

# AN INTEGRATIVE LITERATURE REVIEW OF CRITICAL LIVEABILITY INDICATORS IN URBAN TRANSPORT INFRASTRUCTURE PLANNING

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It is pertinent that urban transport infrastructure developments do not disrupt the lifestyle, health, wellbeing and quality of life of the citizenry for which they are planned. The study aims to identify critical criteria upon which liveability can be measured in an area or location in which transport infrastructure development (new or capacity expansion) is proposed. Existing literature was reviewed and synthesised to identify liveability indicators used in previous studies. Review materials were sourced from accredited journals and conference proceedings. The materials were selected based on their currency and possession of the following keywords and phrases: liveability, sustainability, liveability considerations, liveability indicators, wellbeing of habitants, road planning, and transport infrastructure. Thematic content analysis was used to identify the emerging themes (liveability indicators) from the review. The factors identified were discussed based on their frequency of occurrence, which revealed the relative degree of consensus about them in the literature reviewed. Findings indicate that pollution, ease of access to amenities, services and opportunities, efficiency and effectiveness of service, safety and security, generally indicate liveability (in relation to transport development) in an urban area. Other indicators including availability of alternative modes of transport, reliability/travel time reduction, street aesthetic quality and economic vitality/business environment were also reported as benchmarks for urban liveability. By identifying the indicators of liveability in an urban area, the study provides valuable information that will be useful to road infrastructure planners in evaluating the impact of proposed road infrastructure developments on the environment and the citizenry for which they are intended. The major limitation of the study lies in the fact that it presents a distillation of extant literature which may not really reflect the reality of what is considered "liveable". Nonetheless, planners will take cognizance of the identified liveability indicators when planning for road projects, whether for new road or capacity expansion.

Keywords: development, liveability, planning, road infrastructure, wellbeing

## INTRODUCTION

Transport infrastructure facilitates mobility of people and specialized products and services which are essential for development and growth and enhances the value of land wherein provided (Brown-Luthango, 2011). Transport infrastructure makes the location of households, businesses and social activities more attractive and lucrative and increases demand for properties (Robins, 2015). Changes in land use and employment opportunities also emanate from transport infrastructure developments (Bon, 2015). However, despite the positive impacts of transport infrastructure in an urban area,

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negative effects have also been documented. These include air and noise pollution, congestion, excessive use of natural resources, and shrinking of land area (reduction of land available to households) as poor urban residents are massively displaced or uprooted and sometimes excluded from impact evaluations, leading to dissatisfaction with reduced quality of life (Selmic and Macura 2013; Lee et al. 2014; Robins 2015). Consequently, there is increasing interest in having liveability principles and goals to assist in guiding transportation system investments, with considerable focus on the interrelationship between transportation infrastructure, housing, and land use planning (Grant et al. 2012). This concern relates to the influence of transportation systems on the environment, economic health, and social well-being at geographic scales ranging from the local to the national (National Research Council (NRC) 2002). Community wellbeing is the foundation of any society, and thus, the quality of the built environments, and our access to education, jobs and social and cultural opportunities have significant impacts on community wellbeing, public health outcomes, social inclusion and interaction, and community safety (Commonwealth of Australia 2011). It is therefore pertinent that urban road infrastructure developments do not disrupt the lifestyle, health, wellbeing and quality of life of the citizenry for whom the infrastructure is intended and who ultimately benefit from and/or are burdened by the development in question. The quality of life or “liveability” which an urban area offers is also important in ensuring its future economic performance (Cities Alliance 2007).

According to Gough (2015), liveability in an area is formed by the totality of the physical and social characteristics, including the natural environment and a walkable and mixed-use built environment, economic potential near diverse housing options, and access to a broad range of services, and amenities that add up to a community’s quality of life. Liveable cities are equitable, socially inclusive, affordable, accessible, healthy, safe and resilient, offer a high quality of life and support the health and wellbeing of the people (Commonwealth of Australia 2011). They have attractive built and natural environments and provide a diversity of choices and opportunities for people to live their lives, share friendships, and raise their families to their fullest potential (Commonwealth of Australia *ibid.*). Liveable transportation systems, in particular, provide multiple choices of transport modes (public transit, walking, bicycling, and automobiles), reliable and timely access to jobs, community services, affordable housing, and schools while helping to create safe streets and expanding access to businesses and markets (Grant et al. 2012).

