Editorial: The smart city conundrum – can cities be truly smart without having zero waste?

Tan Yigitcanlar

School of Civil Engineering and Built Environment,
Queensland University of Technology (QUT),
2 George Street, Brisbane, QLD 4001, Australia
Email: tan.yigitcanlar@qut.edu.au

The notion of 'smart city' has become a hot urban agenda in the policy circles (Yigitcanlar, 2016). This is due to its potentials in addressing a range of negative effects of rapid urbanisation, industrialisation and consumerism practices (Yigitcanlar and Lee, 2014). A smart city is widely seen as a city that actively embraces new technologies seeking to achieve desired urban outcomes (Yigitcanlar, 2015). The most common smart city outcomes include productivity, sustainability, accessibility, wellbeing, liveability, and good governance.

Buying on the smart city's premises, today, many cities around the globe are developing smart city agendas (Lara et al., 2016). However, there is a big gap between theory and practice. What smart cities are claimed to be is quite different from what they actually are in reality (Trindade et al., 2017; Chang et al., 2018). While almost all smart city initiatives are highlighting the necessity of achieving sustainability, research on the smart cities of the UK finds no direct correlation between smart city practice and environmental sustainability outcomes (Yigitcanlar and Kamruzzaman, 2018). This highlights a potential environmental sustainability policy challenge (Arbolino et al., 2018a).

While environmental sustainability is a broad concept with many integrated complex subsystems (Yigitcanlar and Dur, 2010; Dizdaroglu et al., 2012; Dizdaroglu and Yigitcanlar, 2014, 2016), perhaps just focusing on one of them could help in shedding light on the smart city conundrum. For instance, municipal waste issue would be a good one. While smart city technologies are helpful in the processes of waste monitoring, collection, recycling, reuse and disposal, technology alone cannot produce panacea (Lee et al., 2008; Yigitcanlar, 2009). For example, the amount of landfill in many cities around the globe is on the exponential increase. This issue is not only a problem for developing nation cities, but also a case for many of the developed country cities.

The problem originates from several factors. Firstly, rapid urbanisation and megapolisation are to blame for (Goonetilleke et al., 2014; Yigitcanlar et al., 2015). According to United Nation's predictions, about 80% of the ten billion world population will be living in cities by 2100. A big portion of these eight billion urban populations will be residing in megacities (Yigitcanlar and Dizdaroglu, 2015). Secondly, the capitalist economic view continues to drive consumerism particularly in the emerging economies of the world. Despite heavy criticisms on consumerism and emergence of the dematerialism movement as a hope, the trend is still on the rise (Carrillo et al., 2014). Thirdly, many cities have not developed adequate infrastructures and amenities to deal with the waste issue (Yigitcanlar, 2010a, 2010b). In most of the developing country

cities, there is either no or very limited recycling facilities. To a degree this applies to developed nation cities as well. Lastly, some of the developing nations have recently stopped undertaking the recycling responsibilities of the developed countries. For instance, the amount of landfill in Australia is rising dramatically since China is no longer buying the recycling waste.

The magnitude of the urban waste problem has made scholars to coin a new concept as a potential way through. In recent years, cities are reconceptualised as 'zero waste' localities – cities where waste disappears as all by-products retain an intrinsic value to feed into other systems. In these cities, even food spoilage and waste could be reduced to zero and turned into biofuels, compost or animal feed (Zaman and Lehmann, 2013).

Zero waste, however, could only be achieved through better design and lifecycle thinking, where consumption and production become closed loops, producing no outputs as waste throughout their lifecycle. This is to say; zero waste is a revolution in the relationship between waste and community (Song et al., 2015). It is a new way of thinking about safeguarding the health and improving the lives of everyone who produces, handles, works with, or is affected by waste (Arbolino et al., 2018b).

Claiming a city being smart has many requirements, where perhaps one of the most important ones is being zero waste. This is to say; cities cannot be truly smart without having zero waste. Numbers of cities are already making progress towards zero waste. For example, Italian municipalities launched their Zero Waste Masterplans, Croatian municipalities adopted a Zero Waste 2020 Strategy, Belgian municipalities are building a culture of zero waste, and Brazilian municipalities are working with the Zero Waste Institute Brazil to develop strategies.

Lastly, smart cities could be an ideal model to build the cities of the 21st century, in the case, its practice involves a system of systems approach and a sustainable and balanced view on the economic, societal, environmental and institutional development domains (Yigitcanlar et al., 2018). However, for a truly smart and sustainable world, we need smart cities also to become zero waste.

Following an editorial commentary on the relation between the smart cities notion and the zero waste concepts, this editorial piece introduces the articles of the issue. This second issue of the *International Journal of Knowledge-Based Development* for 2018 (Volume 9) contains four papers. These papers investigate the knowledge-based development phenomenon from various angles (i.e., knowledge region policy, resilience of sustainable communities, smart city strategy, and company operational efficiency) – in order to provide a further understanding of the complex nature of the concept.

