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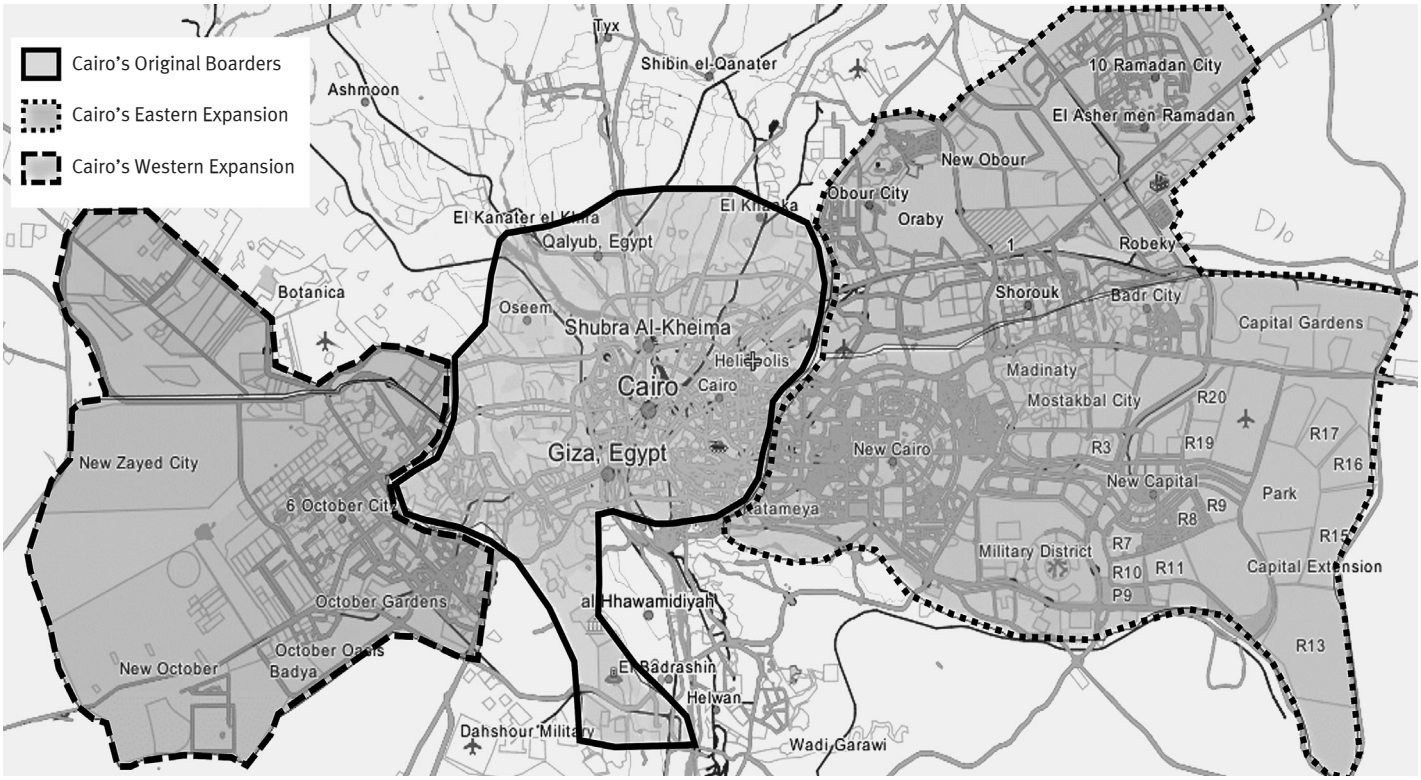

Fig. 1 The New Gated Communities Flourishing Inside Cairo and its Urban Fringe New Towns

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Localizing Social Aspects and Liveability Criteria in Neighbourhood Sustainability Assessment Tools

Case Study: New Urban Expansions in Cairo, Egypt

liveability
Neighbourhood Sustainability Assessment Tools (NSATs)
new communities
social sustainability
urban regeneration

Successful urban regeneration accentuates the major purpose of the built environment in achieving urban renewal, in particular preserving local identity and sense of place, promoting mixed-use communal living, and optimizing resources on a long-term plan. The city of Cairo, Egypt, has witnessed a significant urban growth, with new cities located in the urban fringe. However, it is questionable whether the neighbourhoods located in the new expansions are regenerative and sustainable as claimed. Evaluating new neighbourhoods' performance helps in improving the built environment as enhancing their liveability and sustainability significantly contributes to better regenerative urban environments. This study tackles the issue of evaluating new Egyptian neighbourhoods' sustainability. An extensive analysis was carried out for three Neighbourhood Sustainability Assessment Tools (NSAT), LEED®ND, BREEAM Communities and CASBEE-UD, to address the most applicable one to the Egyptian context. The research showed that 1) the social dimension was poorly addressed together with 2) the difficulty of applying the tool in the Egyptian context, as it has different cultural and demographic characteristics. The research highlights the importance of addressing neighbourhood liveability in NSATs as well as the need for their adaptation to local context. This represents a solid foundation for future research and creating NSATs adapted to the Egyptian cultural context.

Introduction

Urban expansions have emerged as a result of specific human needs expressed by groups of people in a certain area, personal preferences, climatic changes, cultural backgrounds, economic pursuits, political or religious factors, etc (Keleg, 2015: 15). A wide range of new urban expansions worldwide are being planned and developed on a massive scale, yet previous experiences from all over the world proved to be a failure for some of those new communities' social structure (Azzam, 2017: 20). Therefore, there is a crucial need to adopt a strong perception and dedication to designing socially successful as well as economically and environmentally sustainable cities (Woodcraft et al., 2011: 16)

It is thought that expansion has neglected some local values in several new communities and the promotion of environmental quality within others. The newly developed urban environment in Cairo, Egypt often lacks vital aspects of sustainability, and environmental and humane qualities. The focus has been on economic development, leading to the creation of mass-produced housing environments (Nasr et al., 2023: 1).

In general, many new communities might have failed in meeting some crucial needs and preferences of the residents. One of the most influential pillars for achieving any country's urban sustainability is a socially sustainable neighbourhood, however, the term "neighbourhood social sustainability" is challenging and does not clearly exist in the social and sustainable urban development literature (Azzam, 2017: 25).

Limited studies have been conducted related to this topic in the Egyptian context. Consequently, neighbourhood sustainability is not as well illustrated and understood as in western literature. Therefore, this paper aims to investigate the ability to assess the performance of new expansions through detecting which of the existing tools are applicable for assessing the sustainability of the neighbourhood in the Egyptian context, with a special emphasis on social aspects and liveability. This contribution represents an initial phase of a broader research endeavour. It aims to establish the foundational principles and articulate the relevance of the subject matter, thereby setting the stage for subsequent investigations. The paper also elucidates the methodological approach that will guide the comprehensive research, leading to the development and adaptation of a neighbourhood sustainability assessment tool tailored to the Egyptian context.