Although, liveability and sustainability are closely related and sometimes overlapping, liveability is only a subset of sustainability, others being environmental preservation and commerce (National League of Cities 2013). However, the idea of liveability bridges many concepts. It refers to the extent to which the attributes of a particular place can, as they interact with one another and with activities in other places, satisfy residents by meeting their economic, social, and cultural needs, promoting their health and wellbeing, and protecting natural resources and ecosystem functions (NRC 2002). Hence, there is a need to take cognizance of liveability considerations during transport planning. Liveability principles require that human factors take precedence over other factors in the provision of transportation in order to directly benefit people who live, work in, or visit an area (Faiz et al. 2012; Grant et al. 2012). Improving liveability requires an explicit

attention to the satisfaction and wellbeing of households who live in the vicinity of planned transport infrastructure (whether new or adjustments) (Maloir et al. 2011).

Although research has been conducted on liveability indicators, few studies have focused on liveability indicators in urban transport planning. Some literature incorporated liveability and sustainability as a whole (Faiz et al. 2012; National League of Cities 2013; Gough 2015) and others focused on sustainability principles with scant attention to liveability aspects (United States (US) Government 2002; Boarnet 2008). Cities Alliance (2007) focused on environmental protection of cities and urban settlements and health preservation of inhabitants. Faiz et al.'s (2012) study centered on liveability and road development in rural areas while Grant et al (2012) dwelt on liveability and sustainability principles during management and operations. The present study (which is part of a wider study on feasibility study factors in transport infrastructure planning) focuses on liveability considerations and indicators during urban transport planning. The objective of the study is therefore to identify liveability indicators in urban transport planning. The findings from the study will inform transport infrastructure planners and stakeholders in evaluating the impact of proposed transport developments on the people (users). In addition, attention to the identified liveability indicators and openness to factors which could influence the quality of life of the people or community where the infrastructure is proposed or being constructed helps to ensure acceptability of the project. Moreover, expensive and time-consuming rework later on will be reduced, and thus leading to improved efficiency in project delivery. The succeeding sections of this paper present the methods employed to achieve the objective of the study, the themed findings, and conclusion.

## **METHODS**

The current study, which is part of a preliminary investigation in a wider study investigating factors to consider in feasibility studies for transport infrastructure, was conducted through a detailed and integrative review of extant literature. An integrative literature study reviews and synthesizes knowledge in its current state through a re-conceptualization of the subject (Torraco, 2016). The search for literature on liveability considerations and indicators began by listing the relevant keywords, namely, liveability, sustainability, liveability considerations, liveability indicators, wellbeing of habitants, road planning, and transport infrastructure approach adopted for the study was a desk study. Seven databases were searched (Google Scholar, Google, Scopus, Taylor and Francis Online, ASCE Library, Science Direct and Academic Search Complete). A simple matrix was conducted to determine which keywords and phrases led to relevant literature. Materials were selected only if they met the following criteria: possession of any of the keywords; articles published in the last 15 years (since 2002); and publications on transport infrastructure development and related areas. Each piece of literature was reviewed and synthesized to determine the focus, context and key findings. Thematic content analysis was thereafter used to identify emerging themes from twenty-four articles (out of a total of thirty-three) specifically focused on the liveability indicators for transport planning. The identified liveability indicators were tabulated based on their frequency of occurrence in the sampled literature and thereafter discussed to show the

relationships between the works and views of authors (Avni et al. 2015). The indicators that recurred mostly were deemed to reflect high consensus among the authors.

