5 The quest for the holy grail

Can smart cities lead us to sustainability?

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Introduction

Cities around the world increasingly adopt advanced technologies to solve complexities in urban development and resources use and management. These technologies include information technology (IT) and information and communication technology (ICT), big-data and Artificial Intelligence (AI), among others (de Jong, Joss, Schraven, Zhan & Weijnen 2015). Often, these initiatives are framed as ‘smart cities’.¹ ‘Smart’ can be interpreted as providing, acquiring and managing data to tackle problems and their solutions while addressing resources use and management and sustainability in the urban context (Batty et al. 2012; New, Castro & Beckwith 2017).

However, the endorsement of smart cities raises serious issues. For example, Ahvenniemi, Huovila, Pinto-Seppä and Airaksinen (2017) show how the focus on smart cities can neglect the environmental dimensions of sustainability. Yigitcanlar and Kamruzzaman (2018) revealed that becoming ‘smart’ did not translate to a reduction in the carbon footprint of cities. Moreover, Kitchin (2014) pointed to problematic aspects of cities’ race for big-data; namely, political interventions in data management, emerging technocratic solutions to deal with urban problems, commercialisation of governance and weakening of privacy rights.

This chapter adds a modest contribution to these perspectives. It examines (1) advocating advanced technologies as favourable solutions to urban resource-related problems, in (2) social, economic and political constellations that highly encourage these solutions, while (3) considering urban developmental challenges that cities are faced with, and the challenges that these solutions pose to cities. The chapter claims that given urban development projections in national and global arenas that encourage the use of IT/ICT, building smart cities might not make cities sufficiently (resources) efficient to reach urban sustainability. Instead, it may even bring additional challenges for cities to address. The examination could be useful when considering cities’ crucial role in the sustainable use of resources (van der Heijden 2018), and the global pursuit for advanced technologies. For that purpose, the chapter examines Israel, a country in a state of ‘hyper-technologisation’ undergoing

intensive development while faced with acute environmental problems and climate challenges.²

Methodology

The chapter reviewed the literature of smart cities and urban sustainability together with data sets and indices concerning sustainability, innovation and advanced technologies in national and local levels in Israel. One index is the Smart and Sustainable Cities Index developed by the Interdisciplinary Center (IDC) Herzlia, Israel (IDC 2018). The IDC index identifies and assesses urban 'smartness' through several components such as using and sharing data among residents and municipal officials, information-based policy and governmentality, community-based services and resources and the application of innovation to tackle local challenges. Another index is the (Israeli) Start-Up Nation Finder (Start-Up Nation Finder 2019). In addition, the chapter applied data, reports and online information from governmental authorities such as Israel Innovation Authority (IIA),³ from Israeli cities and environmental non-governmental organisations (ENGOS), and from publications in major Israeli newspapers.

The Israeli race for development and technology

A developed economy, Israel nevertheless presents growth of developing/in-transition economies: with a 2% annual population growth, the country is expected to grow from 9 million in 2019 to 15.6 million in 2065 (Central Bureau of Statistics 2018), in an area not bigger than 22,000 km². Israel's population growth and high consumption patterns threaten sustained resources management and future well-being (Brachia 2019; Tal 2016). By 2040 Israel will need 1.5 million new residential units (52,000–67,000 units per year; Raz-Dror & Kost 2017), and many will be built in existing or new urban areas (the majority of Israelis already live in urban areas). Israel's growth patterns affect Israeli cities directly; they will need to continue and provide services and adequate urban environments. These kinds of growth patterns are, therefore, very challenging in terms of the need to reduce the use and enhance the efficiency of resources (Latouche 2018; Lehmann 2018).

However, Israeli decision-makers continuously prioritise private mobility over public transportation and provide insufficient housing planning that considers the sound use of resources. The use of renewable energies increases at a much slower rate than Israel's energy demands. Pollution of air, water and natural areas continues, and so are waste management problems and loss of green areas (Adam Teva V'Din 2019: 6–9). Urban development patterns either contribute to these problems or are directly affected by them.

In parallel, Israel is known as an entrepreneurial 'Start-up Nation'. Much of this reputation derives from the high rate of tech companies that work or have grown in Israel and broke into global markets (Noy & Givoni 2018).

Perceived as the engine that pushes the Israeli economy forward into the 21st century, the IT/ICT sector enjoys political and economic support as well as social legitimacy. The central government invests about 1.6 Billion NIS (approx. 400 million euros) in supporting this industry (Israel Innovation Authority 2017), and recently announced the establishment of a sustainability-focused innovation lab of approx. 3.5 million Euro (Israel Innovation Authority 2019). Much emphasis from governmental and private stakeholders is put on the transportation sector.

