Quality of life in the concept of strategic management for Smart Cities

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Abstract

Smart City concepts are facing ecological, economic and social changes, creating opportunities for better lives, sustainability, development and resilience. Yet strategic management has to flexibly respond to ongoing changes, adapt to trends in the outside environment and, in particular, ensure common elements of Smart City concepts such as the quality of life. While significant, the term "quality of life" is somewhat ambiguous at present, not understood comprehensively, and no set of factors to measure it in cities exists. This paper seeks to respond to the gap in the research by developing its own definition of quality of life, identifying the factors that need to be evaluated in sustainable Smart Cities according to best practice. The objective set out was fulfilled by means of the secondary analysis of articles about the quality of life in Smart Cities and by comparing and summarising them, along with induction, deduction, abstraction and logic. The most frequently used factors were mainly found to be the environment and social inclusion; essentially, ecological and social aspects in combination with hard and soft factors. In theoretical terms, the contributions of this paper to the field are the definition, the analysis undertaken and results for fellow researchers. The practical benefits mainly encompass the strategic management of cities through a set of frequent factors used in international best practice.

Keywords

quality of life, strategic management, sustainability, Smart City, factors

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Introduction

Quality of life is directly linked to the technological development and building of Smart City concepts. The term originated in the 1920s and is presently conceptualised as a multi-component phenomenon related to the external environmental trends that have emerged from urbanisation, migration, population growth and scarce resources. These trends are going to have an impact on the concept until 2050 (Burkina et al., 2020;

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Wann-Ming, 2019). Wann-Ming takes the view that Smart City concepts have benefits for quality of life, and it is therefore essential for strategic urban management to both plan and control (Wann-Ming, 2019; Sharma and Abhay, 2022).

Social, environmental and economic developments are the forces driving quality of life, and the emphasis that has been placed on these forces is reflected particularly in urban planning, sociology and management sciences. The use of factors to measure quality of life has thus become an essential element in developing and evaluating Smart City strategies (Wann-Ming, 2019; Sharma and Abhay, 2022).

Khavandgar (2016) points out the need for urban environments to manage environmental quality, as previous research on the perception of the concept and the establishment of factors had not adequately covered this. Several others have mentioned a research gap in identifying the factors that influence quality of life in a Smart City, including an ambiguous perception of the concept itself (Tijanić, 2019; De Guimarães et al., 2020; Ligarski and Wolny, 2021), an opinion shared by several experts in the field such as Hall (2000), Giffinger et al., (2010), Nam and Pardo (2011), Thuzar (2011), Nilsenn (2019), and Wolfram (2018).

Quality of life is highly topical today and several experts see new concepts and cities of the future having to come to terms with this complicated issue by 2030 (D´Alpaos and Andreolli, 2020; Yang et al., 2021; Senousi et al., 2021). As the issue has become more topical and because it has not received a sufficient amount of attention, in the opinion of Persaud et al. (2020), De Guimarães et al. (2020), and Ligarski and Wolny (2021), a research gap has emerged, which we decided to fill with our own research. Another motivation behind this paper was the desire to build upon our previous research and focus on Smart City issues from the perspective of sustainability. In previous studies (Šulyová and Vodák, 2020; Kubina et al., 2021), we had identified a definition of a Smart City from a quality of life perspective, but it was defined generally, ambiguously and missed the big picture.

In other studies dealing with quality of life, the focus is on the primary sector, regions and job potential (Filipchuk et al., 2014). However, there is a lack of focus on public administration of urban concepts, which are also strategically managed and form an important part of management. Linking the theme of the Smart City with that of sustainability, taking social and managerial aspects into account, represents a unique holistic view for scientists and entrepreneurs as they play the role of citizens. The contribution of the article is the analysis of the results of global best practices in terms of Smart Cities according to the latest data from the Mercer rankings in connection with the focus on quality.