## **LIVEABILITY CONCEPT AND PRINCIPLES**

Liveability, derived from the word “liveable”, is defined broadly as suitability for human living (VanZerr and Seskin 2011). It refers to the subset of sustainability goals and impacts that directly affect community members, including local economic development and environmental quality, equity, affordability, basic mobility for non-drivers, public health and safety, and community cohesion (Litman 2016). In a study which compared liveability and sustainability in planning, in terms of scale, context and potential, Gough (2015) opined that the concept is one which generally offers choice and diversity in the range of amenities available to people who live and work in a community. It is more locality or region specific (gives primacy to local activities), has a direct influence on people, neighbourhoods and cities, entails micro-level behaviour changes, is locally defined through civic engagement, and is receptive to design and planning intervention, responding to transactional relationship between people and place (Gough *ibid.*).

These views were supported in the study by Faiz et al. (2012) which focused on rural areas and stressed involvement of the local community and stakeholders in ensuring sustainable provision of rural roads. By incorporating liveability objectives into the planning and design of roads, communities can maximize the efficiency of the infrastructure while providing better access and mobility. Faiz et al. (2012) believes that liveability is largely affected by physical location and condition of public facilities and also is influenced by public policy and planning decisions. Liveable environments integrate physical and social wellbeing parameters to sustain a productive and meaningful human existence; productive in the sense that the social clustering of humans yields considerably more than the sum total of individual productivity, and meaningful in the sense that humans need to participate in forming successful and self-sustaining social systems by their very nature (Kashef 2016).

Grant et al. (2012), Gough (2015) and Litman (2016) revealed six liveability principles established in 2009 by the Partnership for Sustainable Communities, a collaboration among the US Department of Transportation, Environmental Protection Agency (EPA) and Department of Housing and Urban Development (HUD), which guide development of liveable communities. These include:

- Provide more transportation choices: Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation’s dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health.
- Promote equitable and affordable housing: Expand location- and energy-efficient housing choices for people of all ages, incomes, races, and ethnicities to increase mobility and lower the combined cost of housing and transportation.
- Enhance economic competitiveness: Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services, and other basic needs by workers, as well as expanded business access to markets.

- Support existing communities: Target federal funding toward existing communities (through strategies like transit oriented, mixed-use development), and land recycling (to increase community revitalization and the efficiency of public works investments and safeguard rural landscapes).
- Coordinate and leverage federal policies and investment: Align federal policies and funding to remove barriers to collaboration, leverage funding, and increase the accountability and effectiveness of all levels of government to plan for future growth, including making smart energy choices such as locally generated renewable energy.
- Value communities and neighborhoods: Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods (rural, urban, or suburban).

However, the above principles do not relate specifically to transportation. In relation to transportation, Grant et al. (2012) suggested that liveability includes: (i) addressing road safety and capacity issues through better planning, design, and construction; (ii) integrating health and community design considerations into the transportation planning process to create more liveable places where residents and workers have a full range of transportation choices; (iii) using travel demand management (TDM) approaches and management and operation strategies to maximize the efficiency of transportation investments; (iv) maximizing and expanding new technologies such as intelligent transportation systems (ITS), green infrastructure, and quiet pavement; (v) developing fast, frequent, and dependable public transportation to foster economic development and accessibility to a wide range of housing and employment choices; (vi) strategically connecting the modal pieces—bikeways, pedestrian facilities, transit services, and roadways—into a truly intermodal, interconnected system; and (vii) enhancing the natural environment through improved storm water mitigation, enhanced air quality, and decreased greenhouse gas (GHG) emissions.

The indicators which should be of concern to transport infrastructure planners and policymakers in ensuring that the above liveability principles are upheld are discussed in the next section.

## **LIVEABILITY INDICATORS FOR TRANSPORT INFRASTRUCTURE**

Urban liveability with particular reference to transport utilities can be indicated by measures that evaluate the quality of local road networks, mass transit, and connectivity and impacts on the wellbeing, health and quality of life of the citizenry for which transport infrastructure is provided or planned. The present section identifies these indicators. A summary of the indicators is presented in Table 1. They are presented with regard to the frequency of occurrence in the sampled literature, which shows the extent of consensus about the measures. *Pollution* seemed to appear mostly, followed by *mobility/walkability/connectivity/accessibility* and then *efficiency and effectiveness*; whereas, *residents' migration/relocation* as well as *comfort and convenience* had the least occurrence among the literature reviewed. These indicators are further discussed hereunder.