Cities in Israel: the race to get ‘smart’

About 40% of Israel’s population resides in 15 fiscally-independent cities (known as Forum 15, which now includes three additional cities). Most of them provide a high standard of living and address sustainability to some extent. Other cities often lack capacities and resources to invest in profound sustainability measures.

Entangled in the national enthusiasm to develop and adopt advanced technologies, Israeli cities of all types seem to have what is known as ‘fear of missing out’ when it comes to innovation. Cities see advanced technologies as economic gain, opportunity to increase national and international reputation, and a way to draw educated wealthy resident profile.⁴

Smart mobility draws special interest. To reduce transportation load and increase the efficient use of infrastructure, various cities experiment with car and bicycle sharing schemes (IDC 2018), intelligent, data-driven management of urban public and private transportation (Toch 2018), and autonomous and electric vehicles (e-vehicles) (Schmil 2019). Concerning energy, the focus is, by large, on managing and informing users (be it residents or officials) of energy demands and distribution; and on providing accurate information to enhance climate adaptation efforts (Toch 2018). Moreover, IT/ICT is increasingly used to inform the public over urban development plans and to improve accessibility to- and of- municipal services (IDC 2018; Toch 2018).

One example is Tel Aviv-Yafo, globally known for its innovation-focused sustainability efforts and Israel’s economic centre (EU n.d.; IDC 2018). Formally, the city aims to improve the urban environment and urban services all the while addressing climate adaptation (Tel Aviv-Yafo 2017). Using IT/ICT plays a crucial role in Tel Aviv-Yafo, especially in improving urban transportation and providing information to residents (see also Hatuka & Zur 2019).

Eilat, a city in the southern-most periphery with 52,000 inhabitants, also positions itself as a smart and sustainable city. About 70% of Eilat’s day-time electricity comes from renewable energies provided by a public-benefit corporation – the highest and almost single among Israeli cities. Equipped with the European Union (EU) grant, the city recently completed an energy efficiency demonstration in one neighbourhood using ICT. The city runs a pilot project with a private corporation that informs residents of the physical and financial

Figure 5.1 Tel Aviv-Yafo.

Source: photo by Shai Pal on Unsplash.

feasibility of photo-voltaic (PV) instalments on rooftops through an App, to encourage the use of renewable energies (City of Eilat 2018; IDC 2018).

The city of Kfar Saba positioned itself as a city committed to sustainability thanks to the novel waste management system and using natural solutions to urban wastewater and preserving green areas, among others. The political leadership aims now to reduce cars' emissions by engaging with a private corporation to increase the use of e-vehicles and related infrastructure in the city (City of Kfar Saba 2019). Taking part in an EU project, the city was also among the first in Israel to use smart energy meters in public buildings in the mid-2010s.

Other examples are of Israel's capital, Jerusalem, and the city of Netanya which use ICT to track water leaks in municipal infrastructure (New et al. 2017); an issue with high value to the arid Israeli climate. Netanya also experiments with car-sharing and smart solutions to parking.

Can smart solutions lead to more sustainable cities in Israel?

Feasibility of smart solutions in Israel

The examples above indicate how municipalities incorporate IT/ICT to better use resources in the urban sphere. However, this strategy does not

necessarily equip them to tackle core problems attributed to resources in urban areas. Moreover, leaning on IT/ICT may even turn Israeli cities more vulnerable.

There seems to be no concrete evidence that Israeli cities managed to reduce their greenhouse gas (GHG) emissions, let alone through IT/ICT (see related studies such as Dor & Kissinger 2017; Goldrath, Ayalon & Shechter 2015; Stossel, Kissinger & Meir 2014). Forum 15 cities have voluntarily agreed to reduce their emissions as early as 2008 (Forum 15 n.d.) and in 2013 committed to gradually adopt the innovative Israeli green building standard in new projects. However, most cities did not pass beyond the initial stage of GHG emissions registry, and by 2018 only 10,500 residential units were built according to the Israeli green building standard, with 900 buildings under construction (MoEP 2018). Compared to the stocks of (non-green) private and governmental building prospects, building initiatives in cities and the resources they require are far from being sustainable.⁵

This reality also reflects Toch's (2018) review that, by large, Israeli cities tend to find solutions to narrow, specific problems rather than looking beyond their borders for broader perspectives and other potential solutions. Israeli cities' 'smart' actions miss the bigger picture necessary to deal with *core* features of sustainable resource use in – and by – cities: dramatic reduction of GHG emissions from the built environment and transportation, circulating or reducing – rather than increasing – resources, increasing renewable energy instalments and speeding-up energy efficiency, among others.

