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Spatial Enclosure Assessment toward More Livable Urban Communities; Salah El-Din Street, Aswan- Egypt.

Mohab Taher Abdelfatah[1], Yasser Ahmed Dahab[2], Abdelaziz Farouk Abdelaziz[3]

ABSTRACT

Livability is one of the primary guiding principles for policy-making and urbanists, of which the evaluation and definition have become the crucial research topic of countering. The micro-scale living conditions necessitate more urgent attention as the progress in socio-economic development accelerates. However, few researchers have addressed the evaluation criteria of urban livability at spatial enclosure scales as community scale. Therefore, this paper aims to create an urban community-level balanced weight evaluation statistical system, as residential communities are one of the basic units of urban living places. Twenty-nine objective indicators are selected to establish the indicator system. Considering different age groups, a comprehensive evaluation framework for communities' livability combines objective indicators and subjective perceptions. Accordingly, this study is applied to assess the urban microscale livability of residential communities in Aswan City. There are significant results from the study. Different age groups have distinct demands for an urban community's livability. They have valued some indicators and concentrated on the following two dimensions: pedestrians' rights and convenience of transportation. Finally, the communities' livability shows a decreasing spatial pattern from the city center to the surroundings. These empirical findings may be helpful to urbanists and other parties as stakeholders for future development.

***KEYWORDS**: Livability, spatial enclosure, urban community, urban planning, microscale, Aswan..*

1. INTRODUCTION

The world's population living in urban areas is about 55%. Expected by 2050, the urban population will increase to 68% [1]. According to projections, urbanization and the gradual shift in human population from rural to urban areas, combined with global population growth, these factors could add

[1] Graduate Teaching Assistant, Department of Architectural Engineering and Environmental Design, Arab Academy for Science, Technology and Maritime Transport, South Valley Branch, Aswan, Egypt
mohab.taher@aast.edu

[2] Assistant Professor, Faculty of Computing and Information Technology, Arab Academy for Science, Technology and Maritime Transport, South Valley Branch, Aswan, Egypt
ydahab@aast.edu

[3] Associate professor, Department of Architectural Engineering and Environmental Design, Arab Academy for Science, Technology and Maritime Transport, South Valley Branch, Aswan, Egypt
drabdelaziz@aast.edu

another 2.5 billion people to urban areas by 2050, with Asia and Africa accounting for nearly 90% of this increase, according to a new United Nations data set released today [1]. This internal immigration will negatively affect climate change and create unmanaged environmental issues. These issues will affect urban centers regarding properties and lives [2]. Doubtless, the simultaneity of these difficulties indicates that the livability of urban areas is at risk. The need for improved urban livability-based metrics guidelines needs to be embedded in policy-making. This process would navigate policy shifts to include livability-driven urban services and infrastructures necessary to sustain and create urban livability in communities [2].

Livability terminology is an "ensemble concept" [3, 4] with no precise or universally agreed-upon definition [5, 6]. It has been used synonymously with quality of life [5-7] and is also related to concerns for social well-being [8]. The urbanist M. Pacione stated that livability is a quality that is not a characteristic inherent in the surrounding environment but is a behavior-related function of the contact between personal characteristics and environmental characteristics Figure 1 [9]. However, the definition of livability may differ from one culture to another and from time to time. The livability concept is relative to the time, place, purpose of the assessment and the value system of the assessor [10, 11].

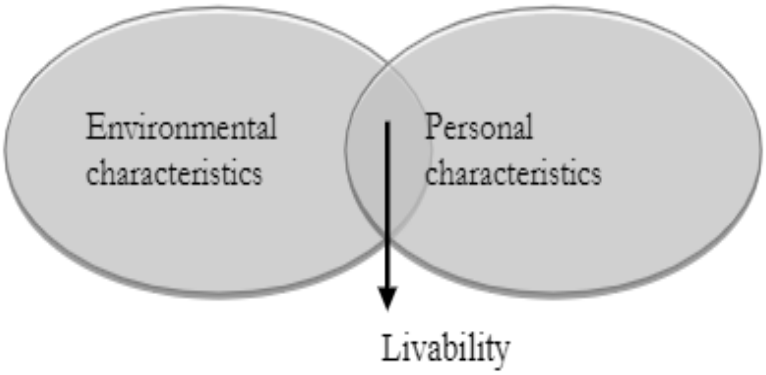


FIGURE 1. The related behavior function of "Livability" adopted from [12]

Livable environments combine social well-being and physical parameters to sustain a meaningful and productive human existence [13]. Social clustering of human yields is more effective and productive than individual productivity and significant in common sense that humans need to contribute to forming thriving and self-sustaining social systems [13]. The paper aims to reach a statistical weight method to evaluate and assess the livability of residential urban communities.

The problem found is that urban livability in Aswan city reached a degradation level in terms of urban mobility and quality of life principles. The current mobility situation found in Salah El-Din Street is not designed to accommodate this number of cars. This paper aims to reach livability evaluation criteria and improve cities' livability by ensuring access for all city residents to sustainable transportation and well-designed streets. To reach the paper aim, the following objectives will be achieved re-design streets to reclaim street identity: commercial or residential streets, Reviewing Challenges from the literature review, Suggest solutions through simulation to reduce traffic congestion, propose a new mobility plan to increase mobility, boost pedestrian socializing ability and connectivity and enhance streetscape design elements.