Table 1: Identified liveability indicators

S/No.	Liveability indicators	Source	Year	Frequency	Percentage frequency	Rank
1	Pollution (noise and air quality)	Cities Alliance	2007	11	46	1
		Boarnet	2008			
		Haas et al.	2009			
		Maloir et al.	2011			
		Grant et al.	2012			
		Zhou	2012			
		Doherty et al.	2013			
		East Central Wisconsin Regional Planning Commission (ECWRPC)	2013			
		Gough	2015			
		Schmale et al.	2015			
		Litman	2016			
2	Mobility/walkability/connectivity/accessibility	Haas et al.	2009	9	38	2
		Commonwealth of Australia	2011			
		Maloir et al.	2011			
		Faiz et al.	2012			
		Grant et al.	2012			
		Doherty et al.	2013			
		National League of Cities	2016			
		Kashef	2016			
Litman	2016					
3	Efficiency and effectiveness	Haas et al.	2009	8	33	3
		Commonwealth of Australia	2011			
		Faiz et al.	2012			
		Grant et al.	2012			
		Gough	2015			
		Carvalho et al.	2015			
		Matsuo	2015			
		Kashef	2016			
4	Safety and security	Haas et al.	2009	7	29	4
		Commonwealth of Australia	2011			
		VanZerr et al.	2011			
		Grant et al.	2012			
		Land Transport Authority (LTA)	2013			
		Kashef	2016			
		Litman	2016			
5	Reliability/Travel time reduction	US Government	2002	7	29	4
		Boarnet	2008			
		Haas et al.	2009			
		US Department of Transport	2011			
		VanZerr et al.	2011			
		Grant et al.	2012			
		Gough	2015			
		6	Integration of facilities			
Ong et al.	2010					
National League of Cities	2013					
Kashef	2016					
Litman	2016					
7	Comfort and convenience	Haas et al.	2009	5	21	6
		Grant et al.	2012			
		City of Johannesburg (COJ)	2013			
		LTA	2013			

8	Availability of alternative transport modes	Litman	2016	4	16	8
		Commonwealth of Australia	2011			
		VanZerr et al.	2011			
		Grant et al.	2012			
		Zhang and Guan	2016			
9	Streetscape/Journey ambience	VanZerr et al.	2011	3	13	9
		Grant et al.	2012			
		Schmale et al.	2015			
10	Economic vitality/business environment	Commonwealth of Australia	2011	3	13	9
		Grant et al.	2012			
		Kashef	2016			
11	Residents' satisfaction and migration/relocation	Maloir et al.	2011	2	8	11
		Kashef	2016			

### **Pollution (noise, and air quality)**

Transportation infrastructure developments affect air quality, noise and climate (Schmale et al. 2015). According to Grant et al. (2012) and Litman (2016), the environmental quality, which is measured by how much fuel is used and pollution produced by transportation operations (including traffic noise exposure and emissions from vehicles), indicates liveability. Although evidence indicates that these emissions are harmful to human health, they are rarely incorporated in strategies to change freight operations, especially (East Central Wisconsin Regional Planning Commission (ECWRPC) 2013; Doherty et al. 2013). Pollutants such as particulate matter, hydrocarbons, carbon monoxides, sulphur dioxide and greenhouse gases can cause cancer, damage to vital body organs and respiratory ailments including asthma and bronchitis (ECWRPC 2013). Unsurprisingly, there is a huge consensus about pollution being a liveability indicator (as evinced by the highest ranking) due to its impact on public health. According to Zhou (2012), clean air and global climate change as well as healthy communities and ecosystems are part of the long-term goals proposed in the US Environmental Protection Agency (EPA)'s Strategic Plan. Non-motorized modes, and support for increased transit ridership and ridesharing should be encouraged if liveability, with regard to health, is to be enhanced (Grant et al. 2012).

