Smart City and the Resource Time: A comparative analysis of concepts and key aspects from different international cities on three continents

Simone SPERR[1]**; Matthias SCHLIPF**[2]

University of Applied Sciences Munich
Am Stadtpark 20, 81243 Munich, Germany
[1] simone.sperr@hm.edu, +49 (0) 89 1265 2757
[2] matthias.schlipf@hm.edu, +49 (0) 89 1265 2757,

Keywords: Smart city, urbanization, quality of life, time

Introduction & Motivation

"*A city is said to be an accumulation of people coming together because they hope to live better and happier in this way*" - this is how Giovanni Botero, an Italian philosopher, characterized the city in the 16th century. Since its invention, the city has represented the dominating and continually growing form of human settlement across the globe. In order to "*live better and happier*", every city dweller must deal with its resource time as satisfying as possible and utilize it in a meaningful and fulfilling manner [1; 2; 3]. Thus, the resource time in the context of cities is a resource that goes beyond individual aspects of the city or urban development and includes diverse factors and indicators. Since the 2000s, such factors and indicators for describing a (desired) livable state of a city have often been aggregated under the term 'Smart City'. There are many cities worldwide that state implementing 'smart measures' to increase the quality of life and thus quality of time - that is, to live better and happier [4]. These are holistic development concepts, which include technical, economic and social innovations aiming to make cities more efficient, technologically advanced, greener and socially inclusive. However, both in science and among those responsible for cities, there are different opinions about a smart city and the resource of time. This creates just as many different goals and focus areas.

Research questions

With a comparative analysis of selected international cities on three continents, the aim of the present study is to classify the different definitions of Smart City and the resource time, to demonstrate possible differences and similarities in the vision and direction of development as well as to make recommendations for action. Answers will be given to the following key questions:

- What do the individual cities understand by the term Smart City and the resource time?
- What are the visions and objectives and what strategic plans do exist?
- What components / focus areas are the cities focusing on?
- Which institutions, organizations or measures enable or facilitate these projects of the cities?

Methodology

The three regions Europe, North America and Asia with three cities each were selected for the comparative analysis. Based on economic, national and territorial aspects, the 'Smart Cities' Amsterdam (Netherlands), Barcelona (Spain) and Munich (Germany); Boston, San Francisco (both USA) and Toronto (Canada); as well as Pune (India), Shenzhen (China) and Singapore were chosen. In addition to a qualitative-analytical survey, a quantitative survey was conducted to provide answers to the research questions. A revised research design according to Giffinger [5; 6] was used as the basis for a city ranking. The six components of a 'Smart City' proposed by Giffinger - Smart Economy (1), Smart People (2), Smart Governance (3), Smart Mobility (4), Smart Environment (5) and Smart Living (6) - were extended by a seventh dimension called 'Smart Commitment (7)'. In order to focus on the resource time, the various fields of action and the underlying indicators for the measurement were newly selected based on the seven 'Smart City' components. This new data-based comparison based on a total of 23 fields of action and 70 indicators (see Appendix) serves to present the respective status quo of the nine cities, which is then compared with the results of the qualitative analysis.

Results and Conclusions

Apart from Shenzhen's technology focus, a uniform conception of the term ‘Smart City’ is evident. The visions and objectives, on the other hand, differ both in the scope of the plans and in the orientation of the goals. Contrary to the holistic view, the focus of the cities’ goals is particularly on technological, digital or economic aspects. Concerning the focus areas, the areas of smart mobility and smart government are prioritized by the cities. However, the cities are only partially trying to compensate the demonstrated deficits by dedicated actions. The comparative analysis shows that a comprehensive and broad coverage of the areas are meaningful. The present research work concludes with recommendations and a ranking of the nine cities regarding their status of a 'Smart City and the resource time' based on the elaborated and newly selected fields of action and indicators.

Literature

[1] **Albino V.; Berardi U.; Dangelico R**. (2015): Smart Cities: Definitions, Dimensions, Performance, and Initiatives. In: Journal of Urban Technology 22 (1), S. 3–21. DOI: 10.1080/10630732.2014.942092.