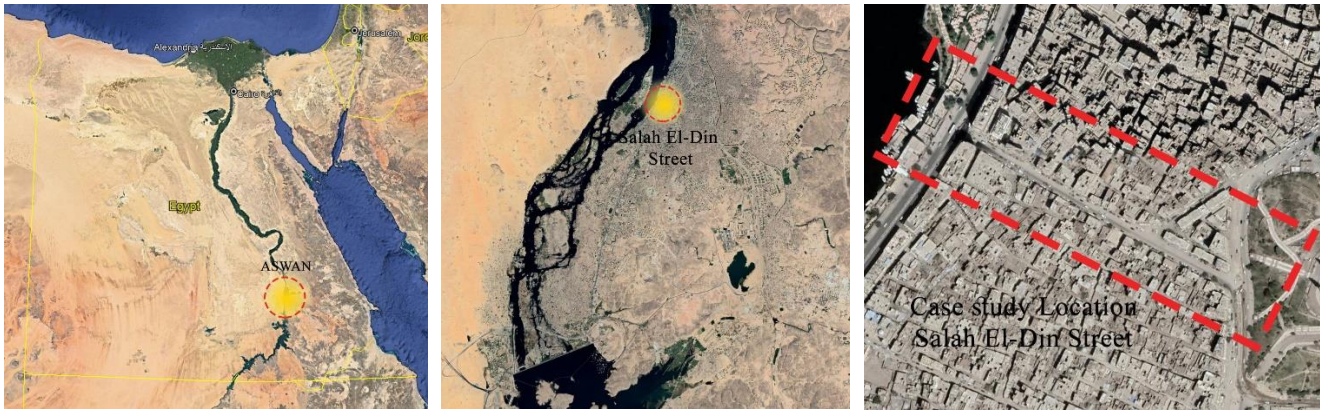
2. RESEARCH METHODOLOGY

Create an urban community-level balanced weight evaluation statistical system using humanities research like questionnaires. Residential communities are one of the basic units of urban living places as

urban livability in Aswan has reached a degradation level, and Salah El-Din street residents do not feel satisfied with their everyday experience.

International precedent studies are analyzed to reach a set of indicators. Barcelona city in Catalonia, Spain, one of the precedent studies used, boasted a tremendous urban livability experience developed in the last period as it is in the Global Livability Index for 2021. There are similarities between Barcelona and Aswan city, population census, grid fabric, touristic city, and accommodating many visitors every year.

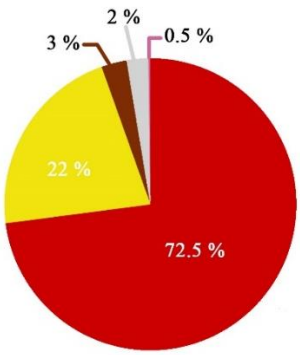
As a case study, this study is performed in a residential street of Salah El-Din street in Aswan city, Egypt using quantitative research by monitoring, reviewing, and evaluating the current state, simulating new proposals through Revit (2017) & Enscape. This case study is selected to assess and evaluate their livability. This street is 300 meters in length with 20 meters in width, location as shown in figure 2.



(a) (b) (c)

FIGURE 2. Case study location: Salah El-Din street Aswan, Egypt (source: Google earth)
(a) Egypt map, (b) Aswan map, (C) Salah El-Din street

First, site visits to obtain land use ground and typical floor to assess this street's vitality, as shown in figure 3. Second, a questionnaire is distributed and collected to characterize different human perspectives on living and working in this street to decide their needs. Interviews are done and questionnaires are distributed at 9:00 am, 12:00 pm, 3:00 pm, and 6 pm on working and holidays in different age groups. For the indicators system, see Table 1.



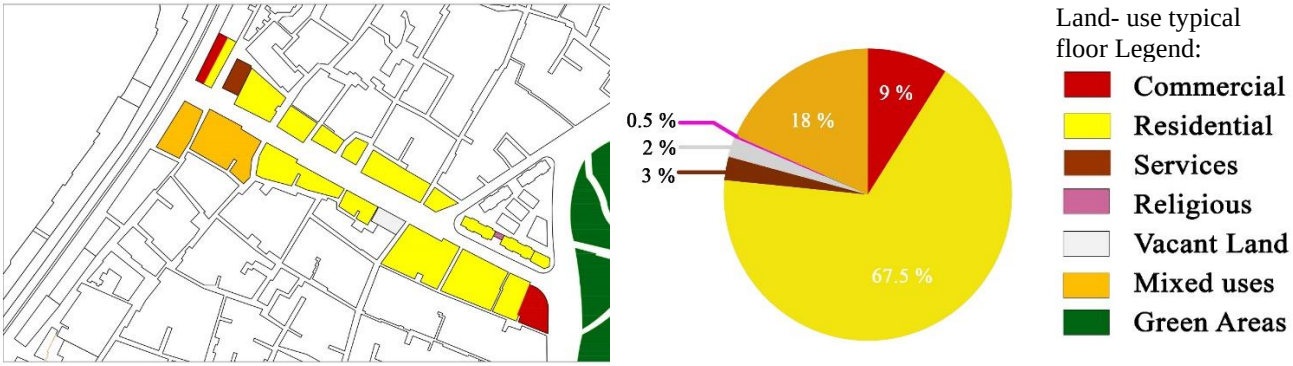


FIGURE 3. Land use maps for both ground and typical floors (source: authors)

Table 1: Indicator system to assess residents' satisfaction [14]

A	B	C	D	E	F
Urban security	**convenience of public facilities**	**Natural environment**	**Sociocultural environment**	**Convenient transportation**	**Environmental health**
A1- Social security	**B1** - Shopping fac.	**C1** - Favorable climate	**D1** - High-quality citizens	**E1** - Urban road conditions	**F1** - Water pollution
A2 - Transport security	**B2** - Education fac.	**C2** - Access to water area	**D2** - Social inclusion	**E2** - Access to public transit	**F2** - Solid waste pollution
A3 - Emergency shelters	**B3** - Healthcare fac.	**C3** - Access to urban parks	**D3** - Urban identity	**E3** - Availability of parking lots	**F3** - Air pollution
A4 - Disaster response capacity	**B4** - Dining fac.	**C4** - Urban green	**D4** - Protection of historical culture	**E4** - Traffic congestion	**F4** - Noise pollution
	B5 - Recreational	**C5** - Cleanliness of city coverage rate	**D5** - Sense of belonging		
	B6 - Cultural fac.				
	B7- Aged fac.				