### **Mobility/walkability/connectivity/accessibility**

There was also consensus about these indicators, undoubtedly because of the essential need (movement) which transportation basically fulfils in everyday living. These second ranking indicators measure how efficiently people and goods move from place to place to access to social, healthcare, recreational and economic opportunities along multi-modal networks and services (Commonwealth of Australia 2011; VanZerr and Seskin 2011; Grant et al. 2012; Doherty et al. 2013; Kashef 2016). Accessibility (people's ability to reach goals and destinations), tends to be optimised with multi-modal transport and more compact, mixed-use, walkable communities, which reduces the amount of travel required to reach destinations (Litman 2011; 2016). Mobility refers to the ability to move around as a result of less traffic volume. The idea of walkability is that communities should be pedestrian-oriented, with daily needs (residential, recreational, commercial and civic uses) situated within easy and enjoyable walking distance of each other or should be connected by both public and private transport alternatives (National League of Cities

2013). Walkability positively affects social capital (a measure of personal networks and connections and group involvement) since residents of lower traffic volume streets are more likely to interact with neighbours and show more concern over their local environment than residents of streets with higher traffic volumes and speeds (VanZerr and Seskin 2011).

### **Efficiency and effectiveness**

According to Carvalho et al. (2015) and Matsuo (2015), efficiency reflects the operating margins and is measured by comparing the volume of service provided with the resource inputs. On the other hand, effectiveness evaluates the social impacts and ability of the system to attain passengers' maximum comfort or fewer passengers per fleet (Carvalho et al. 2015; Matsuo, 2015). Operational effectiveness also includes response time to incidents, claims due to potholes or guardrail damage, response time to public complaints/inquiries (Haas et al. 2009). Efficiency and effectiveness, with particular regard to liveability issues are interrelated. For instance, significant improvements in transport infrastructure, vehicle and operational measures contributed to higher quality of service in Curitiba, with the implementation of a high-capacity bus rapid transit (BRT) system which has 20 miles of exclusive bus way for urban transport (Carvalho et al. 2015). Operators with smaller service areas have lower production efficiency because of lack of capacity, while their service effectiveness is higher due to their compact network and local knowledge (Matsuo 2015).

### **Safety and security**

These include measures such as accidents cost savings as well as crash rates, injuries and fatalities (which could be disaggregated by mode) as well as traveller assault (crime) rates (VanZerr and Seskin 2011; Litman 2016). Safety connotes how safe it is to walk, bicycle, take transit, or drive from place to place. Other measures include traffic signal timing, electronic signs that display the speed of a passing vehicle (to remind motorists of their speed), visual cues/reminders and the addition and improvement of crosswalks and bicycle lanes (Grant et al. 2012; Land Transport Authority 2013). In addition, extension of road engineering measures such as pedestrian crossing lines with enhanced dash markings, traffic calming markings and "pedestrian crossing ahead" road markings will enhance pedestrian safety (Land Transport Authority 2013).

### **Reliability of travel/Travel time reduction**

These indicators have to do with motor vehicle and transit travel time between key origins and destinations (VanZerr and Seskin 2011). The measures also include how much time travellers are stuck in unexpected traffic due to incidents, work zones, special events, or bad weather. Traveller delay reduction also reflects quality of transport modes (Grant et al. 2012). A common liveability goal in many communities is how to reduce time spent travelling so that people can spend more time focusing on other things (US Department of Transportation 2011). Decisions therefore have to be made about creating opportunities for increasing speed or reliability of travel (for instance, diverting trucks to lower speed areas) or decreasing speed (for instance, by creating safer pedestrian crossings).



### **Integration of facilities**

This measures the extent to which various components of the transport system (such as pedestrian and cycling access to transit) and future planning are incorporated into existing land use (Litman 2016). Planning should integrate a variety of recreational, commercial, residential and civic facilities essential to daily life of residents of different demographic characteristics (National League of Cities 2013). The goal is to consider what is being built, where building is to take place and the kind of transport choices availed and needed, in order to obtain desirable outcomes including less congestion, more liveable neighbourhoods and more mobility choices. For instance, instead of providing the same service to all travellers at a minimum fare, public transport services could be made differential to cater for low-income users as well as for those who value quality of service (Ong et al. 2010). Integration of land use decisions and multi-modal transportation planning can help maintain liveability.

