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Phone: +90 506 189 99 66
Website: www.ijcua.com , www.ahep.edu.tr
E-mail: editor@ijcua.com

About the Journal

Journal Of Contemporary Urban Affairs is dedicated to focusing on the socio-economic consequences of contemporary urbanization. In this regard, the journal intended to study these consequences under the three main sections :
- Section A-Citizenship Rights and Responsibilities: Quality of Life, Liveability, Public Health, Identities, Participatory projects, Walkable cities.
- Section B -Territorial Studies: Gated Communities, Urban resilience, Conflict and Divided Territories, Slums, Port-cities, Heritage Studies, Housing Studies, Mediterranean Architectures and Urbanism.
- Section C -Urban transformation: Littoral transformations, Urban Renewal, Urban Regeneration, Urban Morphologies, Rapid Urbanization, Urban Sprawl, Smart Cities, Emerging Cities.
Contributions are welcome from across the full range of social science and Arts and Humanities disciplines. It is expected from the contributions to advance empirical and theoretical knowledge on contemporary urban affairs - both from positive and normative perspectives. The priority of publication will be given to research articles that are specifically written for a multidisciplinary audience with the highest quality and impact. In this regard, The journal looks for articles that are innovative and report excellent research and developments. All articles are published in English and undergo a double-blind peer-review process.

Coverages

The journal explores a range of academic and policy concerns including:
- Citizenship Rights and Responsibilities: Quality of Life, Liveability, Public Health, Identities, Participatory projects, Walkable cities.
- Territorial Studies: Gated Communities, Urban resilience, Conflict and Divided Territories, Slums, Port-cities, Heritage Studies, Housing Studies, Mediterranean Architectures and Urbanism.
- Urban transformation: Littoral transformations, Urban Renewal, Urban Regeneration, Urban Morphologies, Rapid Urbanization, Urban Sprawl, Smart Cities, Emerging Cities.

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All research articles in this journal have undergone rigorous double-blind peer review, based on initial editor's screening.
The manuscript submission and peer review process are broken down into the following steps:
-The Author writes a research manuscript and submits it.
-The Editor does the initial screening and forwards it to the Reviewers.
-Reviewers review the manuscript according to the guidelines provided and verify the quality of research.
-The article is returned to the editor along with a recommendation to reject the article, revise it or accept it.
-The Editor drafts a decision to be sent to the Author.
-The article is returned to the Author along with the reviewer's feedback.
-The Editor receives the updated article and sends it to the Publication Department.
Note: The review process for the submitted papers in this journal is double-blind peer review.

