

Global Trends Shaping Life Quality in Agglomerations with Particular Emphasis on Mobility in Seaport Agglomerations

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ABSTRACT: The modern agglomerations development remains under the influence of current global trends: economic, environmental/climate, social, technological, geopolitical ones. At least six forces are expected to further disrupt the urban mobility landscape, especially coastal one. From self-driving vehicles and the sharing economy, to vehicle electrification, mobile computing, the Internet of Things and Block-chain technologies, each of these trends is quite significant on its own. The actions undertaken by city authorities aim at focusing citizens' attention on the need to improve air quality, decrease congestion in city's main streets, invest in one's health and physical condition, which increases the level of quality of life, and in turn provides the city with considerable economic benefits. The purpose of the paper is to explore global trends shaping life quality in coastal agglomerations with a special regard to sustainable mobility and to present the ISO 37120 - a tool allowing measurement, based on the indicators, of the cities resilience and performance.

1 INTRODUCTION

Global cities have a common ambition to become modern and attractive urban environments for their citizens and future generations. Constantly evolving, cities are facing challenges of population growth and climate change. Finding sustainable solutions, without compromising economic, social and environmental impact, has become one of their top priorities. While transport behaviours change, the number of vehicles on streets grows resulting in congestion, an increased number of accidents, exhaust and noise emissions and, consequently, a lowered life quality.

The 2020s are predicted to be a decade of transformation for urban mobility. Innovations in the transport sector continue to introduce new opportunities to enhance travel experiences in the cities. This is facilitated by business models that offer

a range of new mobility services, such as ride hailing, car sharing, bike sharing and Netflix-like vehicle-subscription models, that provide flexible options to meet travel needs.

The purpose of the paper is to explore global trends shaping life quality in coastal agglomerations with a special regard to sustainable mobility and to present the ISO 37120 - a tool allowing measurement, based on the indicators, of the cities resilience and performance. First, the current megatrends and life quality challenges with a special regard to sustainable mobility issue have been presented. In the second part, the ISO 37120 - a tool for measurement the city services and quality of life using standardized indicators, adopted recently by Polish coastal agglomerations, has been analyzed.

2 CURRENT MEGATRENDS AND LIFE QUALITY CHALLENGES WITH A SPECIAL REGARD TO SUSTAINABLE MOBILITY

In 2050 people living in cities are to constitute 2/3 (66%) of the global population. The data confirms the assumptions that contemporary cities are facing a challenge related to keeping the balance of resources and strengthening development which would improve security and the quality of life for numerous citizens (UNITED NATIONS, 2014). Unfortunately, urban transport is responsible for about a quarter of CO₂ emissions from transport. The gradual phasing out of 'conventionally-fuelled' vehicles from the urban environment is a major contribution to significant reduction of oil dependence, greenhouse gas emissions and local air and noise pollution (Burns 2013). Fully Electric Vehicles (FEV), for public and private transport, can contribute significantly to the lowering of the current pollution levels.

The local development remain under the influence of several current megatrends (tab. 1).

These megatrends shape today the largest changes of development factors and vehicles, determining the most important directions of their impact, changing the course of the development trajectory, including the local one, also in relation to the issue of mobility.

Figures 1 and 2 shows world megatrends and their impact on the future products, services and global economy till 2025. At least six forces are expected to further disrupt the urban mobility landscape. From self-driving vehicles and the sharing economy, to vehicle electrification, mobile computing, the Internet of Things and Blockchain technologies, each of these trends is quite significant on its own (Digital... 2018).

While all megatrends are important, their selection and raking indicate which seismic shifts will have particular relevance in shaping the landscape in which evolve this decade [Frost & Sullivan, 2018].

The mass adoption of motor vehicles (the 'automobility transition') was one of the major socio-economic transformations of the 20th century (Geels 2012). Over the 80 years in which the car has "wound itself inextricably into a large part of our affairs", much research has been undertaken about the evolution of the socio-technical systems that have facilitated mass car ownership, and how the economy

and society have been transformed by automobility, from the sheer distances travelled in everyday activities to the location of economic activity, the operation of the housing market, the structure of retailing and differential access to educational and health opportunities. Alongside these huge gains in prosperity and quality of life, however, came the well-known negative externalities of mass car use, such as congestion, crashes, poor air quality, physical severance, social exclusion and inactivity/obesity, which the state has often struggled to manage effectively (Docherty & all 2018).