There is no consistency in features and aspects that should be incorporated to assess urban livability [15, 16]. Various criteria and measurements have been proposed for different stages of economic development [16, 17]. For instance, the world health organization 1961 summarized the required conditions for human beings' basic living requirements and recommended the absolute status of the living environment as amenity, convenience, health, and safety [18, 19]. Because residential communities are the core unit of urban-dwelling districts, the evaluation criteria for livable communities can be applied to livable cities. Based on the existing state of Egypt's urban residential communities, this article recommends that a livable community should meet the following six dimensions: urban security, convenience of public facilities, natural environment, Sociocultural environment, convenient transportation, and environmental health [14, 20]. As a result, these six dimensions combine diverse group subjective; objective evaluation indicators are chosen to build a comprehensive evaluation framework for the community's livability level.

3. LIVABILITY PRECEDENT STUDIES

Many cities are trying to adopt the livability concept to integrate social well-being and physical parameters. Barcelona, Toronto, and New York have a high-ranked livability level among these cities that have reached a high level of livable urban communities. In this paper, the study will focus on Barcelona as it is a Mediterranean city with grid fabric planning and have many races as Aswan city.

Barcelona city, one of the largest cities in Spain and the cosmopolitan capital of Spain's Catalonia region, is located northeast of Spain on the Mediterranean coast at 41.23° North latitude, 2.11° East longitude [18] as shown in Figure 2. One of Europe's high-density cities has grown continuously in the last century [20]. The city proper had a high population density of 718.7 persons per square kilometer in 2018 [21].

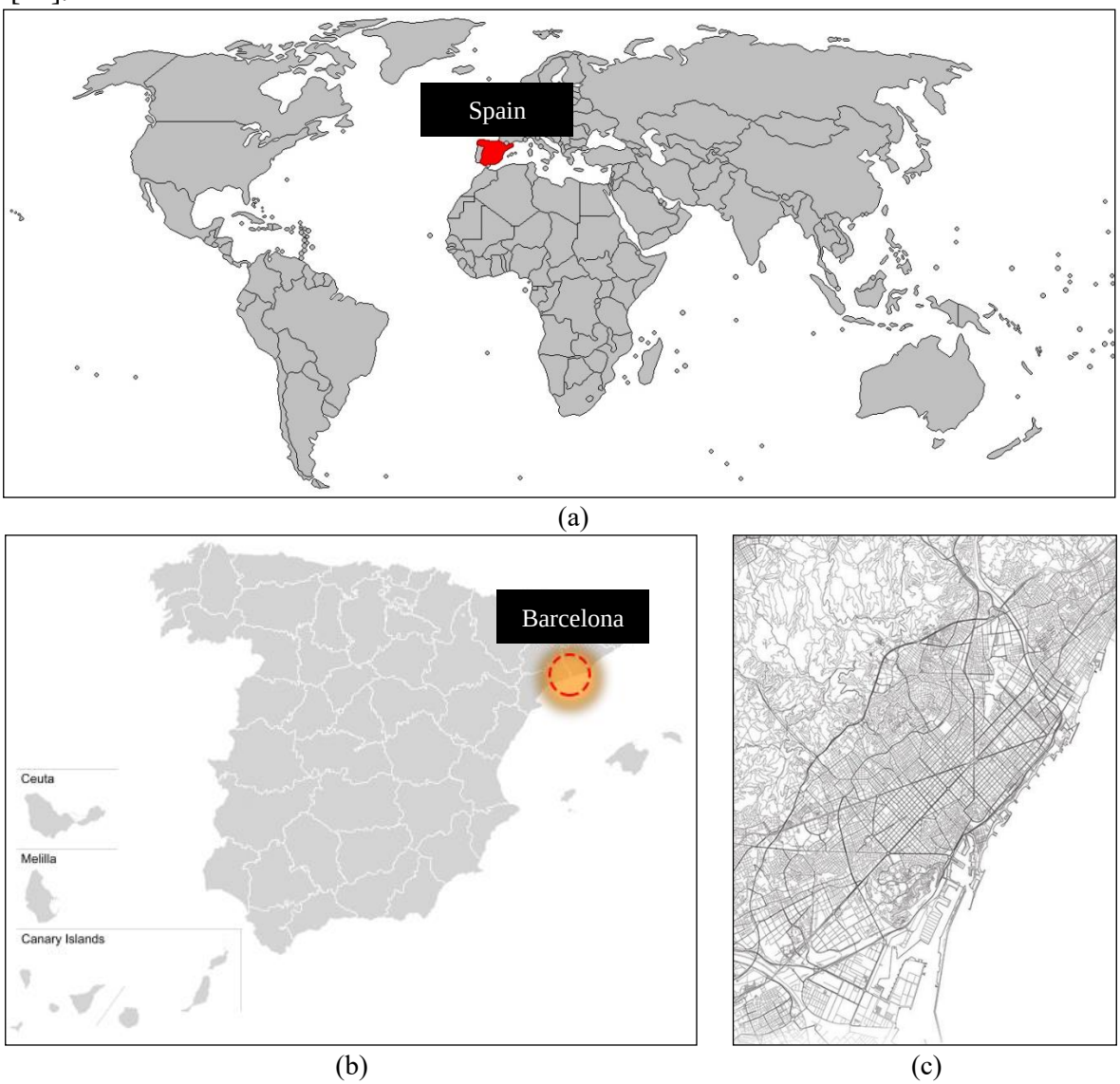


FIGURE 4: Typical map showing Barcelona location [19].
(a) World map, (b) Spain, (c) Barcelona

3.1 Barcelona functional change

The reason for founding the Superblock model in Barcelona city stems from the following factors, necessitating a functional change in our environment: climate change; scarcity of green areas; high density; high levels of noise and air pollution; road accident rates; the tendency towards individualization and sedentarism among young children, teenagers and young adults and the social isolation and lack of independence of older people [22]. These are all features where public spaces can improve the quality of human beings' lives.