The research challenge which this paper seeks to confront is the ambiguous perception of quality of life and the factors thereof in the concept of sustainability-based Smart Cities. The objectives are i) to develop a unifying definition of quality of life and ii) to identify the factors that need to be evaluated in sustainable Smart Cities from the results of best practice cases.

The ambiguous perception of the concept of quality of life, the lack of summarisation of factors and summary results of Smart City best practice form the basis for the creation of research questions in the article.

In order to fulfil the objectives set, a secondary analysis would address the following research questions:

RQ 1: How do best sustainable Smart City practices conceptualise the notion of quality of life?

RQ 2: What factors do best sustainable Smart City practices use to measure quality of life?

RQ 3: What areas and factors do best urban sustainability practices prefer?

1. Literature review

Trends in urbanisation, migration and population growth are driving demands to meet sufficient standards for satisfaction with quality of life (Zachová and Horák, 2020; De Guimarães et al., 2020). According to Zachová and Horák (2020), the development and success of Smart City concepts depends on this element in up to 70% of cases, with residents of Smart Cities demanding quality, especially when it comes to services and the use of limited natural resources. The same opinion has accordingly been expressed by Chen and Chan (2022) and is linked to residential support for the construction, development and sustainability of Smart City concepts.

De Guimarães et al. (2020) have conceived their own perception of Smart Cities as the cognitive and individual wellbeing of their residents, the level of which is influenced by behavioural and social elements. Their research has identified the following factors as having an impact on the quality of life of Smart City stakeholders beyond the strategic level of city management: (i) transparency of shared information to support management and decision-making; (ii) cooperation among all stakeholders; (iii) communication between them on the basis of intelligent technologies; (iv) promoting a strategic level of city and state governance (De Guimarães et al., 2020).

Common elements are an orientation toward centrism in the role residents play, quality of life dependent on the strategic management of cities, and improvement by means of ISO standards (such as ISO 37120) and digitalisation (De Guimarães et al., 2020; Wolniak and Jonek-Kowalska, 2021). Although definitions of a Smart City vary, and there is currently no uniform conceptualisation of a "Smart City", nonetheless, even the outcome of our own research indicates quality of life to be the central element (Kubina et al., 2021; Šulyová and Vodák, 2020; Persaud et al., 2020). Persaud et al. (2020) also assert that the application of environment-friendly innovations and modern technologies can increase the level of overall satisfaction by between 30% and 50%. They define the term as general, subjective satisfaction with physical, social and emotional wellbeing linked to a recognised value system, while considering communication through social networks, transportation, safety and health to be among the essential elements in the development of the Smart City concept (Persaud et al., 2020). Therefore, quality of life should be promoted in every Smart City concept, regardless of the conceptualisation and dimension. Smart City attributes in the form of relevant factors are essential (Keshavarzi et al., 2021).

There has been a limited amount of survey data pertaining to the issue, but the value thereof has been demonstrated by support in governance and decision-making, including in the forecasting of future problems and the adaption of measures for sustainable urban development (Ligarski and Wolny, 2021).

A rather complicated concept of quality of life can be found in sociology, psychology, ethics and management. Ligarski and Wolny (2021) view the concept through hard factors that meet qualitative and quantitative conditions for satisfying the needs of a city's residents. They measure the level of quality with a set of 25 factors, of which residents consider the 10 most important to be (i) labour conditions; (ii) environmental protection; (iii) health; (iv) the social aspect; (v) the condition of infrastructure; (vi) housing; (vii) future outlook; (viii) technology; (ix) strategic management planning; (x) water management.

Santos-Júnior et al., (2020) lean toward previous definitions and stress the importance of objective and subjective forms along with the impact of technological development. They classify associated factors into seven domains: material wellbeing (reflected in economic factors such as income and cost

of living), community (social factors and relationships with people), emotional wellbeing (reflected in cultural indictors and leisure time), health and safety, services (transport, waste disposal and waste treatment), value-related personal lifestyles, and awareness (reputation and natural aspects).

