption No standards Dominance of big companies SMEs neglected	Information overload Cherry-picked suppliers are favoured by governments Corruption Focus on Megacities Already established distribution channels	Vendor lock-in Not transparent value proposition No city-specific proposals Biased performance indicators and targets 'Do it my way' approach No standards	Lower attractiveness for solution providers Biased interpretations, strategies	Knowledge gaps Shortage of experts Access to data Quality of data No standards Policy immaturity

Source: Own edition

For further research, it is necessary to test these assumptions on other European cities by repeating the focus group research methodology in more cities, including local stakeholders in focus groups. Considering the multidimensional nature of Smart Cities, this way of research seems to be the most efficient one. Using this Framework definitely provided added value. In addition, the assessment of other models is necessary to further elaborate the discussion of Smart Cities from the strategic management point of view.

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