3.2 Improving Barcelona's urban livability

Superblocks, a grid of primary roads and blocks forming a polygon, are approximately 400 by 400 m [23]. Within the Superblocks, pacified interior roads will provide a local road network accessible primarily to active transport (e.g., cycling and walking) and secondary to residential traffic with a maximum speed of 20 km/h [22]. The Superblocks will be enclosed by the primary road network that links the city and accommodates traffic at a 50 km/h maximum speed [21], as shown in Figure 3.

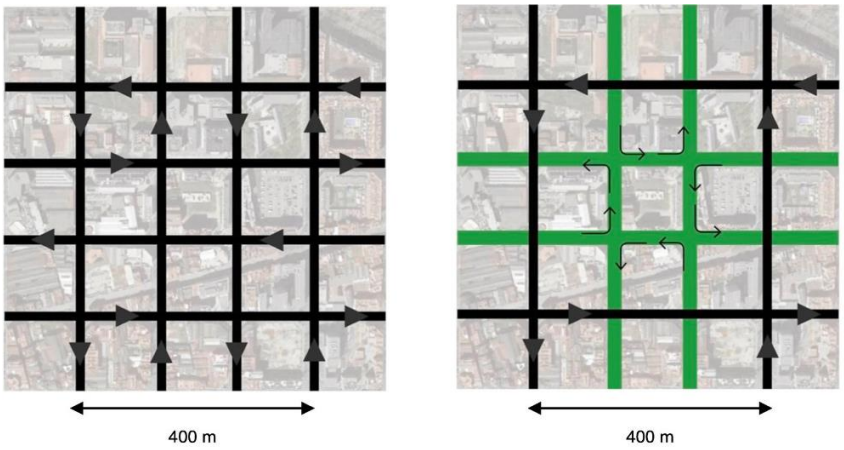


FIGURE 5: traffic circulation and Road hierarchy aimed at the Superblock model. Adopted from [22] (a) Baseline situation, (b) superblock model

Superblock's implementation does not require investment in complex infrastructures, massive redevelopment, or tearing down buildings [24]. It only requires a functional change using the existing structure block, which will lead to a complete modification in city mobility, reduction of carbon emissions, urban traffic, and increased city livability [25], as shown in Figure 4. A city transforms into a public space, considering it is the "house of everybody," a meeting place for interchange, leisure, culture, staying, expression, democracy, and movement [22].

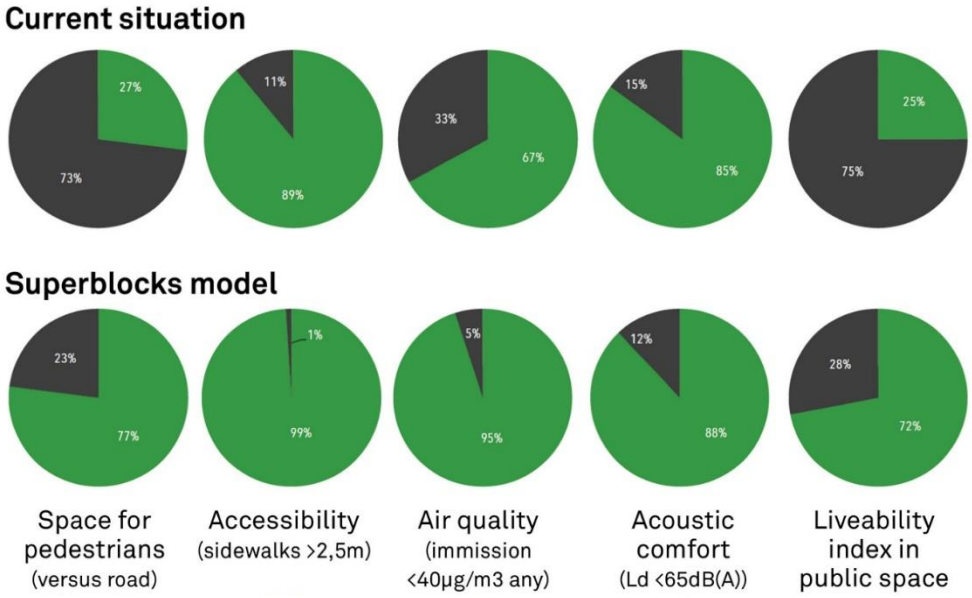


FIGURE 6: showing improvement in different aspects such as, Space for pedestrians, Accessibility, Air quality, Acoustic comfort, Livability Index in public space. Adopted from [25].

4. A CASE STUDY IN ASWAN AND RESULTS

4.1 Aged groups Division

The result of the questionnaire is divided according to different age groups. The young group from 20 – 35, the middle-aged group from 35 – 50, and the elderly group above 50 years old. Different age groups lead to different choices according to residents' needs and perceptions. The 300 people are divided according to the census portion in the population pyramid of Aswan city. Table 2,3.

Table 2: Aswan census for 2017 (Censuses 2021) (source: authors)

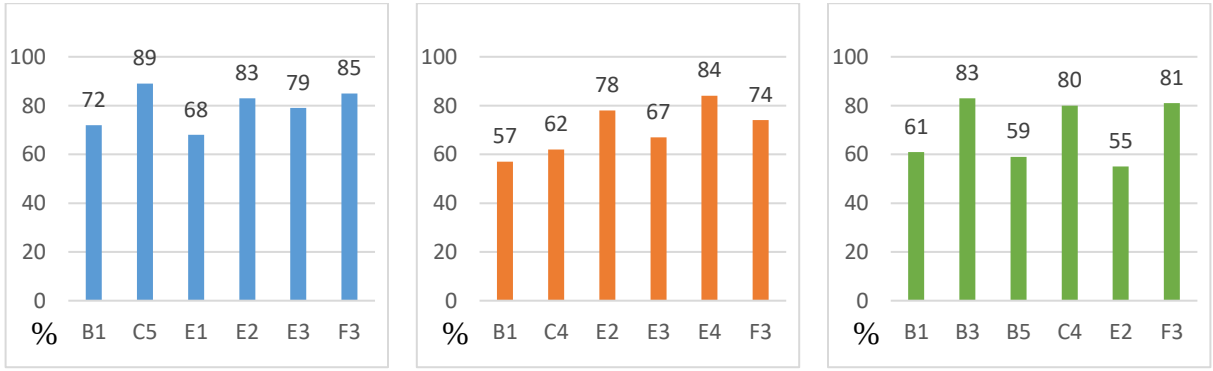
Ages	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	**Total**
Male	6606	5733	5430	5388	4503	4241	3931	3154	2511	1483	919	426	267	106	34	44732
Female	6381	6400	6303	5414	4973	4026	3626	2742	2088	1318	899	353	267	97	31	44925
	47662 (53.16%)				**25300 (28.22%)**					**16695 (18.62%)**						**89657**