Overview of the Research Context

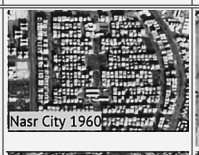
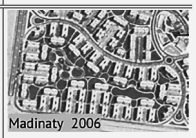
The great city of Cairo's built-up area consists of three main sectors. The major one is the city of "Cairo" located on the east bank of the Nile, extending from Shubra in the North to Helwan in the South, and Heliopolis and Nasr City in the northeast. The second sector is "Giza" governorate lying on the west bank of the Nile, and finally "Al-Qualiubya" governorate located in the north of Cairo (Fahmi, Sutton, 2008: 279). In the period between 1980s and early 2000s, Cairo experienced a surge in urban expansion and development driven by government-led initiatives to accommodate a growing population and stimulate economic growth such as the 1st district established in 1985 and Jasmine in 2000 according to (Ghonimi, 2022: 3) as shown in Table I. This period witnessed the creation of new urban communities on the city's fringes, characterized by modern housing complexes, planned infrastructure, and amenities designed to attract middle and upper-income residents (Fahmi, Sutton, 2008: 281). The aim of these developments was to improve housing shortages, upgrade living standards, and promote sustainable urbanization.

Despite the efforts to establish well-planned new communities, the low-income residents faced several issues concerning the affordability, accessibility, and social integration. Consequently, the informal settlements, known as "Ashwa'eyat" issue has not been solved and kept expanding, causing challenges to urban

planning and governance (Singerman, Amar, 2009: 32). The way those settlements function often led to inadequate infrastructure, lack of basic services, and vulnerability to displacement and social exclusion.

Cairo has witnessed neglect of old neighbourhoods, characterised by rich cultural heritage and historical precedence in the past few decades, being favourably disposed to the construction of new urban expansions. This has resulted in profound consequences on the social cohesion, identity, and liveability of the city. The establishment of new urban expansions on Cairo's urban fringe shown in Fig. 1 has mainly favoured specific social groups, particularly middle and upper-income class (Akl, 2022: 6). These new urban expansions, often known as gated communities, offer progressive amenities, well designed infrastructure, and security services designed to fulfil the needs and preferences of high-class residents.

Table I Classification of neighbourhood types in Cairo since the early 20th Century

Neighbourhood Type	Early Developed (Traditional)	Early Planned	New Planned	Contemporary Private
Examples	 Abasiaa 1850  Shoubra 1850	 Nasr City 1960  Heliopolis 1900	 1st District 1985  Jasmine 2000	 Madinaty 2006  Mivida 2022
Public spaces Morphology	Streets as public spaces	Urban space as fenced islands	Urban spaces as open islands	Urban spaces inside the superblocks
Date	Early 20th Century	Early and mid-20th century	1980-2000	2000-current
Developer	Over agricultural land	Government Private Developers	Government	Private Developers

Neighbourhoods act as an important tool for the investigation and planning of municipal areas (Leby, Hashim, 2010: 69). They are the fundamental building units forming cities letting planners experiment with approaches and development scenarios for improving their quality (Rohe, 2009: 210). The contemporary European discourse on sustainability, particularly within the European Union, increasingly acknowledges the critical role of social sustainability and community development. This trend is evidenced by the emergence of initiatives such as the New European Bauhaus and the 15-minute city concept, which, along with the theoretical and practical contributions of Jan Gehl (2010), advocate for the creation of sustainable and inclusive urban spaces. These frameworks prioritize the community as the central focus of urban design, aiming to cultivate environments that foster individual satisfaction, innovation, and creativity. Governments have usually divided the city into sectors to secure a fair distribution of resources and services. Over the past three decades, several studies have tackled the new urban expansions in Cairo, Egypt. The traditional neighbourhood's spatial configuration has undergone significant transformations influenced by rapid urbanization, population growth, economic development, and changing social dynamics (Stewart et al., 2004: 97). Although neighbourhood planning dates back to long time ago, urban planners and specialists in principle didn't consider the evaluation of its performance and sustainability until the beginning of the 21st Century (Sharifi et al., 2021: 2).

All these factors imply the need for empowering social sustainability components and liveability in planning and regenerating new Egyptian neighbourhoods, indicating a lack of complete and adapted assessment tools for the task.

Sustainable Urban Environments

Regenerative urban environments are entrusted to provide sustainable economic, environmental, and social aspects – the three main pillars of sustainability – for current and future generations; it depends on those environments' performance to ensure that community perform well. On the other hand, liveability and the quality of life is concerned with residents' current satisfaction with the community they live in (Ghonimi, 2022: 3). This research prioritizes social sustainability, one of the three pillars, due to the existing overemphasis on economic and environmental aspects in urban development. Economic considerations dominate development practices, and current sustainability assessment tools largely address environmental concerns. Consequently, social sustainability criteria are often overlooked and represent the main motivation for this research.

The concept of sustainability and liveability emerged in the last half of the 20th century, and they are two important drivers for the early 21st century's city planning vision even if the community or neighbourhood concept has been known as playing an important role in city formation. The three concepts have so much in common, overlapping each other, and several similarities could be found among their criteria. Although each concept has its special criteria and addresses some defined issues in a thoughtful manner, the way it is applied is similar to a specific extent (Zarin, Tarantash, 2011: 2).

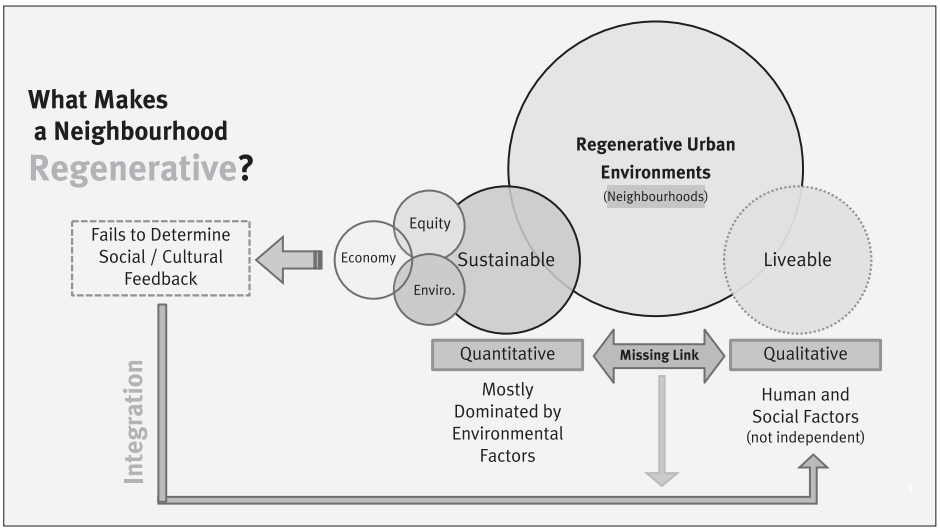


Fig. 2 The relation between the factors affecting the production of regenerative urban environments

Neglecting the sustainability indicators in favor of assuring residents' satisfaction and applying quality-of-life solely may be associated with negative impacts and consequently the community could fail in serving the residents properly, even if it is characterized by a high quality of life (Porio, 2015: 246). In this circumstance, achieving urban sustainability results in dissatisfaction as residents and practitioners ignore applying it. Moreover, increasing the quality-of-life prompts economic and resource consumption, and social exclusion, leading to devalued sustainability (Nikoofam, Mobaraki, 2020: 863). Therefore, it is important to bridge the gap between the achievement of quality-of-life in urban environments and assuring their sustainability socially, economically, and environmentally as explained in Fig. 2. In other words, address how communities apply sustainability aspects and simultaneously provide high quality-of-life and satisfaction for their residents.