[2] **Kummitha R.; Crutzen N.** (2017): How do we understand smart cities? An evolutionary perspective. In: *Cities* 67, S. 43–52. DOI: 10.1016/j.cities.2017.04.010.

[3] **Nam T.; Pardo T.** (2011): Conceptualizing Smart City with Dimensions of Technology, People, and Institutions. In: *Proceedings of the 12th Annual International Digital Government Research Conference Digital Government Innovation in Challenging Times*, S. 282–291.

[4] **Zelt Thilo et al.** (2019): The Smart City Break-away. How a small group of leading digital cities is outpacing the rest. Roland Berger GmbH. München (Think : Act - navigating complexity).

[5] **Giffinger R. et al.** (2007): Smart cities - Ranking of European medium-sized cities. Final report. Centre of Regional Science (SRF), Vienna University of Technology. Online verfügbar unter www.smart-cities.eu/download/smart_cities_final_report.pdf.

[6] **Giffinger R. et al.** (2015): European smart cities 4.0 (2015). The smart city model. Centre of Regional Science (SRF), Vienna University of Technology. Online verfügbar unter http://www.smart-cities.eu/?cid=2&ver=4,

Biographies

Simone Sperr is a graduate of the Faculty of Business Administration at the Munich University of Applied Sciences.

Prof. Dr.-Ing. Matthias Schlipf is Professor of Marketing & Technology Management at the Faculty of Business Administration at the Munich University of Applied Sciences.

Appendix

Components	Factors	Indicators
Smart Economy	Entrepreneurship	New businesses registered
		Time needed to resolve insolvency
		R&D expenditure of GDP
	City image	Importance as decision-making centre
		Importance as knowledge centre
	Labour Market	Time needed to start a business
		Unemployment rate
Smart People	Education	Education Index
		English Proficiency Index
	Lifelong learning	Adult education and learning
		Number of book loans by public libraries
	Ethnic plurality	Foreign-born population
		International migrant stock
	Open-mindedness	E-Participation Index
		International student mobility
Smart Governance	Political awareness	Voter turnout
		Share of female seats in parliament
	Efficient and transparent governance	E-Government Development Index
		International climate policy score
		Control on corruption
		Press freedom
Smart Mobility	Local transport system	Access to transport services score
		Time Expenditure Index
	ICT-Infrastructure	Fixed broadband subscription
		Internet penetration
		Mobile phone subscription
		Telecommunication Infrastructure Index
	Sustainability of the transport system	Journeys to work by public transport
		Average travel time to work/school
		Affordability of public transport
		Efforts to lower transport emissions score
		Road traffic death rate
Smart Environment	Air quality (no pollution)	Pollution Index
		Air pollution attributable death rate
		Particulate matter PM10 µg/m3
		Particulate matter PM2.5 µg/m3
	Ecological awareness	Climate change performance index
		Environmental Performance Index
		Provision of green space index
	Sustainable resource management	Wastewater treatment score
		Renewable energy consumption
Smart Living	Cultural and leisure facilities	Happiness score (cultural satisfaction)
		Satisfaction with quality of green and parks
		Number of museums
	Health conditions	Under-five mortality rate
		Life expectancy at birth
		Mortality rate
		Noise and light pollution
		Health care index
	Individual security	Problem violent crimes
		Crime index
		Safety scale index
	Housing quality	Rent price of 3-room apartment in central area
		Affordability of apartments
		Mortgage
		Population using improved sanitation
	Education facilities	PISA Score average
		Mean years of schooling
	Social cohesion	Working poverty rate
		Poverty rate
		GINI index (inequality)
Smart Commitment	Common Good	Volunteering in organization
		Population covered by social protection floors/systems
		Employment in public administration, community, social and other services and activities
		Social expenses
		Social contact points
		Homeless shelters
		Nonprofit organizations
	Purity & Clarity	Clean and tidy score
		Comfortabel to spend time in city