Table 3: 300 people division (source: authors)

Age group	Population data (Census)	Population data (Percentage)	Sample result from 300 (Theoretical)	Sample result (actual)	Sample result (Percentage)
20 < 35	47662	53.16	159.48 ≈ 160	143	47.67
35 < 50	25300	28.22	84.66 ≈ 85	92	30.67
50+	16695	18.62	55.86 ≈ 56	64	21.33

4.2 Community Livability's Descriptive Analysis

The young group's perspective is the most critical six indicators for increasing urban livability in their community are accessibility to shopping facilities (72%), cleanliness of city coverage rate (89%), urban road conditions (68%), access to public transit (83%), availability of parking lots (79%) and air pollution (85%). At the same time, the middle-aged group's perspective is accessibility to shopping facilities (57%), urban green (62%), access to public transit (78%), availability of parking lots (67%), air pollution (84%), and noise pollution (74%). The elderly group recommended accessibility to shopping facilities (61%), accessibility to healthcare facilities (83%), recreational facilities (59%), urban green (80%), access to public transit (55%) and air pollution (81%). Figure 7



(a) **(b)** **(c)**

FIGURE 7: Descriptive statistics of the young, middle-aged and elderly groups' preference
(a) Young group (20 – 35) years old, **(b)** Middle-aged group (35 – 50 years old), **(c)** Elderly group (Above 50 years old) (source: authors)

4.3 Subjective Perception Characteristics

The three groups agreed that the air pollution rate is high due to the increased demand for private means of transport is one of the most critical indicators. They also agreed that having access to shopping facilities is essential to having a vital community and avoiding ghost city phenomena. They also agreed that having urban green will make streets more livable and aesthetic instead of having only the enclosure as hard space consists of building facades. The young and elderly agreed on the importance of having access to public transport while the middle-aged focused on parking lots as the increasing demand for private cars.

4.4 Weight determination

In the process number of participants in the questionnaire was different from the required Table 4. The residents' perspective determines the indicators' weight of this study. Then, the questionnaire is divided into two parts. The first part includes gender, education level, age and family size, and the second part includes the twenty-nine indicators that measure the urban community's livability. Participants evaluate the indicators according to their importance from their perspective Table 5.

Table 4: balancing weight between target and actual sample acquired (source: authors)

Age group	Target (T)	Actual (A)	Weight (W)
20 < 35	53.16	47.67	1.12
35 < 50	28.22	30.67	0.92
50+	18.62	21.33	0.87

Table 5: indicators weight balancing according to the respondent (source: authors)

Indicators		Age group 20 < 35		Age group 35 < 50		Age group 50+	
First level indicator	Second level indicators	Sample	Weight	Sample	Weight	Sample	Weight
Urban security	**A1-** Social security	30	0.21	51	0.55	24	0.38
	A2 - Transport security	42	0.29	24	0.26	28	0.44
	A3 -Emergency shelters	16	0.11	21	0.23	16	0.25
	A4 - Disaster response capacity	50	0.35	46	0.50	20	0.31
Convenience of public facilities	**B1** - Shopping facilities	103	0.72	52	0.57	39	0.61
	B2 - Education facilities	43	0.30	50	0.54	21	0.33
	B3 - Healthcare facilities	58	0.41	42	0.46	53	0.83
	B4 - Dining facilities	32	0.22	26	0.28	18	0.28
	B5 - Recreational facilities	56	0.39	48	0.52	38	0.59
	B6 - Cultural facilities	24	0.17	37	0.40	22	0.34
	B7- Aged facilities	36	0.25	32	0.35	30	0.47
Natural environment	**C1** - Favorable climate	26	0.18	50	0.54	29	0.45
	C2 - Access to a water area	32	0.22	41	0.45	34	0.53
	C3 - Access to urban parks	29	0.20	46	0.50	32	0.50
	C4 - Urban green	34	0.24	57	0.62	51	0.80
	C5 -Cleanliness of city coverage rate	127	0.89	51	0.55	30	0.47
Sociocultural environment	**D1** - High-quality citizens	52	0.36	49	0.53	16	0.25
	D2 - Social inclusion	43	0.30	36	0.39	22	0.34
	D3 - Urban identity	28	0.20	33	0.36	20	0.31
	D4 - Protection of historical culture	36	0.25	50	0.54	28	0.44
	D5 - Sense of belonging	44	0.31	29	0.32	25	0.39

Table 5: indicators weight balancing according to the respondent (source: authors)