The issue commences with the paper 'Universities and the knowledge triangle policy in new EU member states: the case of the Czech Republic' by Vladislav Čadil and Miroslav Kostić explores the cooperation between universities and companies using the knowledge triangle concept and identifies factors that significantly influence this cooperation. The paper analyses national knowledge triangle policies and instruments and explores how national priorities, goals and measures are reflected in the behaviour of universities. The empirical analysis is based on a combination of a desk research analysis and structured interviews with researchers and university vice-rectors. The analysis reveals underdevelopment of science-industry links in the knowledge triangle. Not counting small technical universities, revenue from the knowledge transfer is still a marginal funding source for research activities of the majority of Czech universities. The low university-industry cooperation contrasts with considerable promotion of development of knowledge transfer activities in the national policy documents, and

public financial support. The reason for the low collaboration lies mainly in the low interest of university management to collaborate and in the current evaluation methodology of research organisations, which favours scientific publications.

The paper 'Resilience and localism through sustainable collaborative communities: the case of Rijeka' of the issue by Alessandra Ricciardelli contributes to the discussion over the development of an innovative approach that would enable academics to revise the modes of collaboration and processes of engaging people in a way that conventional politics has, so far, failed to do. The paper aims at filling the gap in the exiting literature on social capital and social engagement as it suggests steps or initiatives in the framework of the transition approach that supports community engagement for transforming the highly vulnerable, non-resilient state to a resilient and more localised place. The purpose is to understand in what way transition, as a new theoretical approach, can contribute to define a new model for collaboration while leveraging on two key aspects: resilience and localisation. The paper analyses what socioeconomic and community-related structures as well as organisational systems are necessary to implement modes and places of collaboration in a resilient country such as the Croatian City of Rijeka while understanding the complexities of governing systems in the perspective of Community Governance and suggesting criteria for actions in creating a shared, integrated, networked-based and knowledge-based development. The evidence shows that the transition's approach towards relocalisation could be effective in both catalysing community responses to critical issues and in generating engagement and setting up new enterprises.

Next, in 'Gold Coast smart city strategy: informed by local planning priorities and international smart city best practices', Tooran Alizadeh and Leila Irajifar take an applied approach to propose a smart city strategy informed by local planning priorities and international best practices. In doing so, it focuses on Gold Coast – a mid-sized coastal city in Australia – which has been part of IBM's Smarter Cities Challenge, and Open and Agile Smart Cities Network. In this paper, local planning context and priorities in relation to smart cities are investigated and benchmarked against best practice smart city initiatives from around the world. The result is a strategic smart city framework around organisational and operational capital, economic and financial capital, human and social capital, infrastructure and physical capital. The approach taken, and the lessons learned are applicable to other cities interested in taking a strategic approach towards the fast-growing concept of smart cities.

The final contribution of the issue, 'Impact of knowledge management and ICT on operational efficiency: an empirical study', by Salama S. Al-Qubaisi, Mian M. Ajmal and Mehmood Khan, focuses on the operational efficiency issue. The paper aims to investigate the relationship between knowledge management practices, ICT and operational efficiency from financial perspective. Five hypotheses are developed with the help of literature review and are tested through the application of confirmatory factor analysis in structural equation modelling. Four hundred sixty-two valid responses were collected from an oil and gas company in the UAE. Four out of five knowledge management practices have a significant relationship with operational efficiency. ICT has been found to moderate the relationship between knowledge management practices and operational efficiency. One knowledge management practice has shown an insignificant relationship with operational efficiency. The results also show that the standardised coefficients of these paths and the loadings of the indicators on their factors are all

significant. A validity test shows strong evidence of the joint impact of knowledge management practices and ICT on operational efficiency with the possible moderating impact of ICT on operational efficiency.

References

Arbolino, R., Carlucci, F., De Simone, L., Ioppolo, G. and Yigitcanlar, T. (2018a) 'The policy diffusion of environmental performance in the European countries', *Ecological Indicators*, Vol. 89, No. 1, pp.130–138.

Arbolino, R., De Simone, L., Yigitcanlar, T. and Ioppolo, G. (2018b) 'Facilitating solid biomass production planning: insights from a comparative analysis of Italian and German marginalized areas', *Journal of Cleaner Production*, Vol. 181, No. 1, pp.819–828.

Carrillo, J., Yigitcanlar, T., Garcia, B. and Lonnqvist, A. (2014) *Knowledge and the City: Concepts, Applications and Trends of Knowledge-based Urban Development*, Routledge, New York.