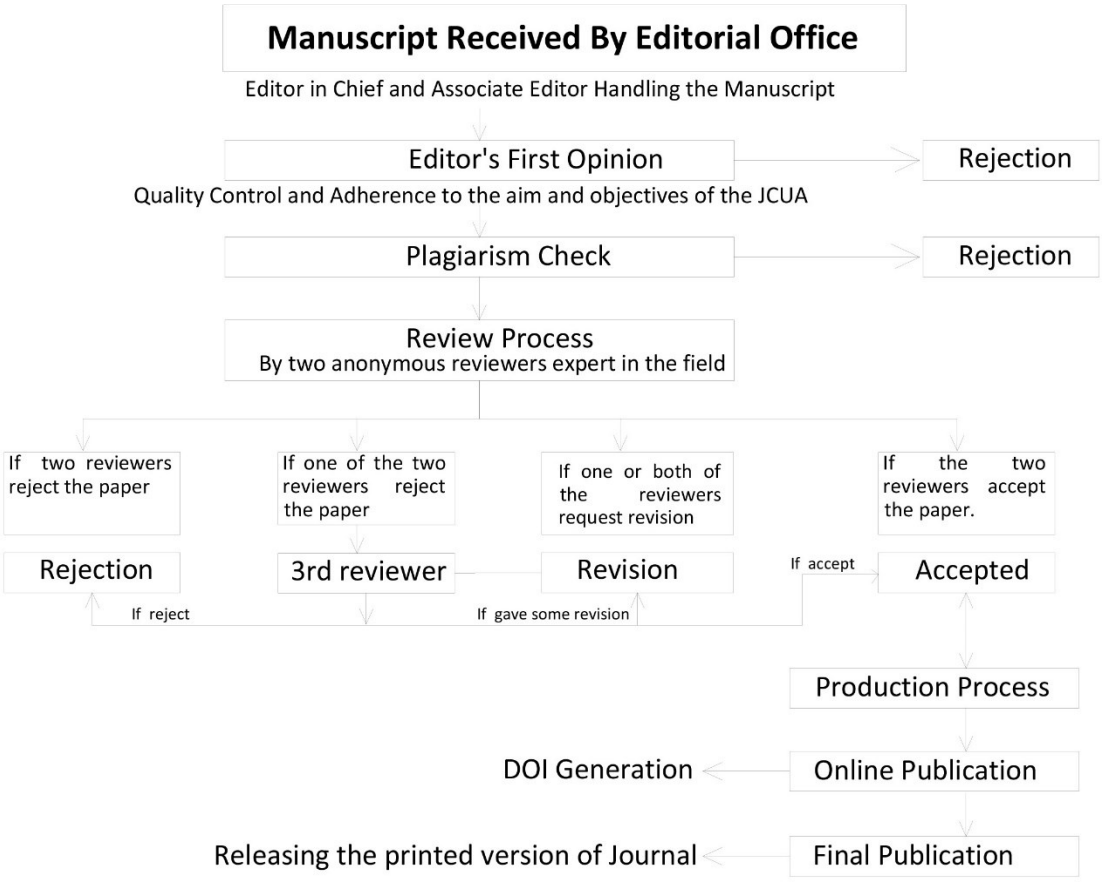

Figure 1. Peer Review Process.

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2. the reply responds directly to the comment without becoming evasive;
3. the tone of both the comment and the reply is appropriate for a scientific journal.

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This issue on education has 8 articles. The editors seek to publish articles considering socio-economic consequences of contemporary urbanization in the specific field of Housing Studies, Emerging Cities, Urban Ecology, Infra Habitation, Revitalization Strategies, Conflict, Divided Territories; they are looking forward to substantial improvement of educational processes and outcomes.

With kind regards,

Dr. Hourakhsh A. Nia
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Original scientific paper

Roles of Drop-in Centers in Street Children Interventions: Design Guidelines and Humanitarian Emergency Architecture Adaptations

* M.Sc. **Ruba Azzam**, Dr. **Karim Kesseiba**, Dr. **Ahmed Abdelghaffar**
Dr. **Mennat-Allah El Husseiny**

[a, b, c and d] Department of Architecture and Architectural Engineering and Building Technologies, Faculty of Engineering, Cairo University, Giza, Egypt
Email [1]: ruba-azzam90@hotmail.com , Email [2]: karimkesseiba@gmail.com , Email [3]: amaghaffar@gmail.com
Email [4]: mennatallahelhusseiny@gmail.com

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ABSTRACT

For decades, numerous countries have been witnessing the Street Children phenomenon where millions of children worldwide are subjected to risks. Despite the crucial role of intermediate non-residential interventions - using drop-in centers- in protecting and rehabilitating street children, there is a paucity of research addressing the quality of design of these centers and how architecture might influence their operational process. Those observations invite investigating drop-in centers used in practice from a design perspective and question adapting architectural applications for humanitarian emergencies, focusing on "Child-Friendly Spaces". The study aims to provide solutions for better quality design, facilitating operational challenges. The methodology undertakes the investigation through primary and secondary axes. This involves conducting literature and international precedents review and secondarily, an Egyptian contextual first-hand documentation and qualitative analysis of selected centers.

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1. Introduction

For well over three decades, numerous countries have been witnessing a phenomenon popularly known as The Street Children phenomenon. It is one involving tens of millions of children worldwide (Panter-Brick, 2002) with street relations subjecting them to

***Corresponding Author:**
Department of Architecture and Architectural Engineering and Building Technologies, Faculty of Engineering, Cairo University, Giza, Egypt
Email address: ruba-azzam90@hotmail.com