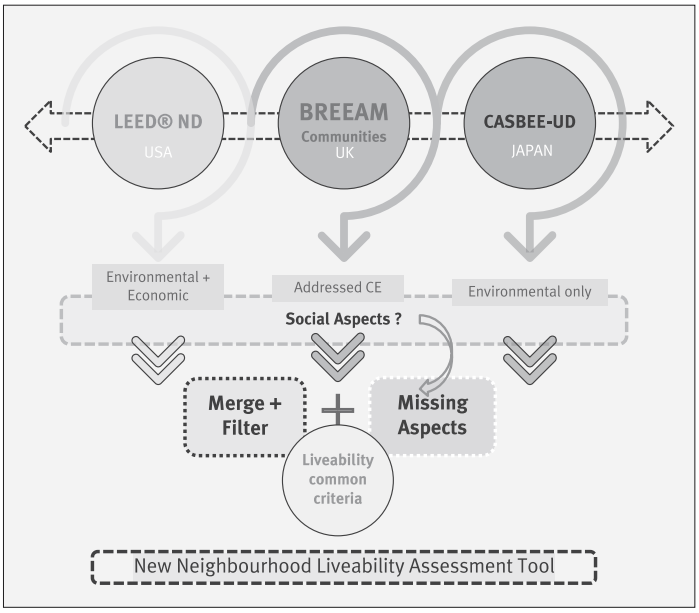


Fig. 3 The proposed research methodology

The Concept of Liveability

Liveability could be described as a result of interaction between the community and the surrounding environment, while focusing on the residents' evaluation of this environment (Shafer et al., 2000: 165; Leby, Hashim, 2010: 71). It embodies dwelling's elements, neighbourhoods and municipal areas that provide security and safety, economic opportunities, health, accessibility, walkability and recreation (Jarvis, Young, 2005). According to Leby and Hashim (2010: 72), liveability does not only appertain to residential units and urban qualities, but it is also concerned with the communities' quality of life. According to Kasim et al. (2020) liveability is addressed as a composite of interconnected social, economic, and ecological values that promote and enhance quality of life and sustainability. Also, it signifies the challenges to the lifestyle of individuals and communities.

Neighbourhoods are places where people live, interact, and spend their time. Also, inhabitants are more concerned with neighbourhoods as what happens there affects their quality of life and, for some business owners it affects their financial standing. Therefore, stakeholders and urban planners have to consider neighbourhoods as an important physical and social unit for managing urban planning challenges (Parker et al., 2023: 14).

Assessing an urban environment's liveability at the neighbourhood scale is an optimal choice for two main reasons. First, it is small enough as an urban unit to pilot the implementation of innovative design and planning ideas, and large enough to transform systemic and integrated approaches to actual urban development in terms of interactions between the urban context and residents. Second, neighbourhood is considered in terms of an optimal scale for promoting social interactions between residents and assuring local stakeholders' engagement in sustainability initiatives, accentuated in the New Urban Agenda and the SDGs (Sala Benites et al., 2020: 8; Sharifi et al., 2021: 5).

Methods for Neighbourhoods' Performance Evaluation

The main research concern is whether the newly established urban expansions in the Egyptian urban fringe accommodate the

LEED v4 for Neighborhood Development Plan
Project Checklist

Project Name:
Date:

Yes	?	No				
0	0	0	**Smart Location & Linkage**			28
Y			Prereq	Smart Location		Required
Y			Prereq	Imperiled Species and Ecological Communities		Required
Y			Prereq	Wetland and Water Body Conservation		Required
Y			Prereq	Agricultural Land Conservation		Required
Y			Prereq	Floodplain Avoidance		Required
			Credit	Preferred Locations		10
			Credit	Brownfield Remediation		2
			Credit	Access to Quality Transit		7
			Credit	Bicycle Facilities		2
			Credit	Housing and Jobs Proximity		3
			Credit	Steep Slope Protection		1
			Credit	Site Design for Habitat or Wetland and Water Body Conservation		1
			Credit	Restoration of Habitat or Wetlands and Water Bodies		1
			Credit	Long-Term Conservation Management of Habitat or Wetlands and Water Bodies		1
0	0	0	**Neighborhood Pattern & Design**			41
Y			Prereq	Walkable Streets		Required
Y			Prereq	Compact Development		Required
Y			Prereq	Connected and Open Community		Required
			Credit	Walkable Streets		9
			Credit	Compact Development		6
			Credit	Mixed-Use Neighborhoods		4
			Credit	Housing Types and Affordability		7
			Credit	Reduced Parking Footprint		1
			Credit	Connected and Open Community		2
			Credit	Transit Facilities		1
			Credit	Transportation Demand Management		2
			Credit	Access to Civic & Public Space		1
			Credit	Access to Recreation Facilities		1
			Credit	Visitability and Universal Design		1
			Credit	Community Outreach and Involvement		2
			Credit	Local Food Production		1
			Credit	Tree-Lined and Shaded Streetscapes		2
			Credit	Neighborhood Schools		1

Yes	?	No				
0	0	0	**Green Infrastructure & Buildings**			31
Y			Prereq	Certified Green Building		Required
Y			Prereq	Minimum Building Energy Performance		Required
Y			Prereq	Indoor Water Use Reduction		Required
Y			Prereq	Construction Activity Pollution Prevention		Required
			Credit	Certified Green Buildings		5
			Credit	Optimize Building Energy Performance		2
			Credit	Indoor Water Use Reduction		1
			Credit	Outdoor Water Use Reduction		2
			Credit	Building Reuse		1
			Credit	Historic Resource Preservation and Adaptive Reuse		2
			Credit	Minimized Site Disturbance		1
			Credit	Rainwater Management		4
			Credit	Heat Island Reduction		1
			Credit	Solar Orientation		1
			Credit	Renewable Energy Production		3
			Credit	District Heating and Cooling		2
			Credit	Infrastructure Energy Efficiency		1
			Credit	Wastewater Management		2
			Credit	Recycled and Reused Infrastructure		1
			Credit	Solid Waste Management		1
			Credit	Light Pollution Reduction		1
0	0	0	**Innovation & Design Process**			6
			Credit	Innovation		5
			Credit	LEED® Accredited Professional		1
0	0	0	**Regional Priority Credits**			4
			Credit	Regional Priority Credit: Region Defined		1
			Credit	Regional Priority Credit: Region Defined		1
			Credit	Regional Priority Credit: Region Defined		1
			Credit	Regional Priority Credit: Region Defined		1
0	0	0	**PROJECT TOTALS (Certification estimates)**			110

Certified: 40-49 points, **Silver:** 50-59 points, **Gold:** 60-79 points, **Platinum:** 80+ points

Fig. 4 LEED®ND checklist for neighbourhood sustainability assessment

factors that build a socially sustainable neighbourhood and to what extent those neighbourhoods are considered liveable. Assessing an urban community's liveability measures the degree of challenges that could be present in residents' daily life. A high liveability ranking maintains positive health outcomes and behaviours, and is also associated with improved mental health and elevated physical activity (Kasim et al., 2020: 2). Although Egypt has developed The Green Pyramid Rating System (GPRS), an Egyptian environmental rating system for buildings, it evaluates environmental credentials of buildings but has no criteria for neighbourhoods (El-Hafeez et al., 2014: 153).

The research also focuses on how the living standards criteria are incorporated into existing NSATs and whether they are locally adapted, which raises the question of what are the prerequisites for designing locally adapted NSATs for Egypt.

After setting the research base through the Egyptian context and the basic concepts of social sustainability, meaning quality of life and assessment tools, the main research method consists of a comparative analysis of the existing NSATs in the field of quality of life criteria. Furthermore, by synthesizing all relevant research elements, this paper proposes a methodological process for the Egyptian context: adapting the quality of life criteria and designing NSATs for the planning and regeneration of new Egyptian neighbourhoods.