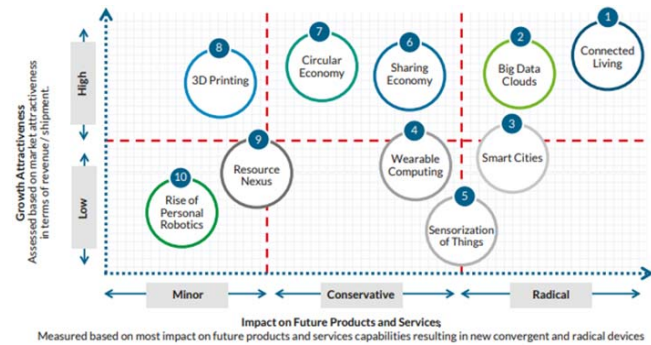


Figure 1. Megatrends impact on future products and services
Source: [Frost & Sullivan, 2018].

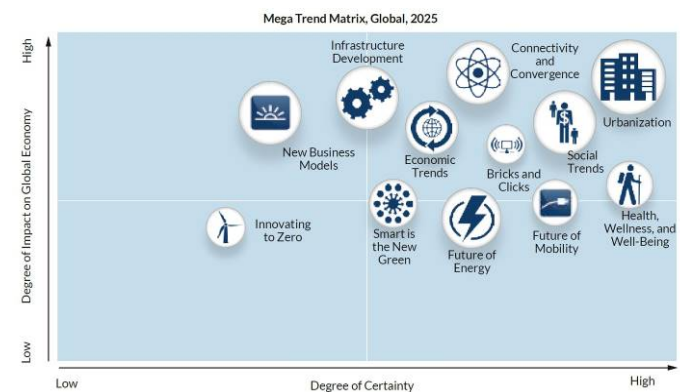


Figure 2. World megatrends till 2025 and their impact on the global economy.
Source: [Singh, 2019].

Table 1. Megatrends shaping life quality and examples of their emanations

Economic	Ecological/Climate	Social	Technological	Geopolitical
sharing & digital economy	climate changes and catastrophies	migrations	cybersecurity	globalisation
e-trade, consument needs redefinition	decarbonisation	demographic changes	artificial intelligence	poverty
new business models	energy storing	aging population	cloud computing	nationalism
crowdsourcing	renewable energy	exclusion (including digital one)	hydrogen economy	terrorism
uberisation		gamification	GPS	
virtual market			ITS, platooning, connected/automated vehicle, tracking&tracing, drones	

Source: own elaboration

In the early 1990s the phrase "smart city" was coined to signify how urban development was turning towards technology, innovation and globalisation (Schaffers and all 2018). The World Foundation for Smart Communities advocated the use of information technology to meet the challenges of cities within a global knowledge economy. However, the more recent interest in smart cities can be attributed to the strong concern for sustainability, and to the rise of new Internet technologies, such as mobile devices (e.g. smart phones), the semantic web, cloud computing, and the Internet of Things (IoT) promoting real world user interfaces. The concept of smart cities seen from the perspective of technologies and components has some specific properties within the wider cyber, digital, smart, intelligent cities literatures. It focuses on the latest advancements in mobile and pervasive computing, wireless networks, middleware and agent technologies as they become embedded into the physical spaces of cities. The emphasis on smart embedded devices represents a distinctive characteristic of smart cities compared to intelligent cities, which create territorial innovation systems combining knowledge-intensive activities, institutions for cooperation and learning, and web-based applications of collective intelligence (Komninos 2002 and 2008).

Contemporary imaginings of 'Smart Mobility' describe a transition of equivalent reach and significance to that of 'automobility', focusing on a range of positive changes to how we travel around. Proponents of the 'Smart Transition' outline a vision of the future in which mobility will be framed as a personalized 'service' available 'on demand', with individuals having instant access to a seamless system of clean, green, efficient and flexible transport to meet all of their needs (Wockatz and Schartau 2015).

Accompanied by the widespread adoption of connected and automated vehicles (AVs) (Fagnant and Kockelman 2015), it is argued that the 'Smart Transition' will bring huge gains in safety, and the costs of transport to the user will be lower because the capital stock of the mobility system, primarily infrastructure and vehicles, will be used much more efficiently. There will be much greater consumer choice as new models of shared ownership of mobility assets, real-time aggregation of data and peer-to-peer mobility matching reduces the grip of large monolithic providers on the supply of transport (Docherty & all 2018).

There will undoubtedly be a transition to smarter mobility futures which will have a significant impact on the role of mobility in society. New actors, networks and technologies are already fundamentally challenging the extant regime and how transport is governed. This is not a debate about state versus non-state actors but instead about the role the state takes within these new networks to steer, facilitate and also reject different elements of the mobility system (Docherty & all 2017). State power in the transport domain is weak in many places, especially those such as many North American and European cities where the private car is already the overwhelmingly dominant form of mobility and in which the state has little or no existing role in the 'belief system' about how mobility should be distributed beyond building

as many roads as possible (Fagnant, Kockelman, 2015).