Popescu (2020) prefers to look at the Smart City concept through the elements of environment, participation, services and leisure. The transformation process is defined here as conceptualising quality of life in a Smart City along with resilience and the effective use of limited resources. In his view, technological innovation, including approaches that reflect strategic city management, has now become the solution. Żywiołek and Schiavone (2021) share the same opinion, incorporating security in modern applications and services, with its positive impact on public confidence, among the essential factors.

Ziganshina et al., (2020) likewise appeal to the desire among all age segments in an urban population to raise quality of life to a higher level, with older generations particularly requiring transparency and adequate awareness of greater satisfaction in the wake of rapid change and adapting thereto (Ziganshina et al., 2020). In most cases, a continuous improvement in the quality of life is the primary objective found in documented strategies for the management of Smart Cities. Przybyłowski et al. (2021) believe that the Smart Cities concept should reflect economic, environmental and social aspects while streamlining planning and control processes. They recommend assessing quality in accordance with the factors outlined in ISO 37120, which covers 17 areas concentrating on, for example, urbanism, the environment, water sources and management. They are divided into 47 baseline and 54 auxiliary factors. For European cities, the sustainability outcome was broken down into the number of different impurities in the air, the amount of solid waste, water consumption and the number of green zones. On the social side of the ledger, factors included the participation of women in elections and the number of cities with a population of over 100,000. Further factors include health, safety and mobility.

Factors are categorised by Pira (2021) into those covering people, government, housing, the economy, mobility and the environment. In contrast to earlier conceptualisations, the study prioritises the management of scarce natural resources, integration, social cohesion and the willingness of the population to adapt to new measures and changes.

A comparison of common and different elements of perception of the concept of quality of life in Smart Cities according to a number of authors from around the world can be found in Table 1. The occurrence of a factor is indicated by an "x", while its absence is represented by a blank line. From selected sources it was possible to identify up to 12 factors that are used as a basis for defining the quality of life in Smart Cities: (i) urbanism; (ii) migration; (iii) population growth; (iv) services; (v) limited resources; (vi) cooperation; (vii) citizens' satisfaction (trust); (viii) awareness; (ix) communication; (x) support; (xi) system of values; (xii) resilience.

The most frequent factors from Table 1 include (i) services covering, for example, safety, health or transport aspects; (ii) using limited resources in an efficient and sustainable way; (iii) cooperation; (iv) citizens' satisfaction building mutual trust; (v) awareness through the sharing of transparent information; (vi) open and regular communication; (vii) support for the strategic management of the city; (viii) building resilience to climate change and adapting to it.

Table 1. Common and different factors of perception of the concept of quality of life in Smart Cities

Author(s)/Factor	Urbanism	Migration	Population growth	Services	Limited resources	Cooperation
Zachová and Horák, 2020	X	X	X	X	X	
Chen and Chan, 2022						X
Persaud et al., 2020				X		
Ligarski and Wolny, 2021				X		
Santos-Júnior et al., 2020				X		
Popescu, 2020				X	X	X
Żywiołek and Schiavone, 2021				X		
Przybyłowski et al., 2021	X			X	X	
Pira, 2021				X	X	X

Author(s)/Factor	Citizens' satisfaction (trust)	Awareness	Communication	Support	System of values	Resilience
De Guimarães et al., 2020	X	X	X	X		
Wolniak and Jonek-Kowalska, 2021	X			X		
Persaud et al., 2020			X		X	
Ligarski and Wolny, 2021	X					X
Santos-Júnior et al., 2020	X	X	X		X	X
Popescu, 2020		X	X	X		X
Żywiołek and Schiavone, 2021	X					
Ziganshina et al., 2020		X				
Przybyłowski et al., 2021				X		X
Pira, 2021	X	X	X			X