On the contrary, investing in pilots for urban IT/ICT mobility management does not address the acute need to reduce the use of cars (Koren 2019). Similarly, while some Israeli cities paved bicycle lanes to encourage low-carbon mobility, they are often used by e-bicycles and e-scooters (usually operated via apps), which demand energy and are used mostly by those which do not own a car. This kind of smart solutions seems not to have a significant impact on reducing carbon-intensive mobility in municipalities.

More concretely, Tel Aviv-Yafo is indeed a leading city in terms of experimentation in mobility, urban data use and even local energy generation, but at the same time, it does too little use of its political and economic power to make comprehensive demands for greener buildings and infrastructures (see discussions in Shefer 2019). Eilat provides residents with information on renewable energy feasibility, but it might not be a practical investment for a mid-income, peripheral city of its kind. Netanya promotes natural areas in the city and experiments with smart mobility, but as one of the fastest-growing cities in Israel, its new neighbourhoods, like many others in the country, will likely to continue to be car-dependent and with a small share of green buildings.

Further implications of technological solutions

Fast adoption of IT/ICT leads to new challenges which cities need to consider (Israeli cities included). An increasing share of studies claims that

Figure 5.2 E-vehicle.

Source: photo by John Cameron by Unsplash.

relying on IT/ICT for social interactions may de-construct social systems as we know them (e.g. Calzada & Cobo 2015). This is especially intriguing for cities and their residents, who may face the consequences of changes in how people consume and produce goods and services in- and of- the city. Will Israeli cities need to invest more in easing fragmentations caused by these new communication and consumption habits (see also Hatuka & Zur 2019)?

Moreover, cities in and outside Israel may push for quick adoption of far-reaching innovations such as 5G and the *internet of things*. Especially the latter means, in practice, connecting every resident and her devices to larger governmental and corporate networks and data-sets, infrastructures and services. It raises questions on cities' abilities, roles and governmentality over sustainability: what resources should cities invest in engaging in these developments, and at what expense? Do cities gain or lose power against central governments and corporations? Moreover, as large data-sets and smart solutions may demand much energy and space, how will it affect cities' resources use and management (see also WBGU 2019)?

Furthermore, persistent reliance on IT/ICT for urban functions and services presents also risk and security issues from exogenous threats and system-failures (e.g. Coaffee & Wood 2006). These concerns are of special interest to Israel,

given its complex national security. Would cities need to invest resources and change priorities against these threats? Would it affect their ability to promote and/or invest in the more sustainable use of resources?

Cities as instigators for change in Israel, and their limitations

Israel has a centralist political system which formally translates to less power for local authorities. Planning and implementing major infrastructures such as energy, transportation and water are by large steered and managed by the central government. In this regard, Israeli cities are not always able to find an independent voice and may not always have the capacity to lead or implement changes. Moreover, unlike many other developed economies, sustainable consumption and production and addressing climate change are at their initial stages in the Israeli public and private spheres (Tal 2017). Often, the extent of awareness of mayors and municipal officials determine the municipality's sustainability efforts. Lastly, as national security plays a prominent role in Israeli public debate, challenging IT/ICT solutions that address security may not be easily conveyed.

Despite these restraints and given that cities can be both sites for- and initiators of- change towards low-carbon activities (Bulkeley, Castán Broto & Edwards 2015), several steps may be at hand to Israeli cities, which could prove insightful to cities elsewhere.

Cities can lead to substantial normative and behavioural changes of resource-use through binding and non-binding measures. Despite the constraints, Israeli cities do have room for autonomous actions in a variety of issue-areas such as planning, regulations and investments (Dery 2002). Herzlia and Eilat are now promoting the banning of disposable plastic utensils in beach areas through a mix of municipal regulations and dialogue with local stakeholders (e.g. Kuriel 2018). These actions may bring more concrete results in terms of sustainable use of resources in the municipality and set an example to residents and other cities, than experimenting with car-sharing and smart parking management. Likewise, Kfar Saba pioneered in using its regulatory power to demand the covering of 50% of new commercial/industrial roofs with greenery or solar/PV instalments (Levi 2014); as well as new initiatives for open roofing spaces with such instalments. Moreover, Israeli cities could take advantage of their political power by providing more stringent, sustainable patterns of commerce (see Tel Aviv-Yafo 2017 for the city's voluntary Green Label initiative). Despite the limitations of these steps, they nevertheless show how legal and political instruments could lead to profound behavioural changes within city boundaries.