The quality of life is related, among others, to the quality of the space in which people live, rest and socialize. It is particularly important to properly shape and develop the space located in the city center, which can be achieved through the implementation of restrictions on car parking and car traffic.

In order to increase participation, modernisation and building infrastructure in cities are important, as well as increasing gradually the integration of all transport means and forms. At the same time campaigns and active promotions affecting the transport habits of urban traffic users are becoming increasingly important. Today much attention is paid to information policy and the improvement of active mobility image as an important means of urban transport. There are good reasons to put mobility at the heart of Smart Cities policies (Sustainable Urban Mobility 2018):

With Sustainable Urban Mobility Plans, Urban Mobility has the framework for integrated planning. New approaches to urban mobility planning are emerging as local authorities seek to break out of past silo approaches and develop strategies that can stimulate a shift towards cleaner and more sustainable transport modes.

In all modes of transport, and for both transport of goods and passengers, electrification is happening. This brings – with the advantages such as clean air, energy independency etc. – also a set of challenges (deployment of charging infrastructures, links with shared mobility).

Urban transport is a key area for the transition towards the sharing economy. Both public initiative (public bicycles, shared cargo-bikes, etc.) as private initiative (ridesharing applications, car sharing, peer to peer parking apps) see the benefit of making better use of urban transport assets.

Also, transport is an endless source of interesting data. The traveler is becoming more and more connected. Vehicles are connected, public transport users check in and check out with smart cards, cyclists and pedestrians use apps to monitor their movement. These data are becoming increasingly available through open data portals of cities (Przybyłowski, 2018).

3 ISO 37120 - CITY SERVICES AND QUALITY OF LIFE INDICATORS IN THE COASTAL AGGLOMERATIONS

The sustainable development of the biggest cities of the world represents a major challenge for the future of the planet in the 21st century, relatively to the contribution and adaptation to climate change, natural resources consumption, energetic transition (the "after oil" transition), population mobility, welfare and security, pollution, the global economic growth (Ducruet, C., 2011). For historical reasons, a great part of these cities, and especially those of emerging countries like Brazil or China, are located on a coast or on a river, thus including a port and

playing a special and major role in the national and the global economy (nodes of logistic chain, concentration of population, touristic attractiveness).

Seaport agglomerations are key places where economic strength, competitiveness, human capital and global appeal, population and migration processes are increasingly concentrated. Since ports throughout history handled an important kind of transportation, they may dominate the local economy of a coastal city. The present day challenge, is the inability of most coastal cities, to absorb rapidly expanding port developments and population growth. However, port cities and areas have a particular development potential (Girard L. F., 2013).

Port city, which serves as a link between the local economy and the global economy, is an interaction of both urban and port systems, giving rise to its complex and dynamic nature (Hein, C., 2011).. While the development of a port city is an aspect that requires continual research and monitoring, the current literature addressing the issue of sustainable development in port cities is rather limited. In addition, empirical studies often analyse the port system and the urban system separately, with little research attempting to integrate the two systems.

Harbor areas become vital, when they act as dynamic, complex systems, capable of transforming and adapting to the continuous pressure of change from the outside and when they are able to modify their physical structure regarding space, organization and functions, by combining infrastructures, facilities, installations, etc., while maintaining their own identity (Schubert, D., 2011). Here, green industrial activities, able to decouple economic wealth production from ecological losses, should be grounded while considering the model of living systems (Boulos J., 2016).

A port areas' smart development should be based on circular processes at three main levels (Girard L. F., 2013):

(1) Economic: symbiosis between companies for value creation, allowing synergies and also stimulating circuits between company and community prosperity; between companies and the city; between all actors and the outside territory;

(2) Social: able to regenerate interpersonal relationships—often weakened in cities—through relationships with “places”;

(3) Ecological: all living systems are characterized by circular processes and are able to conserve and reproduce themselves. Circular processes emerge through re-use, recycling and regeneration of materials and energy, with a reduction of negative externalities. The resilience of systems and creativity are stimulated by circular processes, which break down linear metabolism.

Existing indicators at the local level are often not standardized, consistent, or comparable over time or across cities. As part of a new series of International Standards being developed for a holistic and integrated approach to sustainable development, that includes indicators for city services and quality of life, indicators for smart cities and indicators for resilient cities, this set of standardized indicators provides a

uniform approach to what is measured, and how that measurement is to be undertaken. As a list, it does not provide a value judgement, threshold or target numerical value for the indicators.