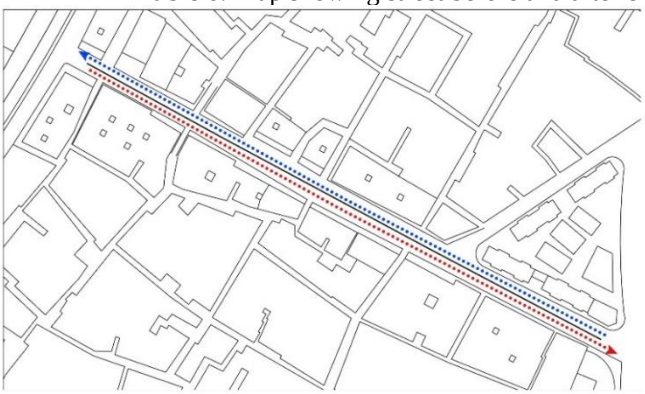
Indicators		Age group 20 < 35		Age group 35 < 50		Age group 50+	
First level indicator	Second level indicators	Sample	Weight	Sample	Weight	Sample	Weight
Convenient transportation	**E1** - Urban road conditions	97	0.68	38	0.41	31	0.48
	E2 - Access to public transit	119	0.83	72	0.78	35	0.55
	E3 - Availability of parking lots	113	0.79	62	0.67	22	0.34
	E4 - Traffic congestion	65	0.45	77	0.84	24	0.38
Environmental health	**F1** - Water pollution	56	0.39	36	0.39	27	0.42
	F2 - Solid waste pollution	60	0.42	41	0.45	24	0.38
	F3 - Air pollution	121	0.85	68	0.74	52	0.81
	F4 - Noise pollution	65	0.45	42	0.46	30	0.47

4.5 RESULTS & DISCUSSION

4.5.1 Results

According to people perspectives found that street problems are air pollution rate is high and missing and narrow sidewalks which led to less communication and a decrease in urban livability. Air pollution rate is high due to the increased demand for private means of transport. Decreasing the car rate in the street is to decrease the carbon emissions. Sidewalks will increase in width, allowing more access to shopping facilities and adding more green elements. But increasing the sidewalk and reducing the street width will make traffic jams. According to Barcelona superblock guidelines, street will change into one-way street to have more control of street traffic. This change will change this street and the surrounding street fabric car pathways.

Table 6: Map showing street before and after changing car pathway (source: authors)



Current state:

Two-way car pathway

Middle pavement 50 cm

One side can fit:

1 parked car

2 moving car

Sidewalk very narrow

Proposed state:

One-way car pathway

No middle pavement

Street can fit:

1 parked cars

2 moving cars

2 bicycle lanes

Sidewalks are wide.

Wide travel lanes and undifferentiated street space can lead to greater speeds and inefficient use of expensive street space.

Bicyclists find riding between fast-moving traffic and the door zone unsettling. Bicycles may weave in and out of traffic unpredictably as a result of double-parked automobiles, posing a risk to both motorists and bicyclists. A raised cycle track installed on the left side of a one-way roadway shields cyclists from bus traffic and forms a pedestrian safety island that reduces pedestrian exposure time.

A bus-only lane may be implemented at the curbside or offset on downtown streets with considerable bus traffic. Bus-only lanes require much enforcement and can be encroached into by double-parked automobiles and loading lorries if they are not enforced properly. Increase the usefulness of bus-only lanes by combining them with bus bulbs, shelters, and transit signal priority.

Consider extending sidewalks as part of a street renovation, significantly if they were previously narrowed to accommodate more transport lanes. This street section shows proposed solutions, as shown in figure 8,9.