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various risks as physical abuse and depriving them of their rights (Aufseeser, 2017; Pare, 2003). An inspection of the phenomenon on the world map reveals early evidence of the phenomenon appears in the 1951 "Street Children" Egyptian film and reports by international organizations as the UNICEF documents estimates reaching 1 million children in Egypt; Egypt being no exception (Abt Enterprises LLC, 2001). The phenomenon is induced by various forces, some of which could be gradual as family dysfunction, while others could be sudden as the breakout of war (Aptekar, 1994, Rosenblatt, 2012). Given its many causes and the large fluctuating numbers of vulnerable children, this phenomenon can reach the level of a crisis (Ammar, 2009). The result is a need for non-punitive and gradual comprehensive intervention programs most suitable for protecting, rehabilitating, and reintegrating children into society (De Benitez, 2003; Dybicz, 2005; Nyamai & Waiganjo, 2014). Indeed, attaining these objectives has gained the interest of the research community who has long been developing intervention programs with several approaches (Figure 1) (Brink, 1997; Abt Enterprises LLC, 2001; Volpi, 2002; Rosenblatt, 2012).

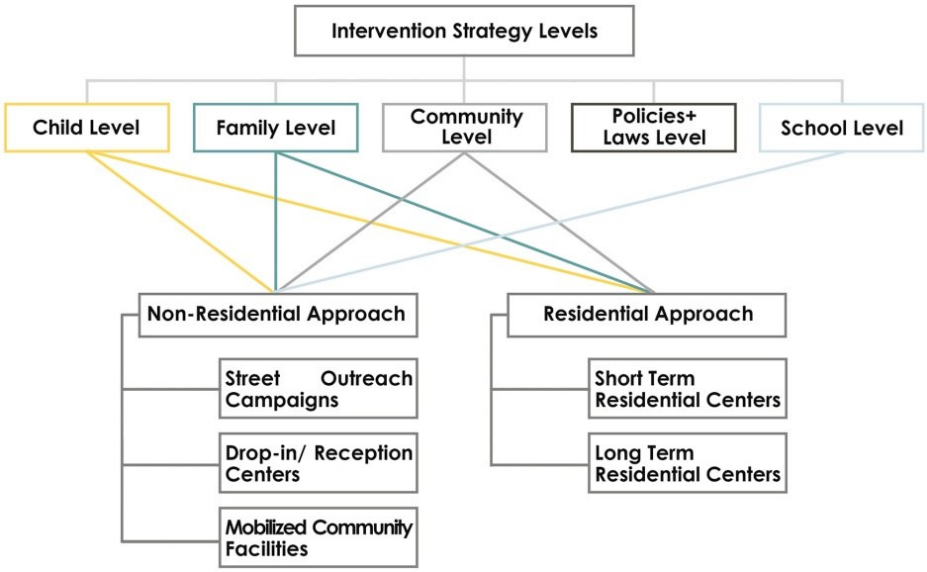


Figure 1. Intervention levels and approaches for street children phenomenon (Developed by Authors based on Azzam et al., 2019).

Analysis of such efforts indicates that comprehensive programs ideally consist of three stages: an initial street-outreach stage, an intermediate non-residential stage, and a final residential stage. Each stage requires corresponding structures to host children, rapid construction and operation, easy accessibility by children and flexible adaption to the phenomenon changing nature. However, despite the established vital role the intermediate non-residential stage - using drop-in centers- plays in the intervention (Volpi, 2002), an inspection of the phenomenon in literature reveals a scarcity and datedness in architectural contributions addressing the quality of design of these centers. This is accompanied by a focus on dated correctional and residential models unsuitable for the majority, which are the non-homeless children (Aptekar, 1994). Furthermore, there is a noticeable gap between what architectural research offers and operational challenges centers face in real life including economic limitations and children's constant mobility. Such observations- consequently- invite investigating drop-in centers used in practice from a design perspective and questioning adapting architectural applications for Humanitarian Emergencies (HE), particularly Child-Friendly Spaces (CFS) with similar desired properties, used during or in the aftermath of disasters (Kennedy et al., 2008).