Cities can challenge central planning and policies, even in centralised systems as in Israel. Shmueli, Feitelson, Furst and Hann (2015) showed how planning schemes at Israeli local authorities altered and shaped central level initiatives. In 2018, Haifa, the capital of the northern metropolitan area (approx. one million residents), presented a plan to transform the Haifa Bay's

petrochemical complex to a mixed-used area of housing and (clean) industries. The plan, drafted in cooperation with central agencies, is novel in two ways: the will to confront influential stakeholders such as the fossil fuels industry and the vision to design a large area according to its ecological (water-based) characteristics rather than override them. The plan embeds balanced development vis-à-vis climate adaptation and dramatic reduction of GHG emissions (Levi 2019).

A similar novelty can be seen in Tel Aviv-Yafo's plan to incorporate Combined Cooling, Heat and Power (CCHP) instalments in new neighbourhoods.⁶ Disseminating and amplifying these efforts may have a more significant impact on sustainable use of resources in Israeli cities than small scale initiatives such as smart meters. In addition, cities may benefit from trends in European cities (e.g. in Germany) which prefer density and conversion of existing building stocks to alternative uses to reach more efficient and lean use of resources (Reißmann & Buchert 2018).

Conclusions

This chapter questioned the often-too-rapid adoption of advanced technologies to reach urban sustainability. While more data and research are needed to more comprehensively analyse Israeli cities, the initial analysis in this chapter suggests that smart cities in Israel, at the way they currently operate, are not serving the function of reaching sustainability. Moreover, they may even enhance this outcome. To avoid any doubt, the chapter does not reject IT/ICT integration in urban systems. Instead, it suggests that adopting and experimenting with technology should not be the goal but rather supplementary to broader social and political priorities to reach sustainable patterns of social and economic urban living (also WBGU 2019).

As in Israel, IT/ICT is the holy grail for many global powers such as China, India, Japan and Germany at national and local levels alike (e.g. Höffken & Limmer 2019). Racing into innovation, cities in these and other countries run the risk of ignoring or delaying treatment of main carbon-intensive practices as well as risking vulnerability to exogenous ICT-related shocks. Uncertainty over issues that derive from smart solutions for resources at the urban sphere such as governmentality and legitimacy is growing, as well as concerning changes in dependency and authority. Cities will need to address these complexities vis-à-vis demands for urban well-being. City authorities will benefit from considering the advantages and disadvantages that IT/ICT innovation brings into these complex systems before they hastily adopt innovation for the sake of being progressive or obtaining short-term political and economic gains.

Sustainability requires profound planning and implementation that removes or at least dramatically reduces, carbon-intensive socio-economic activities. Utilising existing regulatory and legal mechanisms, forming coalitions to resist

(external) bad planning and lobbying higher political levels may speed-up reaching this goal. This is particularly, but not solely, true for cities that demand fast-paced development and need to deal with large stocks of resource use and management as in Israel.

Transformation towards sustainable patterns of urban living does not require radical changes of rules and values; but instead changes in *how* and *when*, and perhaps with *who*, to use them. It is certainly not an easy task, especially for cities in centralised systems as in Israel; and with growing needs that require fast solutions to the challenges of urban development. Nevertheless, it might be the smarter choice.

Notes

- 1 'Smart cities' is often mixed with other concepts such as sustainable cities or eco-cities (de Jong et al. 2015).
- 2 All data related to Israel excludes the Palestinian Authority and Gaza Strip.
- 3 Previously Israel Chief Scientist, this governmental agency assesses, promotes and finances IT/ICT and innovation related to Israel. The change of title reflects the economic and political significance of this industry in Israeli eyes.
- 4 See, for example, www.nytimes.com/2013/04/14/education/edlife/inside-the-technion-israels-premier-technological-institute-and-cornells-global-partner.html; and www.haifaup.co.il (accessed 31 July 2019).
- 5 In March 2020 Israel's National Planning Authority approved a gradual, mandatory implementation of the Israeli green building standards as of mid-2021. However, it is too early at this point to assess the impacts on urban planning and sustainability policies in Israeli cities.
- 6 See www.tel-aviv.gov.il/About/Pages/energy.aspx (accessed 31 July 2019).

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