Neighbourhood Sustainability Assessment Tools

The Neighbourhood Sustainability Assessment tools (NSATs) are a classification of impact evaluation tools aiming to enhance urban sustainability by stating a list of standards for assessing and declaring the sustainability of residential neighbourhoods (Aguiar Borges et al., 2020: 6). Fig. 3 explains the research attempt to identify the most widely used and verified assessment tools worldwide, also clarifying the common and missing aspects among them. It was found (Sharifi, Murayama, 2013: 75; Szibbo, 2016: 4; Sharifi et al., 2021: 7) that the following three assessment tools were most widely used and referenced concerning the neighbourhoods' performance evaluation:

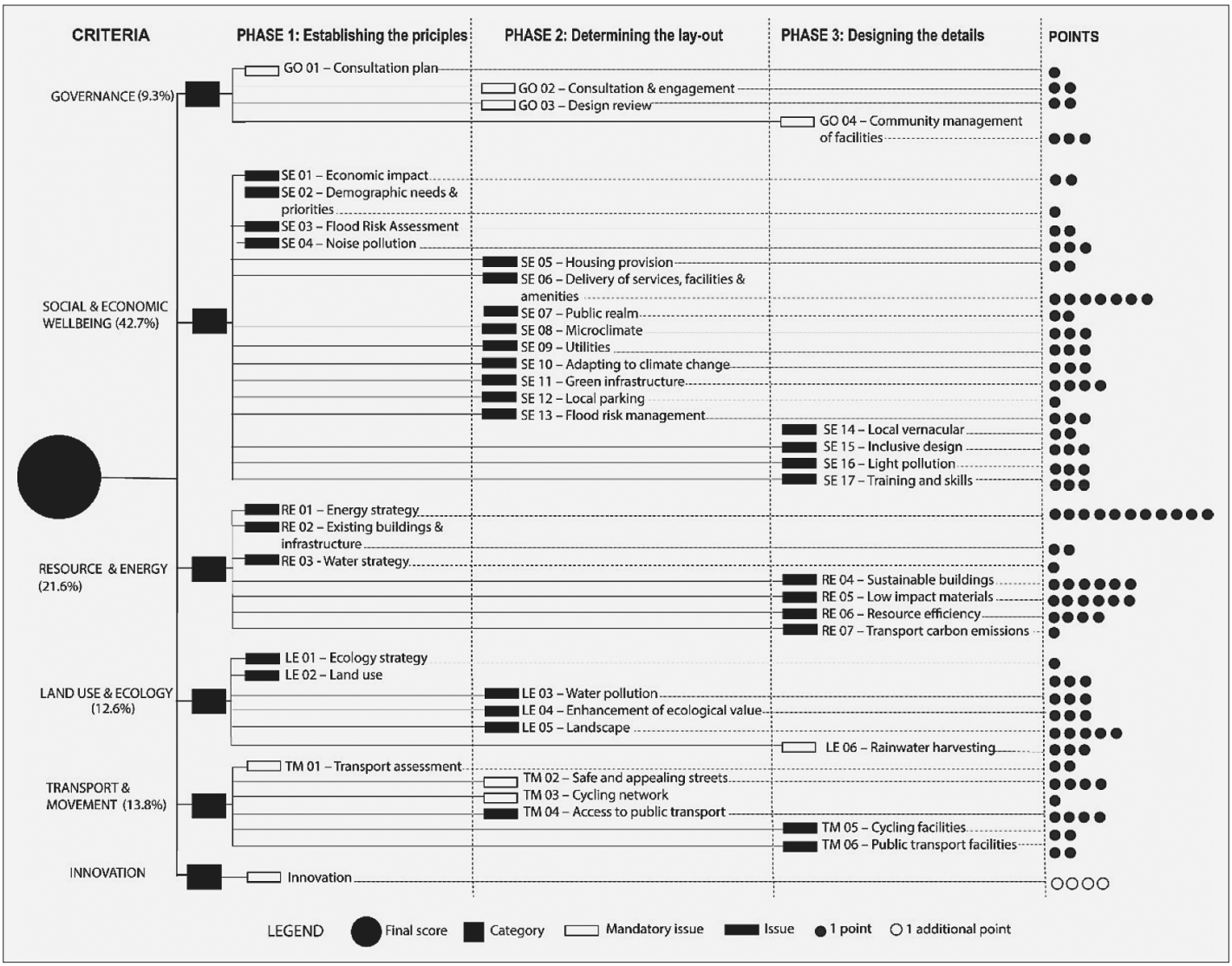


FIG. 5 HIERARCHICAL DIAGRAM FOR THE STRUCTURE OF BREEAM COMMUNITIES

1) LEED®ND – Leadership in Energy and Environmental Design for Neighbourhood Development (LEED®ND) rating system is the most familiar rating system in North America, developed by the US Green Building Council (USGBC) for assessing the sustainability of neighbourhoods (Szibbo, 2016: 4). Designed for neighbourhood-scale projects that are near completion or were completed within the last three years. Therefore, it may help in creating better or alternative solutions within the construction phase. However, its main goals are commercial, as it helps market and fund projects among prospective tenants, financiers, and public officials by affirming the intended sustainability strategies. 33% of its criteria is related to the resources and environment theme.

2) BREEAM Communities – Developed in 2011 by BRE Global, with the aim of considering the sustainability principles at the early stages of the design process (Sharifi, Murayama, 2014: 245). BREEAM Communities is a certification assessment tool that can be applied to existing and newly established neighbourhoods. It is used to evaluate recent developments, existing and renovated projects in the social, economic, and environmental aspects. Also, it enhances communities' life cycles (Umdu et al., 2021: 209).The system was developed to offer measurement tools determining the outcomes of sustainability using a numerical criterion. This tool works following three main steps. First, establishing the principles; then, determining the layout; and finally, designing the details. It is divided into six major categories (Governance; Social and economic wellbeing; Resources and energy; Land use and ecology; Transport and movement; Innovation; Glob-

al, 2017: 2). The certification is obtained when a score of at least 30% is achieved. One of the main advantages of BREEAM is involving the stakeholders within the design process in order to increase the benefit and developments in accordance with the economic and political change (Revellini, 2022: 950). The main issue with BREEAM Communities is that it is not easy to use as its six major categories has many complicated subcategories which make it difficult to understand and apply easily. Aguiar Borges et al. (2020: 8) tried to illustrate the structure of BREEAM shown in Fig. 5.

3) CASBEE-UD is a product of the collaboration between Japan Green Building Council (JaGBC), and Japan Sustainable Building Consortium (JSBC). It is a member of the CASBEE family, developed to evaluate the environmental efficiency of projects accommodating numerous buildings and open public spaces. This tool mainly focuses on the outdoor environment and the function of building clusters. CASBEE-UD's scope is just limited to specific large-scale projects and is mainly focused on the environmental aspects of sustainability (Sharifi, Murayama, 2013: 79). The environmental quality criteria constitute three major themes "natural environment", "service functions", and "contribution to the local community".

Correspondingly, "environmental impact on microclimates and buildings", "social infrastructure", and "management of the local environment" are used in the evaluation of the environmental load. Scores are given based on the scoring criteria for each assessment item. These criteria applied to assessments are determined by taking into consideration the level of technical and social standards at the time of assessment.

A five-level scoring system is used, and a score of level 3 indicates an "average". However, those sub-criteria represent the Japanese context and are used as the reference level for assessment. Credits are awarded based on the performance above or below the ranking of this subcriteria which makes it more specific to the Japanese environment (Sharifi, Murayama, 2014: 246).