Accordingly, this qualitative study showcases results of research aiming at providing solutions for better quality design of street children drop-in centers while responding to operational challenges. The adopted methodology investigates primary and secondary research axes. The former focuses on studying the street children phenomenon through a review of

literature, observations of international precedents, and a first-hand contextual study of the phenomenon in the Egyptian "Greater Cairo" metropolis, where the largest concentrations of street children reside in Egypt. This is accompanied by a qualitative analysis of the design, operational process and challenges of selected drop-in centers operated by the Resala Foundation. The latter axis investigates CFS through reviewing international academic literature and precedents. The results of these axes enable assessing actual possibilities of adapting CFS to create efficient drop-in centers for street children while highlighting areas of improvement and- eventually- concluding a set of design guidelines for such centers in terms of technical, psycho-social, and administrative aspects concerning operation.

2. Drop-in Centers for Street Children: Objectives and Design Considerations in Literature

Irrespective of whether they are children living, working, or idly spending their day on the streets without adequate adult supervision (Panter-brick, 2002), drop-in - or reception-centers are safe spaces created to host all groups of streets connected children and those at risk of forming such connections. These centers aim at providing refuge for children from their daily street interactions. They represent an intermediate transitional stage between street existence and life back with the family or in the third-stage- residential centers that children can join of their own will. This is especially crucial since efforts leading the children too rapidly into environments with social constraints and different expectations of behaviour i.e., residential centers, may result in them feeling suddenly restricted or alienated and thus fail (Bibars, 1998). Accordingly, drop-in centers cater to children's non-residential needs and mitigate the increased risks of street connections to serve child-reintegration. The latter objectives are achieved through providing services meeting the children's immediate needs as personal care opportunities of bathing and washing their clothes, rest away from stressful street settings as well as healthcare and hot meals provision. Additionally, some centre-services have more preventive and rehabilitative purposes including recreational activities, sports, therapy sessions, family counseling, tutoring classes, and vocational training (Shillington et al., 2011) all of which make drop-in centers the foundation of actual rehabilitation.

To be easily accessible to the children and -possibly- their families, drop-in centers are usually located in urban centers or locations with high densities of the children. Consequently, the centers are usually in the form of rental apartment units in already existing buildings within the city as in the case of the Yayasan Chow Kit center in Malaysia or specially dedicated free-standing buildings as the future SONNE center in Myanmar (Aliaas et. al, 2012; SONNE Social Organization, personal communication via e-mail, 2018)- Figure 2. Such locations also facilitate the child-self-referral policy of most rehabilitative programs.

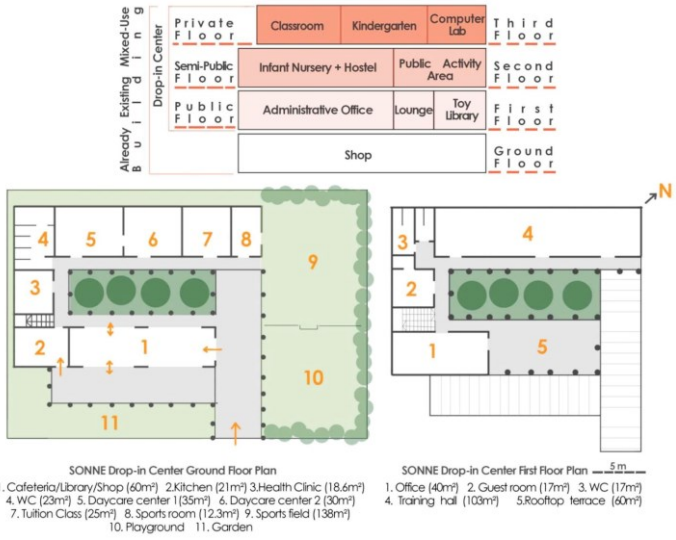


Figure 2. Top: Sectional zoning of Yayasan Chow kit drop-in center occupying 1st; 2nd; and 3rd floors (Developed by Authors based on Aliaas et al., 2012), Bottom: SONNE Street Children Center Design (Developed by Authors based on personal communication via email with SONNE Social Organization, 2018).

Identifying objectives, services, and possible set-ups of drop-in centers makes it possible to start exploring design guidelines in the literature that help create these spaces. However, despite extensive research of the phenomenon from socio-cultural and intervention-strategies perspectives (Dybicz, 2005; Ennew & Swart-Kruger, 2003), scarce and dated are the efforts discussing the design of non-residential spaces hosting street children. Yet, of particular significance is Brink's work in 1997 on design guidelines of centers for street children and AbdelRasheed's work in 2004 on social welfare institutions for children at risk of delinquency, despite the latter's focus of residential facilities. Other beneficial efforts, which however do not directly target drop-in centers or street children, include work on the design of behavioral health facilities whose target population includes homeless youth and work on the design of day-care centers for children. In light of the previous work, design guidelines could be investigated through two complementary approaches: the traditional and humanitarian approaches discussed as follows (AbdelRasheed, 2004).