Source: own elaboration

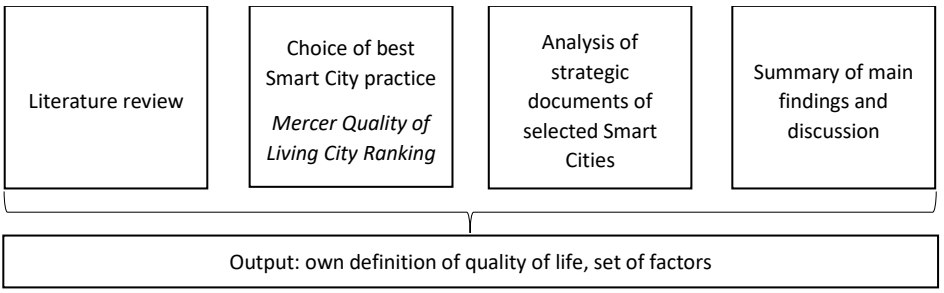
This implies a preference for social aspects, the value system through the satisfaction of basic needs and the ecological sustainability of the system for future generations. The term is very broad and its common factors take external trends and influences into account only to a limited extent (for example, urbanism, migration or population growth).

It is, therefore, appropriate to summarise the list of factors that should form the essence of the definition of the term of quality of life in the Smart City concept, based on the results of world best practices in the field. Based on theoretical data, the term is understood and operationalised as a factor of the development of the Smart City concept, which builds the trust and satisfaction of citizens and contributes to building sustainable resilient cities with the efficient use of limited resources and the support of strategic city management.

2. Methodology

Figure 1 diagrams the methodological approach used to resolve the scientific challenges and fulfil the objective of the paper.

Figure 1. Methodological procedure for the paper



Source: own elaboration

The first step involved the literature review that had been selected from the Web of Science and Scopus databases. The search string was composed of the phrase "quality of life in Smart City", which first filtered out 623 publications. Further selection criteria were then set in order to obtain up-to-date articles (i) published in 2020, 2021 and 2022 inclusive (up to April 2022); (ii) focusing on sustainability; (iii) including links with the new keyword "factors".

The search string was now revised to be composed of the phrase "quality of life and its factors in Smart City concept".

After stripping out duplicate articles that had been found in both the Web of Science (WoS) and Scopus databases, abstracts from 25 published papers meeting the selection criteria were subsequently analysed. They were read and, in the end, 17 publications formed a source for Literature Review (section 1). This method guaranteed the review of articles which were relevant, topical, reflected expert opinions, and thematically concentrated on the focus of this paper.

Having reviewed the references to develop the analytical base, the most sustainable Smart Cities were then sought from the Mercer Quality of Living Ranking (Mercer, 2022a). The current data below was taken from the 2019 ranking (not updated in 2020 and 2021 due to the COVID-19 pandemic), with five cities included in the top three positions because three of them were tied for third place (City of Vienna, 2022).

The Mercer ranking compares the quality of life aspect of 500 cities around the world based on factors such as (i) ecology; (ii) the political and social environment; (iii) the economic environment; (iv) the cultural environment; (v) housing; (vi) health; (vii) education; (viii) public services and transport; (ix) recreation (Mercer, 2021; Mercer, 2022b). Table 2 shows how the cities were ranked.

Table 2. Mercer Quality of Living City Rankings

Mercer Quality of Living City Ranking 2019		
Rank	**City**	**Region/Country**
1.	Vienna	Austria
2.	Zürich	Switzerland
3.	Vancouver	Canada
3.	Munich	Germany
3.	Auckland	New Zealand
6.	Düsseldorf	Germany
7.	Frankfurt	Germany
8.	Copenhagen	Denmark
9.	Geneva	Switzerland
10.	Basel	Switzerland

Source: Mercer, 2022a

In order to answer the three research questions, cities that had ranked high in the table (from first to third inclusive) were selected in such a way for each to belong to a different region and country to avoid duplication and subsequent comparison with each other. Then the Smart City strategy documents for each of the selected cities (Table 3) were analysed. The Smart Cities ultimately selected were Vienna, Austria; Zurich, Switzerland; Vancouver, Canada; Munich, Germany; and Auckland, New Zealand (Table 2). A survey was then conducted of the factors used and their preferences, alongside perceptions from the cities of what quality of life means.