### **Comfort and convenience**

These are qualitative in nature and as such, tend to receive less consideration in transport planning (Litman 2016). This includes aspects such as convenient stops and stations, parking convenience, road smoothness, comfortable and convenient streets and network and services which make it convenient and comfortable to reach destinations (Haas et al. 2009; City of Johannesburg 2013). Consideration should also be given to the elderly and less mobile by providing fully equipped facilities to access amenities and participate in the society and economy (Land Transport Authority, 2013).

### **Availability of alternative transport modes/option value**

According to VanZerr and Seskin (2011), the option value indicator has to do with the percent of households within a quarter mile of transit, in “walkable neighborhoods,” or within a quarter mile of a bicycle route, and the number of transportation options available vs. auto accessibility. In a recent study predicting mode choices in different travel time-related policy scenarios, using multinomial logit regression, Zhang and Guan (2016) found that as service for particular modes of transport, for instance, transit or shopping shuttle bus, increases, travel time decreases, air pollution is reduced, energy consumption and traffic congestion are also reduced. Liveability considerations of providing more transport choices should result in a decrease in household transport costs, improvement in the quality of air, a reduction in greenhouse gas emissions and public health promotion.

Other factors such as street ambience, economic vitality/business environment and residents’ satisfaction and migration seemed to appear the least among the reviewed studies, reflecting little consensus on these elements as liveability indicators. However, they have been argued to be important liveability indicators as well. With regard to street ambience, aesthetics (trees, public art, scenic views, *etcetera*), parking and pedestrian countdown signals enhance the attractiveness of the environment as well as lifestyle (VanZerr and Seskin 2011; Grant et al. 2012; Schmale et al. 2015). Regarding economic vitality, which has to do with freight movement, ridesharing programs, and bus rapid transit, measures how efficiently and cost-effective it is for goods, the public and shippers to reach their destinations (Grant et al. 2012). With regard to residents’

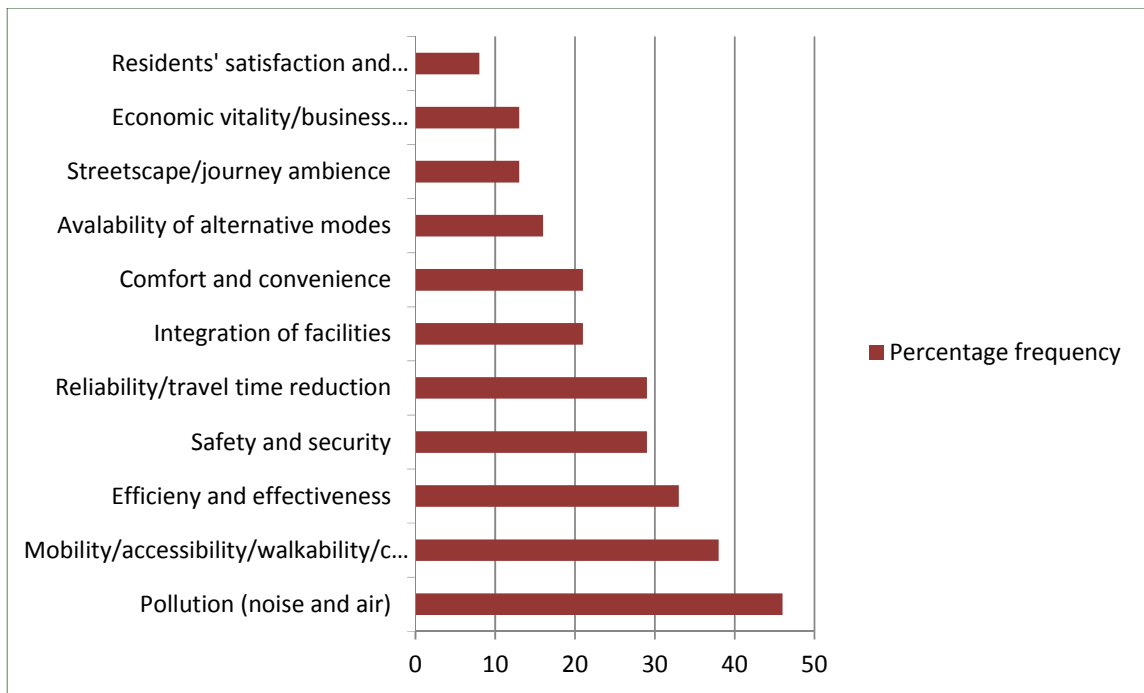
satisfaction and migration, Maloir et al. (2011) posited that new transport infrastructure developments could impact negatively on residents and they may relocate as a result. The authors in Maloir et al. (ibid.) further opined that in economic terms, local residents may derive a lower value from living at the subject location, but that this may not be reflected in property prices. This suggests that property value may not necessarily be an indicator of liveability in the subject area.