Discussion

The past two decades, a wide range of literature has been published on various topics related to NSATs. This is helpful in reviewing the existing knowledge on them and understanding precisely their aspects of success and failure. However, so far there is no published article that approves the 100% success of any of those NSAT's. This success means

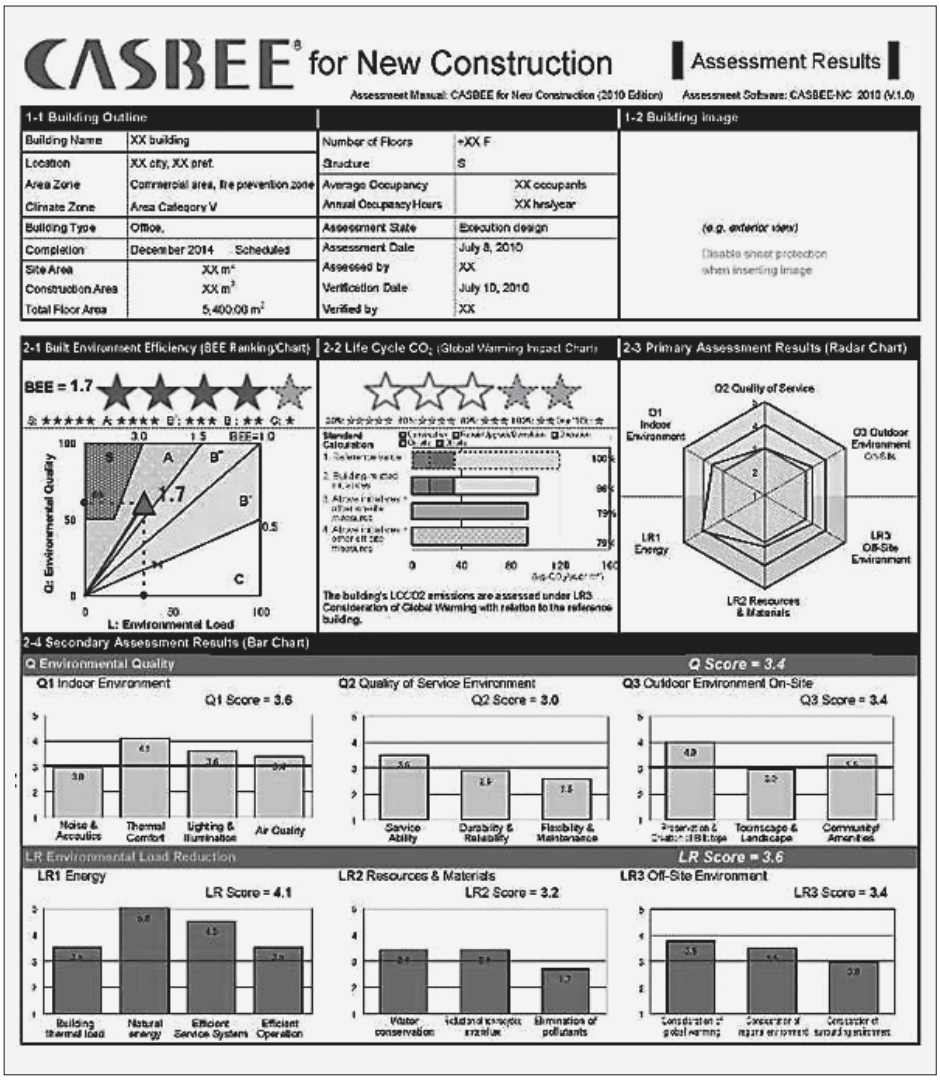
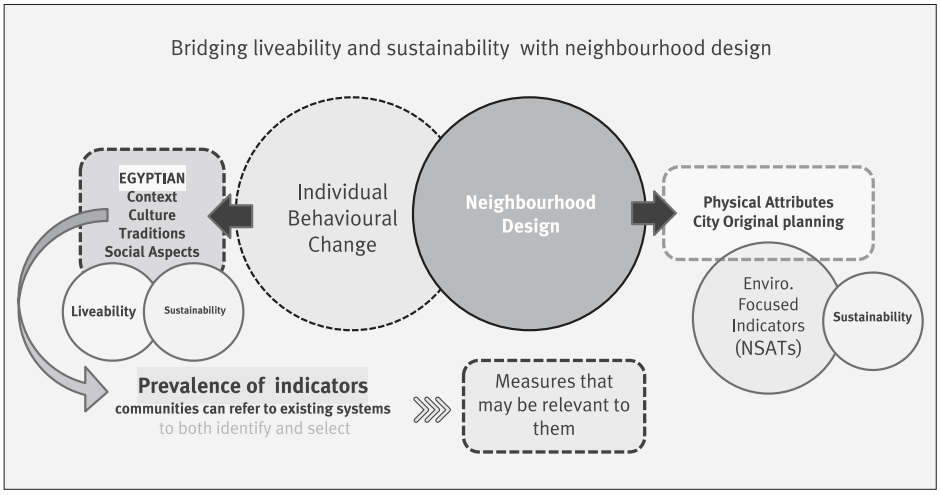


Fig. 6 A sample for the outcome of CASBEE-UD assessment tool

Fig. 7 Bridging liveability and sustainability with neighbourhood design

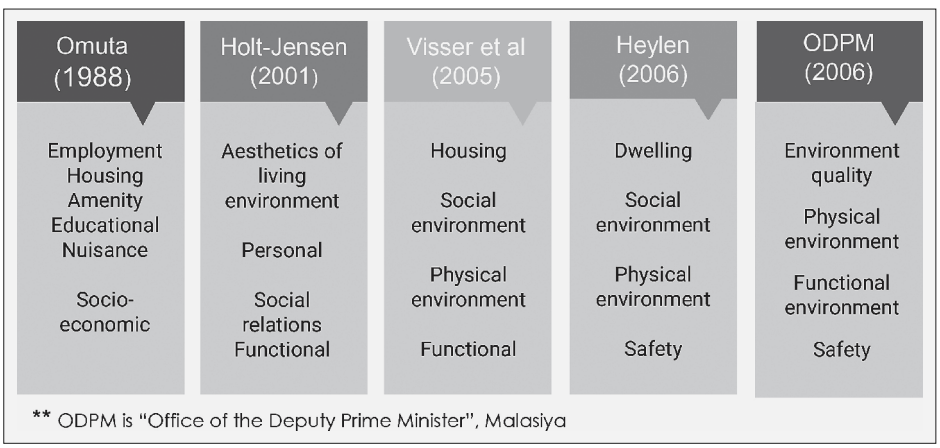


Sustainability	Livability	Neighborhood
Compact Development	Public & Personal safety	Size
Diversity of Uses	Pedestrian-oriented & walkable	Boundaries
Diversity of Housing Types	Balanced transportation mood choice	Open Spaces
Affordable Rental Housing	Mixed/Integrated land use close to housing	Institutional Sites for community involvement
Affordable For-Sale Housing	Housing choice & affordable housing	Local shops
Reduced Parking Footprint	Physical identity / character / sense of place	Internal street systems
Walkable Streets	High density	Density
Street Network	Recreation & open space opportunities	Walkability & pedestrian-orientation
Transit Facilities	Public facilities & social service provision	Transportation availability & mode choice
Transportation Demand Management	Attractive / Aesthetically appealing	Land use mix and distribution
Access to Surrounding Vicinity	Socially diverse / Inclusive / Tolerance / Equity conscious	Housing choice and affordability
Access to Public Spaces	Active / Robust / Flexible public realm	Leisure use spaces & opportunities
Universal Accessibility	Good & convenient transit connections	Special amenities & place qualities
Community Outreach and Involvement	Protected / Conserved natural environments	
Local Food Production	Universal accessibility	
Preservation of natural environments	Well-connected street & pedestrian network	
A range of job types	Citizen / residents engagement & participation	
Well-defined edge of agricultural greenbelts	Local serving commercial and shopping choice	
	Work opportunities / good palings jobs	