Table 3. Strategic documents analysed for selected cities

Smart Cities strategic documents		
Rank	**City**	**Strategic document**
1.	Vienna	Smart City Wien Framework Strategy 2019–2050
2.	Zürich	Strategies Zürich 2035
3.	Vancouver	Greenest City
3.	Munich	Das ist das Konzept (This Is the Concept)
3.	Auckland	Auckland Plan 2050

Source: own elaboration

Having analysed the strategic documents (listed in Table 3), the factors most seen in the best sustainable Smart City practices of each city were summarised as the main findings.

In addition to the secondary analysis, the article also used methods of comparing the obtained results for the purpose of identifying common and different elements and factors (sections 2 and 4). After the analysis, a synthesis and summary of the main findings were carried out, which was the input for the discussion part of the article. From a large number of factors, specific ones were selected on the basis of abstraction, and methods of induction and deduction were used to create the introduction and conclusion.

3. Research results

This section is logically organised according to the results from the Mercer Quality of Living City Ranking (Mercer, 2022a).

3.1. Vienna

Vienna sees its Smart City concept in terms of a climate and environmental objective that every resident should be able to achieve. The strategy reflects the effective use of limited resources based on social and technological innovations that focus on the quality of life. The development of a sustainable Smart City is one of three critical dimensions alongside resources and innovation. Strategic management helps build the resilience of the city, although only if it can eliminate external environmental influences (pandemics, conflicts, scarce resources) that negatively shock the system. Vienna's leadership believes that the key elements of the sustainable development and strategic management of the city will guarantee the quality of life for its residents (City of Vienna, 2019). Quality of life is measured in Vienna through factors such as (i) job opportunities; (ii) work-life balance; (iii) access to services; (iv) safety; (v) recreation; (vi) peace; and (vii) personal development by means of education (City of Vienna, 2019).

An innovative factor is the "extended living room", which is what local Viennese call their city's coffee houses. The city strives for the use of its streets other than by cars, such as for playing games and sports or as additional space for customers of its cafes to be seated. Sustainability is dominated by such factors as clean air, water quality and efficient waste management (City of Vienna, 2019).

An important part of the satisfaction of the city's inhabitants is the adaptive and flexible response of the city to climate change. Today, quality of life is a driving force and a competitive advantage for Vienna. The starting point is long-term perspective planning, which takes into account reliable scientific data and adjusts current strategies and standards depending on the state of the climate. Strategic management prefers soft factors ranging from the level of environmental protection to education. Vienna's Smart City approach to quality of life highlights the necessity for comprehensive perception through each resident's own satisfaction with the current, as well as the future, condition of the city. Satisfaction is monitored by means of regular surveys.

The ambition of the city is to convey the quality of life to citizens with lower incomes. Here social inclusion and digitalisation also play key roles. In Vienna, there are so-called "repair cafés", which are used to self-repair household appliances, thus making efficient use of limited resources and building conscious communities in the local neighbourhood. Digitisation is based on the principles of meeting the needs of citizens, as all stakeholders should have access to the shared benefits of technological progress and services in the city. The key elements of success are diversity, efficient urban infrastructure, cohesive communities and support for the city's competencies through its strategic management and research capacity. The constant improvement and stabilisation of the quality of life are directly linked to the value system and the satisfaction of the needs of the people of Vienna (City of Vienna, 2019).

3.2. Zürich

Zürich defines the quality of life as a guarantee of the sustainable development of the city based on resilience to climate change and the promotion of diversity. It means providing adequate services, modern infrastructure, security, housing, environmental development and social cohesion. The principal dimensions are quality of life, stability and the level of education. The essential driving forces are urbanisation and population growth in cities (Stadt Zürich, 2015).