The former approach addresses technical and functional design aspects, which, in the case of drop-in centers hosting street-connected children, include the following:

A. a. Location: close to children's congregation nodes, easily accessible through walking or public transportation and away from pollution but within proximity to natural features and community services as public libraries and hospitals to encourage community interaction (Brink, 1997; AbdelRasheed, 2004; Moore & Sugyami, 2007)
B. b. Image: welcoming, child-friendly, and non-institutional image using single-story structures whenever possible, terraces, appropriate windows built to scale welcoming entryways and natural finishing materials while avoiding fences and security bars (Moore & Sugyami, 2007).
C. c. Capacity: low capacities to reduce anxiety and aggressive behaviour associated with crowdedness and allow for one-on-one interaction between specialists and children (AbdelRasheed, 2004).
D. Size and Modules: division of the center into a common core of shared facilities and several modules consisting of activity spaces and home bases i.e., spaces simulating home environments as dining halls, bedrooms, and baths, according to age groups and/or educational needs-see Figure 3 (Moore & Sugyami, 2007).
E. d. Spatial Program: center spatial program consists of : (i) a home base zone including separate napping areas for each gender with separate beds and bathroom facilities for each gender, a shared dining hall to bring children together for meals and activities, and locker space for children to keep their belongings, (ii) an activity zone including multipurpose and re-arrangeable areas for quiet and loud activities as reading and playing with toys respectively, (iii) a shared facilities zones as a reception area, kitchen, administrative offices, gyms, in-house clinic for attending to children's medical needs and group-therapy rooms, educational classes for literacy, formal education, and Non-Formal Educational (NFE) programs alongside vocational training workshops and (iv) an outdoor recreational zone to enhance children's' physical, social and emotional development through creative play using a variety of set-ups (Brink, 1997; AbdelRasheed, 2004).

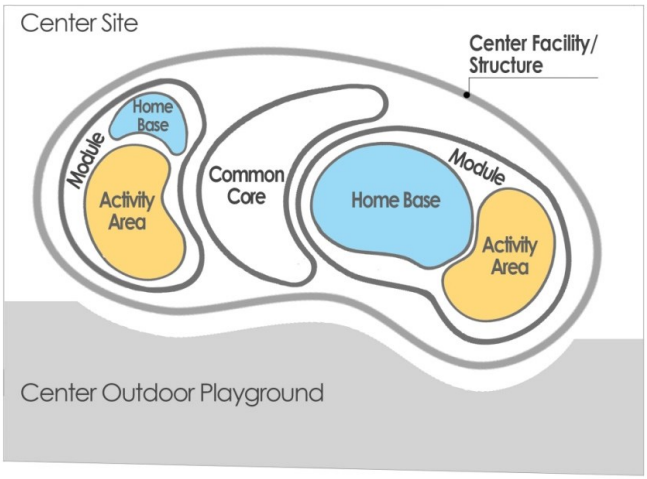


Figure 3. Module and zoning diagram for non-residential centers hosting children.

F. e. Spatial Properties: spaces should be (i) flexible and adaptable to encompass various activities and changing numbers of children using foldable furniture and partitions, (ii) physically well-defined for longer child-attention span using implied boundaries and semi-enclosed clusters achieved through furniture, changing levels, and changing finishing materials

and (iii) visually spatially connected using low and transparent partitions (Moore, 1986; Brink, 1997; Shepley and Pasha, 2013).

G. f. Finishing Materials and Furniture: usage of easy to clean; safe and hygienic finishing materials as well as age-appropriate, flexible, and multi-purpose furniture items and layouts (Brink, 1997).

H. g. Environmental Quality Considerations: insurance of proper natural ventilation, natural lighting and acoustic levels not higher than 35 decibels using sound-absorbing finishing materials and furniture (AbdelRasheed, 2004).