FIG. 8 THE SUSTAINABILITY, LIVEABILITY AND NEIGHBOURHOOD COMMON CRITERIA

any actions, achievements, and positive outcomes that contribute to informing decision making and guiding transition towards sustainable neighbourhood development. The previously mentioned examples indicate that there is a wide range of assessment tools focusing on the urban, regional, and single building levels. According to (Choguill, 2008: 44) "no single city can contribute to overall sustainability if its own component parts are found not to be sustainable". However, those tools focus mainly on the environmental and economic sustainability factors, paying less attention to social sustainability, which is a key factor in achieving liveability as shown in Fig. 7.

FIG. 9 LIVEABILITY DIMENSIONS DEFINED IN SEVERAL STUDIES



Although LEED®ND and BREEAM Communities were designed specifically for the neighbourhood scale, they missed some social factors. Those factors were addressed and filtered according to a common liveability criteria developed by (Zarin, Tarantash, 2011: 5) to evaluate to which extent each tool addresses the social factor.

According to the criteria illustrated in Figs. 8 and 9, two liveability factors lists shown in Tables II and III were deducted and used to question the availability of factors or attributes that address the social liveability aspects in an attempt to cover all the possible aspects that affect the achievement of neighbourhoods liveability with a specific focus on the social dimension. Moreover, other aspects in common with sustainability and neighbourhoods' design in each of the NSAT's previously explained

Table II explains the missing liveability related aspects in each assessment tool according to the liveability common criteria adapted from Zarin and Tarantash (2011: 6). It is obvious that the three tools do not address the physical identity or sense of place aspects, in addition to the availability of local shops and the population density. Although BREEAM communities and LEED®ND are most widely used, both of them neglected the social diversity parameter. Moreover, LEED®ND missed the preservation of natural environments, while it is the tool most concerned

with environmental matters (Szibbo, 2016: 5). CASBEE-UD and BREEAM communities did not take citizen participation and integrated land use into account, which is a critically important aspect of liveability.

Table III shows another criterion adapted from Leby and Hashim (2010: 74), in which there are some common indicators with the previously illustrated Table II. However, more attention is paid to other three important factors that the three assessment tools failed to address. First, the crime and accidents safety, which is crucial for the inhabitants to feel safe in a neighbourhood, consequently increasing the sense of belonging. The other aspect is the behaviour of the neighbours and their interaction, which shapes the way how a neighbourhood functions and results in better social cohesion. Finally, it was surprising that the three tools do not directly mention the maintenance of the buildings and public realm which will affect the concept of sustainable urban environments provision.

The absence of neighbourhood rating tools in the Egyptian context is a significant gap in the country's urban development and sustainability efforts as there is currently no comprehensive neighbourhood rating tool specifically focused on urban form and sustainability assessment in Egypt. Also, providing a socially sustainable environment is inevitable. Even though the old, historical districts might not fulfil the economic and environmental sustainability criteria, social cohesion and sense of belonging is evident in Egyptian communities. Therefore, investigating the existence of any factors related to this matter in the new urban expansions helps in preserving one of the major factors that provide the essence of the Egyptian communities' liveability.

Table IV illustrates the total number of projects assessed by each tool, the certified ones and the locations of most of them. Also, it was necessary to investigate the number of projects from the Arab countries. It was found that projects from 3 countries were evaluated through LEED®ND and none was certified. As for BREEAM communities, 5 projects were evaluated, 3 of them got certified, one from Oman and 2 from UAE.

The origin of the majority of projects' locations shows that each tool functions much better in the country in which it was developed. According to the list published by the US Green Building Council, the developer of LEED®ND, almost 50% of the evaluated projects are located in the USA, while nearly 20% are from Canada which also lies in North America. The majority of BREEAM communities is in the UK, in addition to a few from Sweden and Spain. Finally, CASBEE-UD which was only used in Japan, shows that the third level of its assessment follows a specific criterion created for the Japanese context which won't be suitable for other contexts globally (Cappai et al., 2018: 7).

Table II The common criteria for a liveable/sustainable neighbourhood used for filtering the NSATs

Liveability Common Criteria		LEED® ND	BREEAM Communities	CASBEE-UD
Liveability	Public / Personal Safety		√	√√
	Attractive /Aesthetically Appealing	√		
	Physical Identity / Sense of Place			
	Flexible Public Realm	√	√	
	Socially Diverse			√
Liveabilty + Sustainability	Job Opportunities	√√	√	√√
	Preservation of Natural Environments		√	
	Universal Accessibility		√	
Liveabilty + neighbourhood	Local Shops			
	Public Facilities & Special Amenities		√	√
Liveability Common Criteria				
Liveabilty + Sstainability + neighbourhood	Walkable Streets	√√		
	Well Connected Streets & Networks	√√	√	
	Citizen Participation & Involvement	√		
	Recreation & Open Space Opportunities	√√	√	
	Socially Diverse			
	Housing Choice & Affordable Housing	√	√	√
	Mixed / Integrated Landuse	√		
	High Density			

Table III The liveability dimensions and indicators used in filtering the NSATs

Liveability Dimensions and Indicators		LEED® ND	BREEAM Communities	CASBEE-UD
Social Dimension (social relations)	Behaviour of Neighbours (Nuisance)			
	Community Life and Social Contact	√		
	Sense of Place			
Physical Dimension (residential environment)	Environment Quality	√	√	√
	Open Spaces	√	√	√
	Maintenance of Built Environment			
Functional Dimension (facilities and services)	Availability and Proximity of Amenities	√	√	√
	Accessibility		√	
	Employment Opportunities	√	√	√
Safety Dimension (crime and sense of safety)	Number of Crime			
	Number of Accidents			
	Feeling of Safety		√	√

Table IV The statistics and locations of the evaluated and certified projects by the three NSAT's

NSAT'S		LEED® ND	BREEAM Communities	CASBEE-UD
Statistics	Origin	USA	UK	Japan
	Total Number of Evaluated Projects	282	132	8
	Certified Projects	31	67	8
	Projects Location (Majority)	USA	UK, Sweden, Spain	Japan
	Certified Projects Location (Majority)	USA	UK	Japan
	Projects in Arab Countries	**3** (2 Qatar, 1 Lebanon)	**5** (3 UAE, 2 Oman)	0
	Certified Projects in Arab Countries	0	**3** (2 UAE, 1 Oman)	0

It is important to emphasize that the social parameter of liveability can hardly be successfully prescribed on a global level, because liveability represents precisely the beauty of diversity that human communities possess in various parts of the world. Therefore, aspects of liveability, so far neglected, should be included in NSATs as necessarily inclusive but separately defined, depending on the context of the community that is evaluated by them.