Sustainable development mediates suitable conditions for business activity, supporting the ecological and social aspects and a cosmopolitan outlook. The basic factors in

Zürich are elements in the area of (i) services; (ii) modern infrastructure; (iii) security; (iv) housing; (v) environmental development; (vi) social cohesion; (vii) physical well-being; (viii) mental and social well-being (adaptation to changing requirements and conditions); (ix) collaboration; (x) the value of leisure time (recreational areas, the use of a natural ecosystem of greenery and water areas) (Stadt Zürich, 2015).

The factor preferred by Zürich in its Smart City strategy is a favourable environment created by recreational space – specifically leisure time spent using a natural system of green zones and water bodies (Stadt Zürich, 2015).

The strategic approach also takes into account diversification, innovation, cultural aspects and the response to demographic change, which create pressure for an internal increase in the population density of the city with the elimination of the polarisation of society. The city council plans to increase the quality of life by 2050 through the creation of new flats. Services are provided to residents on a digitised basis. From an environmental point of view, citizens have taken the initiative to reduce energy consumption and emissions. In accordance with the principles of sustainability and resilience, the strategic management creates plans for the settlement, energy and transport policy of the city. All activities of the city council must meet the condition of application in the long term, which will reflect the interests and needs of the population. The quality of life is thus mediated through the response to trends in the external environment in the form of population growth, factors of social diversity and solidarity, ecological and technological aspects in the form of protection of limited resources, digitisation and innovation (Stadt Zürich, 2015).

3.3. Vancouver

Vancouver's sustainability action plan explores the Smart City concept as an element of ensuring global competitiveness, with the aim of stabilising the natural ecological system and responding to the challenges of creating "green jobs", communities and satisfied residents (City of Vancouver, 2020).

Green jobs connect the sector of classic and modern jobs on the basis of sustainable departments, for example in the fields of finance, fashion, energy or telecommunications, construction, education, consulting and transport. The strategic management of the city supports the creation of green jobs through job clusters, business incubators, and business engagement programmes, which ensure greater competitiveness, reputation and productivity. Communities and citizen satisfaction depend on identification with the city's vision, strategic management and its plans, including the actions taken to implement the plans in practice. Building partnerships, collaboration and participation is an important part thereof (City of Vancouver, 2020).

Factors in Vancouver's Smart City strategy document particularly cover (i) waste reduction; (ii) social inclusion; (iii) the creation of green communities; (iv) lower production of greenhouse gases to conserve the ecosystem for future generations (adapting to change); (v) peace; (vi) water quality; (vii) human rights (City of Vancouver, 2020). Vancouver prioritises physical wellbeing based on mobility, associating environmental protection therewith through a larger population of active residents, cleaner air and fewer traffic accidents.

The quality of life, therefore, depends to a large extent on meeting the needs and provision of services in the field of health care, resilience to climate change, the protection of limited resources, and building conscious communities and a strong economy through so-called green jobs.

3.4. Munich

Because Munich's strategic management is underscored by a belief in managed growth, this Smart City sees strategies and monitoring quality levels as critical to its mission. It seeks to respond in good time to changing conditions and trends, both in the urban

concept and above all in the social aspect represented by its residents. Quality of life is perceived as a measurable element to be managed in order to create social, economic and environmental aspects in the concept of Smart Cities characterised by population growth. Resilience in the face of climate change is fundamental. Smart City Munich uses a set of different factors in the areas of (i) sustainability including citizen participation in decision-making processes; (ii) the affordability of housing; (iii) attractive green areas; (iv) free time; (v) sustainable transport based on adaptation, specific challenges and population growth (City of Munich, 2013). Munich's strategic management focuses primarily on adjusting to climate change, specifically on sustainability, resilience and clean air. The social and environmental aspects are key points in its strategy.