These indicators can be used to track and monitor progress on city performance. In order to achieve sustainable development, the whole city system needs to be taken into consideration (McCarney, 2015). For developing countries, especially, consequent monitoring and evaluation of urban change is a major issue in urban planning and management. In this context, the ISO (the International Organization for Standardization) and the responsible committee ISO/TC 268: Sustainable development in communities developed a document that outlines indicators for city services and quality of life, and provides a uniform approach to what is measured and how that measurement is to be undertaken. The mentioned standard defines and establishes methodologies for a set of indicators to steer and measure the performance of city services and quality of life. The indicators provided through the ISO document can be used to track and monitor the progress of cities' performance. In total, 163 countries are members of the ISO through their national standards bodies, and the standards provided by the ISO committee generally have a high degree of popularity throughout different areas. These facts increase the likelihood of the ISO 37120:2014 actually being applied and put to operational use in the future (Lehner A. & all, 2018).

The indicators and associated test methods in this document have been developed in order to help cities (*Sustainable cities and communities...*, 2019-01-30):

- measure performance management of city services and quality of life over time;
- learn from one another by allowing comparison across a wide range of performance measures; and,
- support policy development and priority setting.

Maintaining, enhancing and accelerating progress towards improved city services and quality of life is also fundamental to the definitions of both smart cities and resilient cities. This document is intended to be implemented in conjunction with ISO 37122 and ISO 37123 to measure progress towards smart cities and resilient cities, respectively (Fig. 3).



Figure 3. Sustainable development of communities — Relationship between the family of city indicators standards Source: *Sustainable cities and communities — Indicators for city services and quality of life*, <https://www.iso.org/obp/ui/#iso:std:68498:en>, 2019-01-30.

The indicators are structured around themes. Recognizing the differences in resources and capabilities of cities worldwide, the overall set of indicators for city performance has been divided into “core” indicators (those implementing this document shall follow) and “supporting” indicators (those implementing this document should follow). The ISO 37120 defines 21 city themes of City Services and Quality of Life including as follows: Economy, Education, Energy, Environment and climate change, Finance, Fire and Emergency Response, Governance, Health, Housing, Population and social conditions, Recreation, Safety, Solid Waste, Sport and culture, Telecommunications, Urban Planning, Transportation, Urban/local agriculture and food security, Urban planning, Wastewater, Water (ISO, 2014).

For example, as far as the Transportation is concerned, among the indicators one may find such as: Kilometers of high capacity public transport system per 100,000 population and Number of personal automobiles per capita (Lehner A. & all, 2018).

Many cities, including coastal ones, have already implemented this standard. Worldwide, one may find: Boston, Dubai, Los Angeles, Shanghai. Among European agglomerations, there are: Amsterdam, Barcelona, Helsinki, London, Rotterdam. Gdynia - a seaport city at the Baltic Sea, in 2017, was the first one in Poland to receive the international certificate of intelligent city according to ISO 37120. Gdańsk - another city of the coastal Tricity agglomeration - was the second one. The certificate confirms that these Polish coastal cities develop in a sustainable manner by monitoring the quality of life of its residents on an ongoing basis, and also reacts in a situations of deterioration of these conditions. Representatives of these cities, among the reasons for which the ISO 37120 standard was implemented in the city, mention issues related to:

- rankings - justification of high places in rankings and good position of the city in new rankings,
- acquiring knowledge (as a reliable basis for city management) about areas for improvement and areas in which the city conducts good actions,
- marketing values,
- identification of the city as a smart one,
- possibilities of comparing cities.

4 CONCLUSIONS

The contribution of this paper consists on the investigation of the importance of the global trends shaping life quality in the agglomerations with a special regard to sustainable mobility. Another one is the presentation of a tool - ISO 37120 - allowing the measurement, thanks to concrete indicators, of the city performance. City authorities, including coastal agglomerations being particularly exposed to heavy congestion, are increasingly promoting various types of actions to increase the level of quality of life, but despite the growing awareness of residents regarding, among others, travelling by other means of transport than a car, the share of the latter is unfortunately constantly increasing.

Initiatives taken in favour of sustainable urban mobility, like on the Polish coast at the Baltic Sea in Gdynia and Gdańsk, may help in shaping the future of the contemporary society, putting the main focus on the citizens' needs and enhancing life quality. These actions aim at focusing citizens' attention on the need to improve air quality, decrease congestion in city's main streets, invest in one's health and physical condition in order, in turn, to provide the city with considerable economic benefits and to face global challenges. In the context of the United Nations Agenda 2030 for Sustainable Development and the presented Sustainable Development Goals (SDGs), the process of developing and agreeing on indicators to monitor the SDGs implementation becomes fundamental.

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