The study conducted was based on testing the applicability and performance of selected NSATs in the Egyptian context, the testing strategy used a comparative method approach, which verified the missing aspects using a qualitative comparative analysis. Based on the reviewed literature and the qualitative analysis shown in Tables II and III, the most important missing social sustainability aspects are social interactions and relations between residents, social integration and security, and safety. Accordingly, their absence affects the liveability of neighbourhoods.

Liveability Assessment Framework

This research proposes a framework for assessing the liveability of a newly developed neighbourhood within an Egyptian gated community, utilizing sustainability assessment tools adapted to the specific local urban context. The framework evaluates key dimensions encompassing environmental, social, economic, and governance factors. It is structured into three primary components: Fig. 10 illustrates the core liveability dimensions, Figs. 11 and 13 present the adaptation of the Neighbourhood Sustainability Assessment Tool (NSAT), and Fig. 12 outlines the implementation and monitoring strategy. To ensure a comprehensive evaluation, international and regional sustainability rating systems can be adapted to the Egyptian context as follows in Figs. 11 and 13.

A robust strategy is crucial for the successful implementation and continuous monitoring of the liveability framework.

Incorporating human needs and cultural identity preservation into the liveability assessment framework enables the newly developed communities in the Egyptian context to fulfil residents' material requirements while also supporting their cultural and social well-being. This comprehensive approach aligns with sustainable urban development principles, promoting a dynamic and inclusive community.

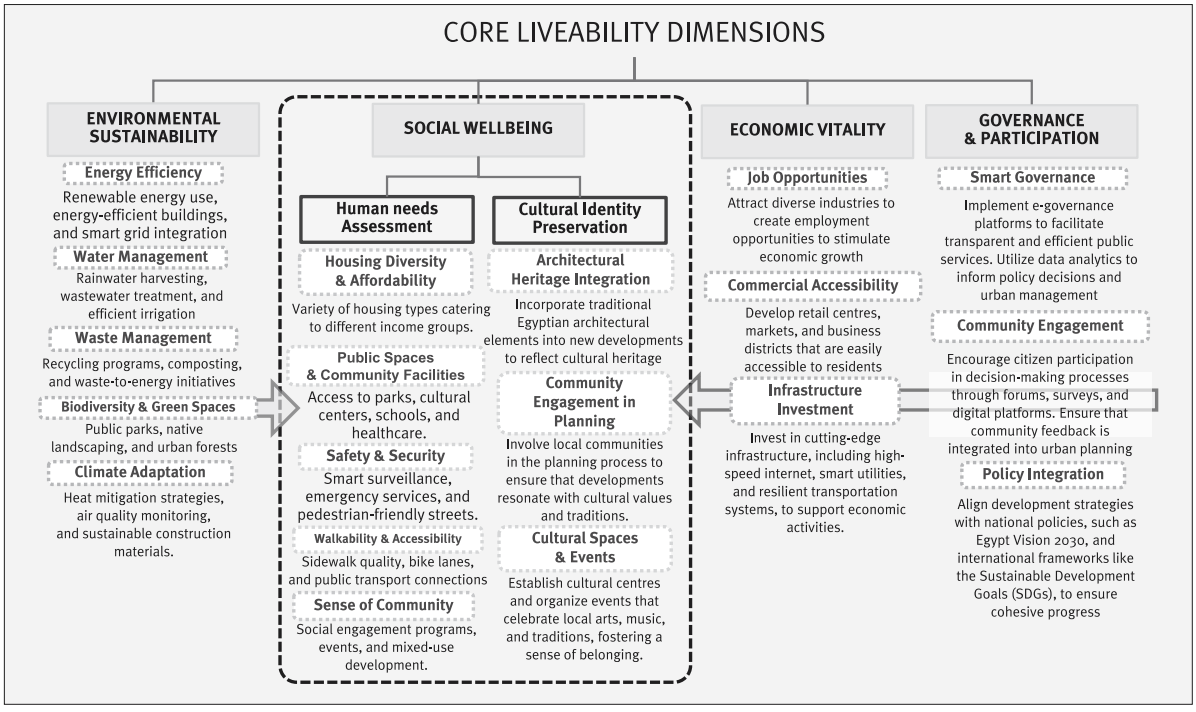


Fig. 10 The core liveability dimensions

Conclusion

The presented research was initiated by the need to assess the sustainability of communities in Egyptian neighbourhoods located in new urban extensions. For this reason, an analysis of three leading neighbourhood sustainability assessment tools, LEED®ND, BREEAM Communities and CASBEE-UD, was conducted to analyse their applicability to the Egyptian context. These tools could help identify the missing aspects in the existing communities that can make them more sustainable. In addition, they could also provide a better understanding of the critical attributes to be considered in the future development from the early stages of design and urban planning. A detailed analysis of the three assessment tools mentioned, however, revealed their shortcomings as well as their difficult applicability in contexts other than those in which they were created.

In the initial part of this research, liveability in the neighbourhood has been presented as necessary to ensure the development and prosperity of the city as it reflects the real daily experience of the residents. The analysis of assessment tools sought to assess and value the issue of liveability in currently established urban districts by identifying attributes that should be key to designing a healthy and pleasant living environment. What was surprising was the lack of several key aspects of liveability in all three assessment tools. It must be emphasized that some aspects of social sustainability were present in some of the tools, but certainly not systematically or completely. In other words, all the three NSATs failed to meet all aspects of liveability as well as sustainability.

Based on the statistics of the application sites of the tool, it was found that most neighbourhood sustainability assessments were developed and applied in Western countries and cultures. Essentially, it is questionable whether these tools could be sustainably applied globally to assess residential neighbourhood quality in a diverse physical and cultural environment such as the city of Cairo, Egypt. Therefore, the insights obtained from this research also refer to the need to adapt a certain NSAT to the local context in which it is planned to be applied, in this case, the Egyptian.

The essential part of this adaptation is investigating people's perceptions about the built environment they inhabit, especially what makes their neighbourhoods liveable in their point of view. Most studies focused only on their satisfaction with their living environment and rarely on the exact important as-

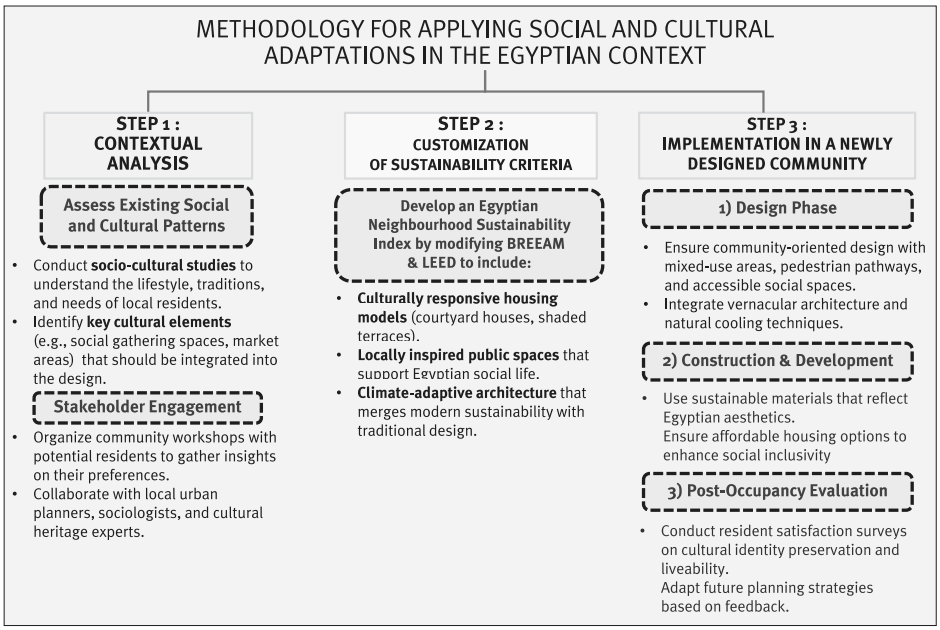


Fig. 11 Methodology for applying NSATs social and cultural adaptations in the Egyptian context