Chang, D.L., Sabatini-Marques, J., Da Costa, E.M., Selig, P.M. and Yigitcanlar, T. (2018) 'Knowledge-based, smart and sustainable cities: a provocation for a conceptual framework', *Journal of Open Innovation: Technology, Market, and Complexity*, Vol. 4, No. 1, p.5.

Dizdaroglu, D. and Yigitcanlar, T. (2014) 'A parcel-scale assessment tool to measure sustainability through urban ecosystem components: the MUSIX model', *Ecological Indicators*, Vol. 41, No. 1, pp.115–130.

Dizdaroglu, D. and Yigitcanlar, T. (2016) 'Integrating urban ecosystem sustainability assessment into policy-making: insights from the Gold Coast City', *Journal of Environmental Planning and Management*, Vol. 59, No. 11, pp.1982–2006.

Dizdaroglu, D., Yigitcanlar, T. and Dawes, L. (2012) 'A micro-level indexing model for assessing urban ecosystem sustainability', *Smart and Sustainable Built Environment*, Vol. 1, No. 3, pp.291–315.

Goonetilleke, A., Yigitcanlar, T., Ayoko, G.A. and Egodawatta, P. (2014) *Sustainable Urban Water Environment: Climate, Pollution and Adaptation*, Edward Elgar, London.

Lara, A.P., Da Costa, E.M., Furlani, T.Z. and Yigitcanlar, T. (2016) 'Smartness that matters: towards a comprehensive and human-centred characterisation of smart cities', *Journal of Open Innovation: Technology, Market, and Complexity*, Vol. 2, No. 1, pp.1–13.

Lee, S.H., Yigitcanlar, T., Han, J.H. and Leem, Y.T. (2008) 'Ubiquitous urban infrastructure: infrastructure planning and development in Korea', *Innovation*, Vol. 10, Nos. 2–3, pp.282–292.

Song, Q., Li, J. and Zeng, X. (2015) 'Minimizing the increasing solid waste through zero waste strategy', *Journal of Cleaner Production*, Vol. 104, No. 1, pp.199–210.

Trindade, E.P., Hinnig, M.P., Da Costa, E.M., Marques, J.S., Bastos, R.C. and Yigitcanlar, T. (2017) 'Sustainable development of smart cities: a systematic review of the literature', *Journal of Open Innovation: Technology, Market, and Complexity*, Vol. 3, No. 1, p.11.

Yigitcanlar, T. (2009) 'Planning for smart urban ecosystems: information technology applications for capacity building in environmental decision making', *Theoretical and Empirical Researches in Urban Management*, Vol. 3, No. 12, pp.5–21.

Yigitcanlar, T. (2015) 'Smart cities: an effective urban development and management model?', *Australian Planner*, Vol. 52, No. 1, pp.27–34.

Yigitcanlar, T. (2016) *Technology and the City: Systems, Applications and Implications*, Routledge, New York.

Yigitcanlar, T. (Ed.) (2010a) *Sustainable Urban and Regional Infrastructure Development: Technologies, Applications and Management: Technologies, Applications and Management*, IGI Global, Hersey.

Yigitcanlar, T. (Ed.). (2010b) *Rethinking Sustainable Development: Urban Management, Engineering, and Design*, IGI Global, Hersey.

Yigitcanlar, T. and Dizdaroglu, D. (2015) 'Ecological approaches in planning for sustainable cities: a review of the literature', *Global Journal of Environmental Science and Management*, Vol. 1, No. 2, pp.159–188.

Yigitcanlar, T. and Dur, F. (2010) 'Developing a sustainability assessment model: the sustainable infrastructure, land-use, environment and transport model', *Sustainability*, Vol. 2, No. 1, pp.321–340.

Yigitcanlar, T. and Kamruzzaman, M. (2018) 'Does smart city policy lead to sustainability of cities?', *Land Use Policy*, Vol. 73, No. 1, pp.49–58.

Yigitcanlar, T. and Lee, S.H. (2014) 'Korean ubiquitous-eco-city: a smart-sustainable urban form or a branding hoax?', *Technological Forecasting and Social Change*, Vol. 89, No. 1, pp.100–114.

Yigitcanlar, T., Dur, F. and Dizdaroglu, D. (2015) 'Towards prosperous sustainable cities: a multiscalar urban sustainability assessment approach', *Habitat International*, Vol. 45, No. 1, pp.36–46.

Yigitcanlar, T., Kamruzzaman, M., Buys, L., Ioppolo, G., Sabatini-Marques, J., Costa, E. and Yun, J. (2018) 'Understanding 'smart cities': intertwining development drivers with desired outcomes in a multidimensional framework', *Cities*, https://doi.org/10.1016/j.cities.2018.04.003.

Zaman, A.U. and Lehmann, S. (2013) 'The zero waste index: a performance measurement tool for waste management systems in a 'zero waste city'', *Journal of Cleaner Production*, Vol. 50, No. 1, pp.123–132.