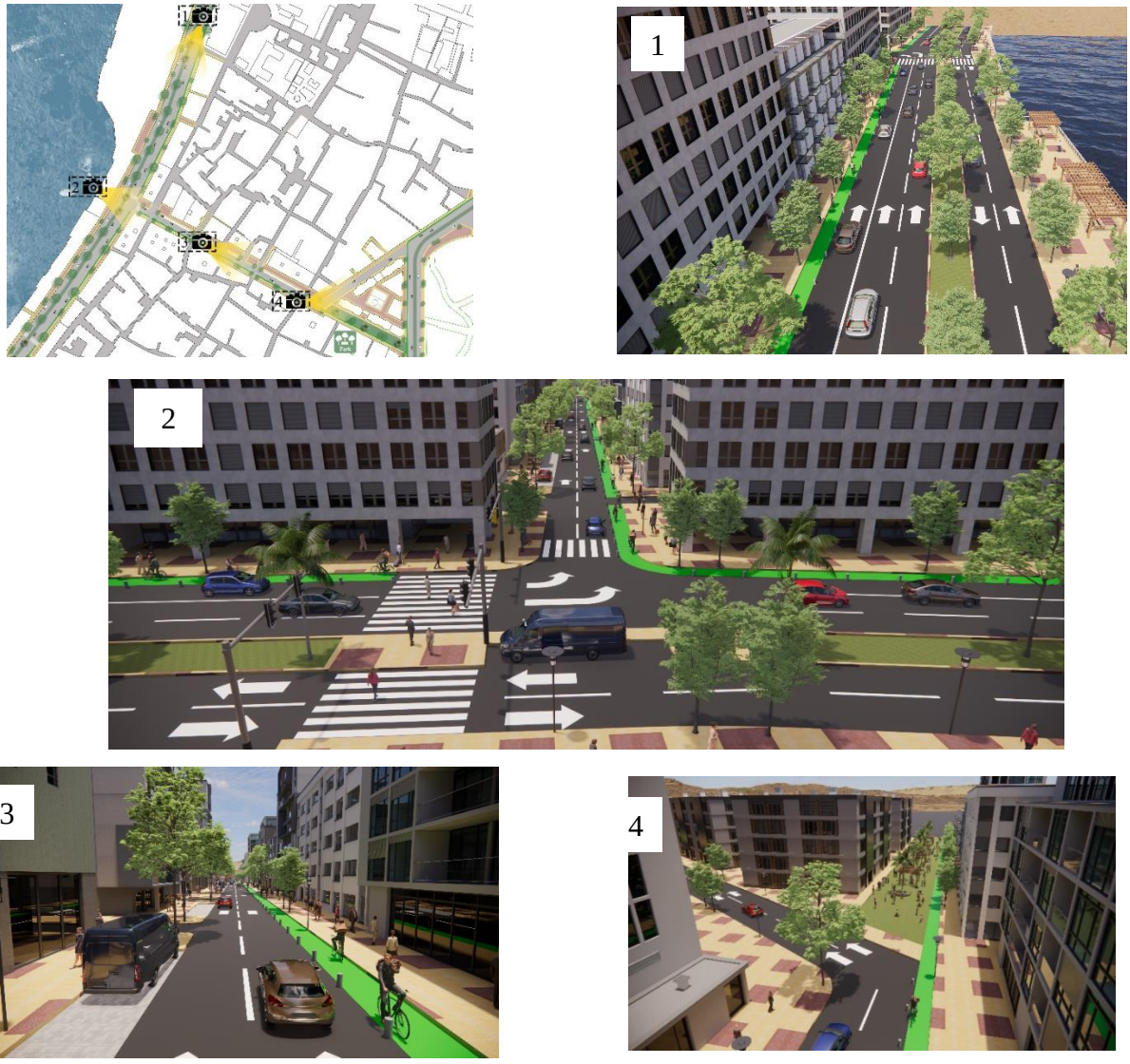


FIGURE 8: Salah El-Din street after development (source: authors)Z

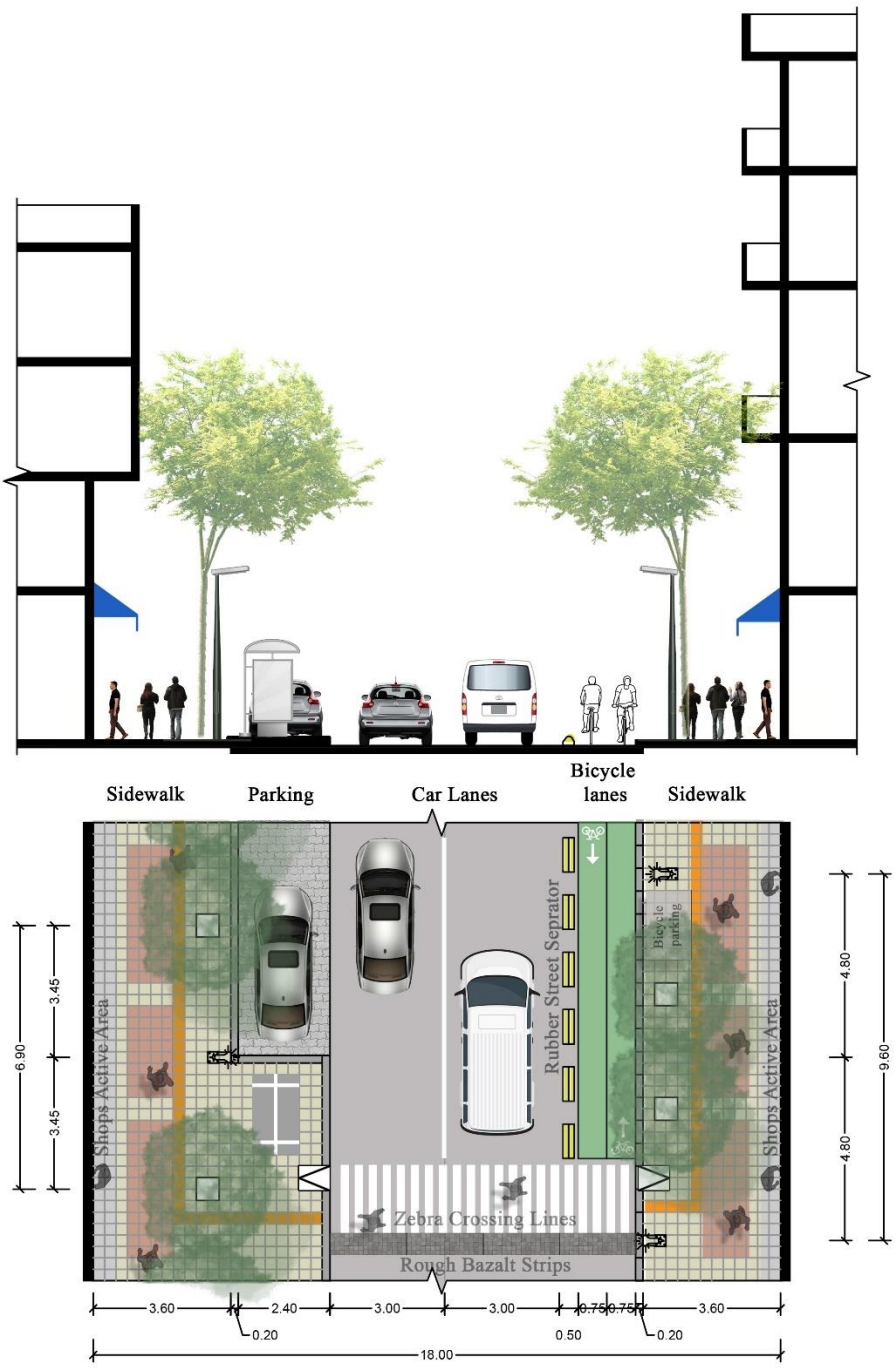


FIGURE 9: Salah El-Din street after considering precedent studies & people's perspectives (source: authors)

4.5.2 Discussions

Combining subjective residents' feelings with objective environmental elements is essential in constructing and planning livable communities. This combination can conduct more people-oriented livability as urban livability can be transformed from one place to another according to people's needs and perspectives.

Evaluation of urban livability is an essential field of study to improve livability. This quality of living and livability assessment is evaluated based on statistical data. Twenty-nine indicators are chosen from six dimensions to create an objective indicator system. This conceptual framework is applied to a street

in a residential community in Aswan, Egypt, to obtain findings and contribute to the existing research area.

Decreasing lanes will give more space for sidewalks in order for people to have the opportunity to communicate. This action will lead to decreased car capacity in Salah El-Din street, which is directly proportional to decreasing carbon emissions. Having bicycle lanes in both directions will motivate and encourage people to use bicycles instead of private cars as bicycle lanes are shaded with green.

Finally, the main focus of this paper is on environmental quality. A residential community is chosen to be objectively evaluated and livability analyzed. Moreover, the integrated evaluation framework is based on residents' preferences and environmental factors. This methodological framework has operability and scalability, which encounter theoretical connotation, user experience, and practical value. Findings and results can provide more insight for policymakers to improve urban livability.

5. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This paper assessed the global research output on livability using descriptive Statistics and humanities methodology. To gain a clearer picture of liveability in the scientific knowledge, the study identifies and evaluates the productivity of top authors, journals, documents type, countries, sources, and affiliations. The insights gained from the Salah El-Din street study showed that it needs to be more livable for people of all ages and abilities. Air pollution, access to shopping facilities, urban green, and public transportation are the leading essential indicators for these street residents. According to people's needs, the indicators' choices may change from one place to another. This is why using descriptive Statistics and humanities methodology will lead to more efficient decisions. Decisions made in developing Salah El-Din street are based on the analysis of the Barcelona superblock.

First, air pollution is controlled by limiting car circulation to a one-way car pathway. Increasing sidewalks' width will lead to more access to shopping facilities with more opportunities for people to communicate. Urban green is enhanced by increasing vegetation from trees and shrubs. Introducing new hubs within five minutes of walking distance motivates people to use public transportation instead of private cars. As shown in figure 6, these decisions will help increase the livability of Salah El-Din street in Aswan city.

5.2 Recommendations

The world is now moving toward more livable urban communities. May cities adopted this concept like Barcelona, New York and Toronto city. The focus of the precedent studies was on Barcelona due to the standard features. As livability changes from one city to another, a descriptive statistical method was used to evaluate and assess the indicators of the six dimensions based on the human perspective. The results combine physical features and people's perceptions. The statistical weights that lead to which indicators and dimensions are needed the most can guide urbanists and policymakers toward what is needed for future development.

The government should invest in more studies on the microscale as community-scale while improving urban livability. In order to build a livable urban community, the government and urbanists should consider different age groups and residents' needs.

- Human research-based is needed to have a clear view of what is needed for increasing livability;
- Statistical evaluation should support the human research-based to reach design guidelines;

- Solutions should be discussed with residents as user experience and people's voice matter;
- The methods used to increase urban livability should be presented to the public as render shots, virtual reality, and
- These methods should have minor changes to the existing fabric to avoid losing the place's identity.

Future work

- Changing the Salah El-Din car direction pathway will change surrounding fabric pathways; this change will be studied.
- A study of the new car capacity to figure out the capacity of carbon emissions decreased.
- Using virtual reality from the Enscape simulation program and questionnaire from humanities research to allow users to live the whole experience and validate these changes from users' experience.
- A study of the soft-scape introduced in Salah El-Din street is to figure out the capacity of increased shadow percentage and drop in temperature in the whole street.

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AUTOBIOGRAPHICAL SKETCH

Mohab Taher Abdelfatah is a graduate teaching assistant in the Architectural Engineering and Environmental Design department, Arab Academy for Science, Technology and Maritime Transport university (AASTMT). He received a bachelor's degree in Architectural Engineering and Environmental Design and is currently a master's student in (AASTMT). His research areas include urban design, urban livability, human perception and behavior.

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تقييم الاحتواء المكاني نحو مجتمعات عمرانية أكثر ملائمة للعيش في شارع صلاح الدين في أسوان، مصر

مهاب طاهر عبد الفتاح[1], ياسر أحمد دهب[2] ,عبد العزيز فاروق عبد العزيز[1]

الملخص

التعايش هو أحد المبادئ التوجيهية الأساسية لصنع السياسات ومساعدة المتخصصين في التخطيط الحضري ، والتي أصبح تقييمها وتعريفها موضوع البحث الحاسم للتصدي لها. تتطلب الظروف المعيشية على نطاق صغير اهتمامًا أكثر إلحاحًا مع تسارع التقدم في التنمية الاجتماعية والاقتصادية. ومع ذلك ، فقد تناول عدد قليل من الباحثين معايير التقييم للعيش في المناطق الحضرية على مقاييس الاحتواء كمقياس المجتمع. لذلك ، تهدف هذه الورقة إلى إنشاء نظام إحصائي لتقييم الوزن المتوازن على مستوى المجتمع الحضري ، حيث تعد المجتمعات السكنية إحدى الوحدات الأساسية لأماكن المعيشة الحضرية. تم اختيار تسعة وعشرين مؤشرًا موضوعيًا لإنشاء نظام المؤشرات. بالنظر إلى الفئات العمرية المختلفة ، فإن إطار التقييم الشامل لصلاحية المجتمعات المحلية يجمع بين المؤشرات الموضوعية والتصورات الذاتية. وعليه فقد تم تطبيق هذه الدراسة لتقييم قابلية العيش في النطاق المجهري الحضري للمجتمعات السكنية في مدينة أسوان. هناك نتائج مهمة من الدراسة. لدى الفئات العمرية المختلفة مطالب مميزة فيما يتعلق بقابلية المجتمع الحضري للعيش. وقد قيموا بعض المؤشرات وركزوا في البعدين التاليين: حقوق المشاة وسهولة النقل. أخيرًا ، تُظهر قابلية المجتمعات للعيش في نمط مكاني متناقص من وسط المدينة إلى المناطق المحيطة. قد تكون هذه النتائج التجريبية مفيدة للمدينيين والأطراف الأخرى كأصحاب المصلحة في التنمية المستقبلية.

الكلمات الدالة: *التعايش ، الاحتواء ، المجتمع الحضري ، التخطيط الحضري ، النطاق المجهري ، أسوان*

[1] مساعد تدريس، قسم الهندسة المعمارية والتصميم البيئي ، الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري، فرع جنوب الوادي، أسوان، مصر.
بريد إلكتروني mohab.taher@aast.edu

[2] مدرس، كلية الحاسبات وتكنولوجيا المعلومات ، الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري، فرع جنوب الوادي، أسوان، مصر.
بريد إلكتروني ydahab@aast.edu

3 أستاذ مساعد، قسم الهندسة المعمارية والتصميم البيئي ، الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري، فرع جنوب الوادي، أسوان، مصر.
بريد إلكتروني drabdelaziz@aast.edu