As the population grew, the city supported the implementation of innovative concepts in connection with regional transport policy. Electric cars, car sharing and e-bikes improve suburban transport and access to services. The quality of life can also be greatly influenced by the business sector, which generates high emissions. Munich has set itself the goal of reducing emissions from production by up to 50% by 2030. The city must develop, but at the same time it must achieve a certain degree of attractiveness in order to maintain the quality of life. As such, economic competitiveness, the level of education, the harmonisation of cultural differences and the development of individual creativity and satisfaction are important aspects. In the long run, therefore, the basis is primarily the social and ecological background of the city government. Strategic management must therefore take into account not only collective needs but also individual specifics when planning and decision-making. The connection of nature with technology is manifested in, for example, an energy centre for 319 houses, which is located under the natural grassy surface of a hill. It is about harmonising modern know-how and the quality of life of citizens. To achieve citizen satisfaction, the city predictively anticipates problems, takes corrective action as soon as possible and creates solutions based on cooperation with all stakeholders. Involvement, mutual trust and satisfied needs thus mediate the satisfaction of citizens, the quality of life and the attractiveness of the city (City of Munich, 2013).

3.5. Auckland

Auckland has built a good reputation from having provided its residents with a high quality of life, seen through the lens of the environment and of lifetime opportunities that are based on population diversity (and linked to population growth). These are perceived in such a way that neither limited resources nor the natural ecosystem are compromised. Both the material and mental aspects are examined, including the value of leisure, work-life harmony and participation (Auckland Council, 2018). Auckland measures quality of life through factors such as (i) trust; (ii) social inclusion; (iii) health; (iv) education; (v) employment; (vi) safety; (vii) local participation; (viii) adaptation; (ix) availability; (x) efficient infrastructure; (xi) connectivity (Auckland Council, 2018). The factor preferred by Auckland in its Smart City best practices is the mental wellbeing of its residents, which is supposed to be promoted through the creation of social connections, building self-confidence, identity, a value system, general prosperity and satisfaction with life.

Quality of life is regularly measured through population satisfaction surveys. Strategic management assesses a city's identity based on the shared values of its residents in the form of culture, traditions, customs and opinions. In this way, cohesion and the building of conscious communities are promoted. The city management then works with these communities on joint plans, sharing responsibility for the city's development, building mutual trust and a willingness to participate in change. As many as 53% of

Auckland residents believe that cultural diversity enhances the quality of life in the city. Access to services, ample space for housing and leisure activities generate an urban environment and an attractive space for business, job opportunities, innovation and support (Auckland Council, 2018).

4. Discussion

Common elements in the definition of quality of life include trends in urbanisation and population growth, which Zurich, Munich and Auckland also favour in their own conceptualisations of the term (Zachová and Horák, 2020; De Guimarães et al., 2020; Stadt Zürich, 2015; City of Munich, 2013; Auckland Council, 2018).

Support from the local population, as an element in the conceptualisation, is noticeable in the definition provided by Vicky Chen and Irene Chan, and also happens to appear in the Smart City strategies of all five of the cities examined in this paper. Chen and Chan (2022) consider social inclusion, and also the incorporation of collaboration and participation, to be very significant elements. Yet they are inclined to express this opinion as it reflects the trend toward creating centrist, new generation Smart Cities that emphasise the demands and requirements of its residents.

According to the results above and Vienna's own definition of quality of life, the concept has to be perceived individually, a point of agreement expressed by De Guimarães et al., (2020) and Ligarski and Wolny (2021). An essential aspect of conceptualisation is the role played by strategic management, which is supposed to eliminate the adverse impacts of external factors (City of Vienna, 2019).

An associated finding is the impact of digitalisation which is seen in both the theoretical opinion hypothesised by Wolniak and Jonek-Kowalska (2021) and in the practical outcomes in Vienna's Smart City strategic document (City of Vienna, 2019). Our own opinion is that digitalisation and the technologies associated therewith should create the core of the Smart City concept, while stressing the social and behavioural aspects including the environment and strategic management, which chimes with the reasoning and definition provided by Persaud et al., (2020).

A different view is taken by Ligarski and Wolny (2021) and the City of Munich (2013), preferring hard factors and considering them to be more critical. In contrast, most of the cities analysed here prioritise social inclusion, and Vienna uses only soft factors (City of Vienna, 2019). Based on the results of our analysis, we lean toward a combination of hard factors, because of the need for measurability, and soft factors to highlight the subjective form of the concept.