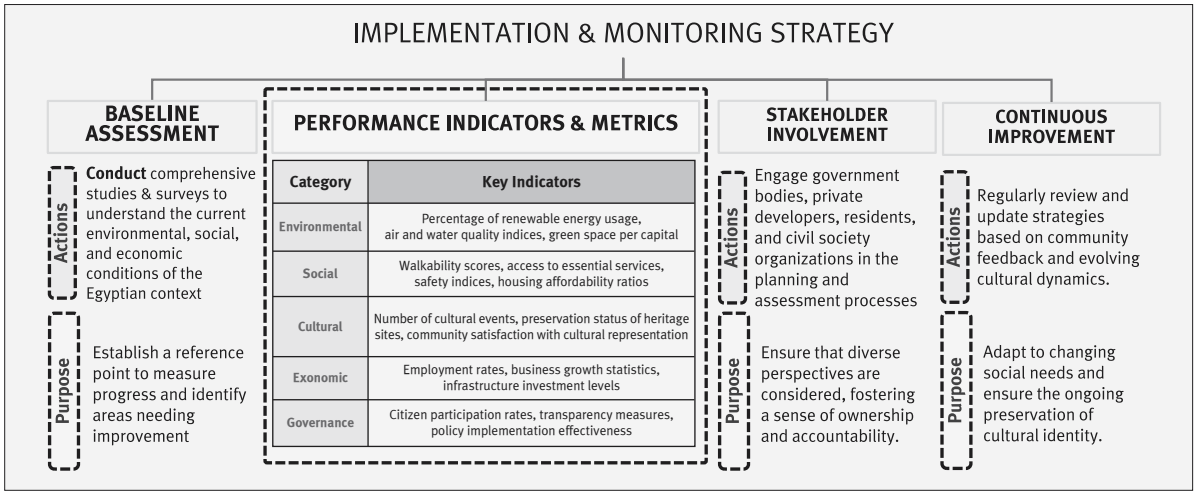


Fig. 12 The proposed implementation and monitoring strategy

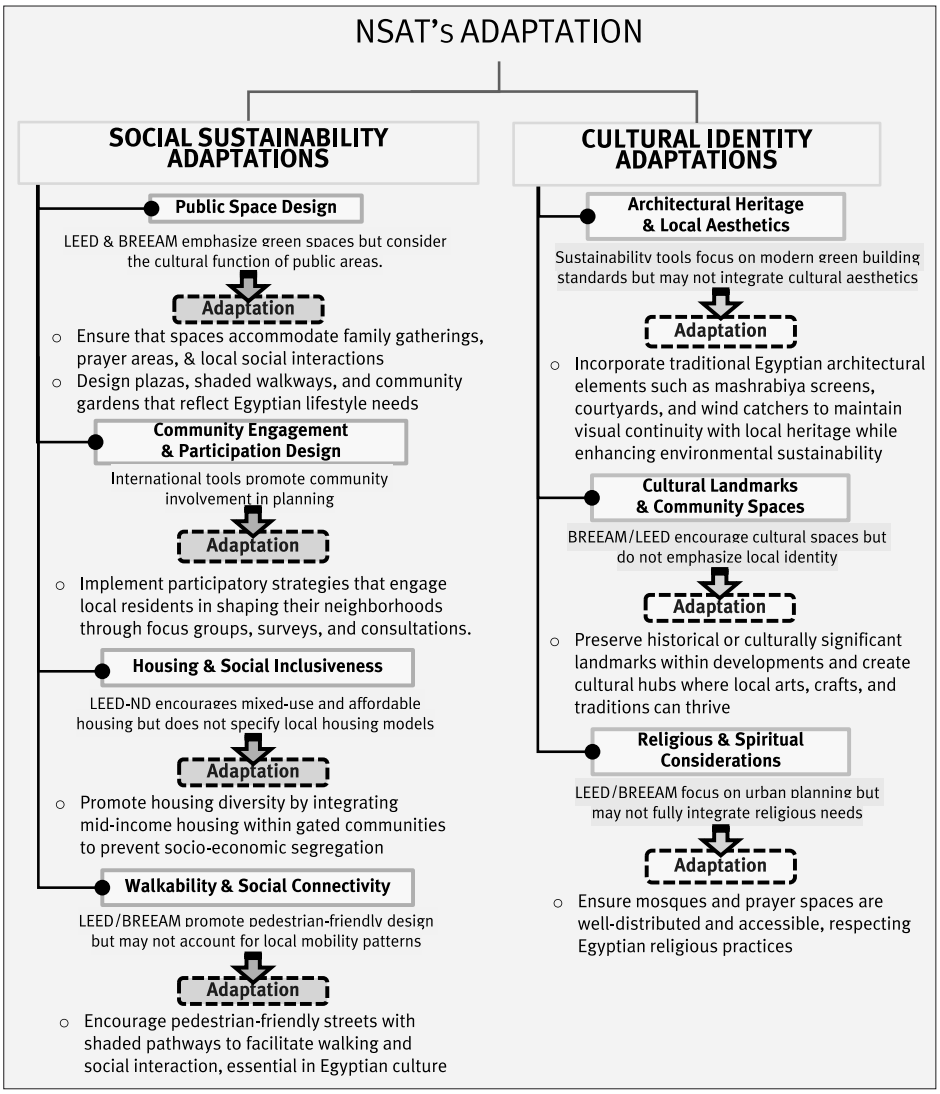


Fig. 13 The proposed social and cultural adaptations to the global NSATs

pects to them, such as ensuring the overall safety of the community which promotes their satisfaction level, not just satisfied broadly. In conclusion, this research demonstrates the importance of including social aspects in a clear and well-defined way in any neighbourhood assessment. It represents a contribution to understanding the importance of promoting liveability and consequently sustainability, with the potential to create better assessment tools applicable in different contexts. On this track, further research will continue in the direction of formulating a complete and adapted NSAT for Egypt. Finally, it announces research methodology that will include onsite surveys to formulate specific local liveability aspects, as well as case studies of local NSAT applications. Further research should, therefore, continue in the direction of formulating a complete and adapted NSAT for Egypt.

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Illustration sources

Figs. 1-3, 7, 11-13	Authors
Fig. 4	https://www.usgbc.org/
Fig. 5	Aguiar Borges et al., 2020: 8
Fig. 6	https://www.ibecs.or.jp/CASBEE/
Fig. 8	Developed by: Zarin, Tarantash, 2011: 5-6
Fig. 9	Adapted from: Leby, Hashim, 2010: 74
Fig. 10	Authors, adapted from: https://cur.org.au/project/the-healthy-liveable-communities-urban-liveability-checklist/
Table I	Adapted from (Ghonimi, 2022: 7)
Tables II-IV	Authors

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Methodology: N.N.; conceptualization and methodology phase: N.N., K.C. and R.L.; data collection: N.N.; writing – original draft preparation: N.N.; writing – review and editing: N.N., K.C. and R.L.; visualization: N.N.; supervision: K.C. and R.L. All authors have read and agreed to the published version of the manuscript.