Summarily, the top-ranking indicators that have been identified to measure liveability in an urban area include pollution, mobility/accessibility, efficiency and effectiveness. These factors indicate that importance is attached to the impact of transport developments on health and social values. Liveability, which embodies the perfection of transport systems and reduction of externalities that emerge from the proximity of incompatible uses, should be of paramount concern in transport infrastructure planning. In other words, reducing the negative impacts of transport infrastructure provision in a neighbourhood or community could improve liveability therein. As advocated in the 2013 Land Transport Master Plan in Singapore (LTA, 2013), transport planning needs to be altered to take into account various changes for the betterment of humanity. Such changes as building noise barriers, use of non-motorised vehicles, walkable and cycling lanes, providing fully-equipped facilities for the elderly and less mobile, and so on, can go a long way in promoting and enhancing liveable communities. Citizens appreciate a climate-friendly, healthy and liveable city and look forward to deriving satisfaction through available and functional choices of mobility.

It is worthy of note that some of these are quantitative (example, accidents, traffic speed) and easy to measure and analyse and as such, tend to receive more weight in the planning process; whereas qualitative measures such as comfort, walkability, lifestyle, and environmental impacts, are more difficult to measure and seemingly receive less attention in transport planning. Nonetheless, as argued by Kashef (2016) and Litman (2016), consideration of both quantifiable and qualitative indicators will enhance livability of the environment, giving more consideration to the wellbeing and health of the public.

## **CONCLUSION**

The current study set out to identify liveability indicators for transport infrastructure through an integrative literature review. The objective of the current study was met. A summary and ranking of the indicators which emerged were tabulated. Pollution, mobility/accessibility, efficiency and effectiveness, safety and security, and increase in travel choices, were identified as the most important factors that indicate liveability. Other factors which emerged from the review were also deemed important although they received lower consensus among the sampled literature. The indicators are also represented in the bar chart (Figure 1) for a visual appreciation of the findings.



*Figure 1: Frequency distribution of the identified liveability indicators*

The identified indicators could promote solutions by responding to transactional relationship between the place, transport developments and the people who feel the direct impacts of the benefits and burdens of such developments. They could help leaders to focus on human health issues and prioritising transport alternatives that reduce the negative impact on health. Such indicators can also point community leaders and transport stakeholders toward specific initiatives or policy changes that will have a real effect on quality of life. Furthermore, the findings from this study will inform transport infrastructure planners and stakeholders in evaluating the impact of proposed transport developments on the people (users). Moreover, attention to the identified liveability indicators and openness to factors which could influence the quality of life of the people or community where the infrastructure is proposed or being constructed helps to ensure acceptability of the project.

The major limitation of the study lies in the fact that it presents a review of literature, which may not really reflect the reality of what is considered “liveable”. However, through an integrated literature review, providing new knowledge as to the most important indicators in extant literature (sampled), the study provides information which would be beneficial to planners and policy makers in transport infrastructure planning.

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