Our opinion considering the notion of quality of life until 2030 is up-to-date and has been confirmed in an analysis of strategic documents covering the period up to 2050.

The findings above have led us to conceptualise the term "Smart Cities" within the concept of sustainable cities, as the inclusion of social, ecological and economic aspects incorporating both hard and soft factors that interact in their strategic management. Major elements of the above are the technological foundation, focusing as part of the social orientation on the value system, and individual satisfaction including the overall conservation, sustainability, stability and harmonisation of the urban environment ecosystem in the 21st century, taking trends in the external environment into account (climate change, migration, population growth, etc.). The author's definition differs from the current definitions in its complexity, as it includes all aspects, strategic management, the external environment and its impact on the Smart City system.

Within the factors, the common elements found in Table 4 (where the occurrence in a city is indicated with an "X") include social inclusion (participation and collaboration), adaptation, leisure activities and access to services. This finding supports the preference for the social aspect and change management.

Table 4. Quality of life factors summarised in the Smart City concept

Factor/City	Vienna	Zürich	Vancouver	Munich	Auckland
Job opportunities	X				X
Balance	X				
Access to services	X	X			
Safety and security	X				X
Recreation and leisure	X	X		X	
Peace	X				X
Education and personal development	X				X
Extended living room	X				
Clean air	X		X	X	
Water quality	X				
Adaptation		X	X	X	X
Collaboration/participation/social inclusion		X	X	X	X
Waste reduction			X		
Housing				X	
Number of green zones				X	
Health					X

Source: own elaboration

The factors most preferred by the cities examined for this paper are the level of environmental protection, taken from the perspective of clean air and water quality, and social inclusion factors (Table 5).

Table 5. Preferred quality of life factors summarised in the Smart City concept

Factor/City	Vienna	Zürich	Vancouver	Munich	Auckland
Environment	X	X	X	X	
Education	X				
Social inclusion	X	X	X	X	X
Digitalisation	X				
Individual satisfaction	X				X
Recreation and leisure		X			
Mobility			X		
Adaptation				X	

Source: own elaboration

The contribution of the article is a list of factors, which will be followed by the creation of factors of their measurement, comparison and evaluation in future research activities. A future research goal is, in addition to the implementation of our own primary survey and the design of a management model in connection with the quality of life factors, the

creation of a bespoke list of Smart Cities with the highest quality of life and comparison with other rankings.

Conclusions

While conceptualising quality of life in Smart Cities has not been unambiguous, it is still strongly subject to trends that are influencing Smart City concepts on a global scale. An analysis of relevant publications and strategic documents outlining the best practices of cities has produced a uniform, comprehensive conceptualisation, which could be defined as the inclusion of social, ecological and economic aspects incorporating both the hard and soft factors which interact in the strategic management of the cities. Major elements of the above are the technological foundation, focusing as part of the social orientation on the value system, and individual satisfaction including overall conservation, sustainability, stability and harmonisation of the urban environment ecosystem in the 21st century.

The outcome of our own research indicates that the most frequent factors which cities should measure and evaluate in order to continuously improve quality of life are the environment and social inclusion; in other words, ecological and social aspects. The main finding is the need to combine hard and soft factors and to see the technological foundation as the cornerstone, followed up by centrism in the promotion of a city's strategic management.

At a theoretical level, this paper provides a uniform definition of the concept of quality of life, including secondary analysis of relevant references that fellow researchers can utilise, presenting in practical terms a set of factors frequently used in global best practices. Here the insights can be beneficial for strategic urban management.

The results and our own research can be used in developing management as a science and connecting it to sustainability and Smart City issues. Nonetheless, it is limited due to the specific criteria that were employed for selecting the references and cities. There was a logical reduction of data and it involved a multi-factorial system that cannot be fully encompassed. The issue is to be addressed through further research, specifically by our own primary research and in the design of a governance model with regard to the quality of life element.

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