The humanitarian approach, accompanying concepts of rehabilitative intervention, discusses the human dimension in the design process through two branches. The first branch is a line of design considerations responding to children's psycho-social needs including giving them a sense of control and freedom of choice, familiarity to space, safety and security, privacy, and reduced negative emotions and stress. They help make the children more responsive to help and raise chances of intervention success. The second branch aims at facilitating facility operation through addressing administrative design requirements as to design for indirect supervision, clearly defined spatial boundaries and functions, and encouragement/discouragement of specific behaviors (Moore, 1986; AbdelRasheed, 2004; Shepley & Pasha, 2013). However, the previous review of design considerations for drop-in centers addressed in relevant literature reveals insufficient discussions of spatial rates, various architectural scenarios, and structure typologies to encompass the specified spatial program, considerations responding to the center operational challenges, as well as factors of time efficiency, cost, effectiveness and economic sustainability of used structures. These are the main requirements of intervention programs which are mostly run on tight and donation-based budgets.

3. Drop-in Centers in Greater Cairo: A Contextual Analysis

In an attempt to address the previously mentioned design gaps and further identify operational processes of and challenges facing drop-in centers, exploring what practice has to offer becomes crucial. The latter entails a first-hand contextual study of the phenomenon and drop-in centers in Egypt's Greater Cairo, where the country's largest number of documented street children reside. In addition to reviewing literature and legislations concerning the phenomenon in Egypt, the study relied on unstructured interviews with officials at the Egyptian Ministry of Social Solidarity, semi-structured interviews with 86.6% of the staff of three drop-in centers of Resala Foundation- a local Non-Governmental Organization (NGO)- (7 staff members) and 63.3% of the hosted children (22 children). Furthermore, qualitative analysis of three of the NGO drop-in centers, Maadi, Helwan, and Nasr City centers, were conducted.

This study further uncovers a shift in the perception of local Governmental Organizations (GO's) of street children from delinquents to being at risk since 2008 (Egyptian Ministry of Justice, 2008; Ammar, 2009). While the latter shift resulted in GO's adopting rather rehabilitative interventions- instead of the previous correctional ones- and incorporating street outreach campaigns into their process, GO efforts still lacked implementing the second intermediate stage using drop-in centers. Instead, local NGOs have historically adopted protective and rehabilitative interventions some of which using the 3-stage-comprehensive programs which incorporate drop-in centers (Azzam et al., 2019), an example of which is the locally active Aad Al Hayah (AAH) program run by Resala Foundation.

Since 2007, the AAH program has been operating intending to protect, rehabilitate and reintegrating both homeless and at-risk children, including children at risk of forming or already having street connections. Along with outreach campaigns and residential centers, the program second stage is conducted through 5 drop-in centers providing the largest coverage of Greater Cairo compared to other NGOs. Locations of the latter centers were selected based on the availability of space at the foundation branches while also working on covering reported nodes of children congregation on the streets. Once the child reaches the center through outreach campaigns or the child rescue hotline, for instance, the center rehabilitation process begins as follows:

a. reporting the child's case to the police department; b. creating a child's case file; c.

conducting medical examinations of the child to identify illnesses/ injuries; d. identifying appropriate program for the child whether it is to visit the drop-in center or convince the child of moving to a residential center; and e. enrolling a child into the center-daily-activity program, including conducting family counseling sessions, to ensure child's protection and/or rehabilitation till child reintegration with family or referral to a residential center upon their consent. Selected AAH drop-in centers for this study are located in Maadi, Helwan and Nasr-City districts, since they represent different scales of the program centers- 95 m², 130 m² and 165 m² respectively- and the centers most regularly visited by children throughout the study. The three centers are located in mixed-use residential and commercial neighborhoods, which help to maintain a child-friendly and non-institutional center image and are easily accessed by children. They are also set-up in a readapted apartment unit consisting of a single module and a common core of shared facilities owned by Resala Foundation but not originally designed for their current purpose (Figures 4).

The study reveals that inspected centers rely on multi-functional spaces to facilitate the indirect supervision of hosted children, whose numbers could be uninspected (Figures 5,6,7). Additionally, they enable the provision of various services to children at the same time despite the center-limited space and given the economic and budget constraints facing such donations- dependent programs.

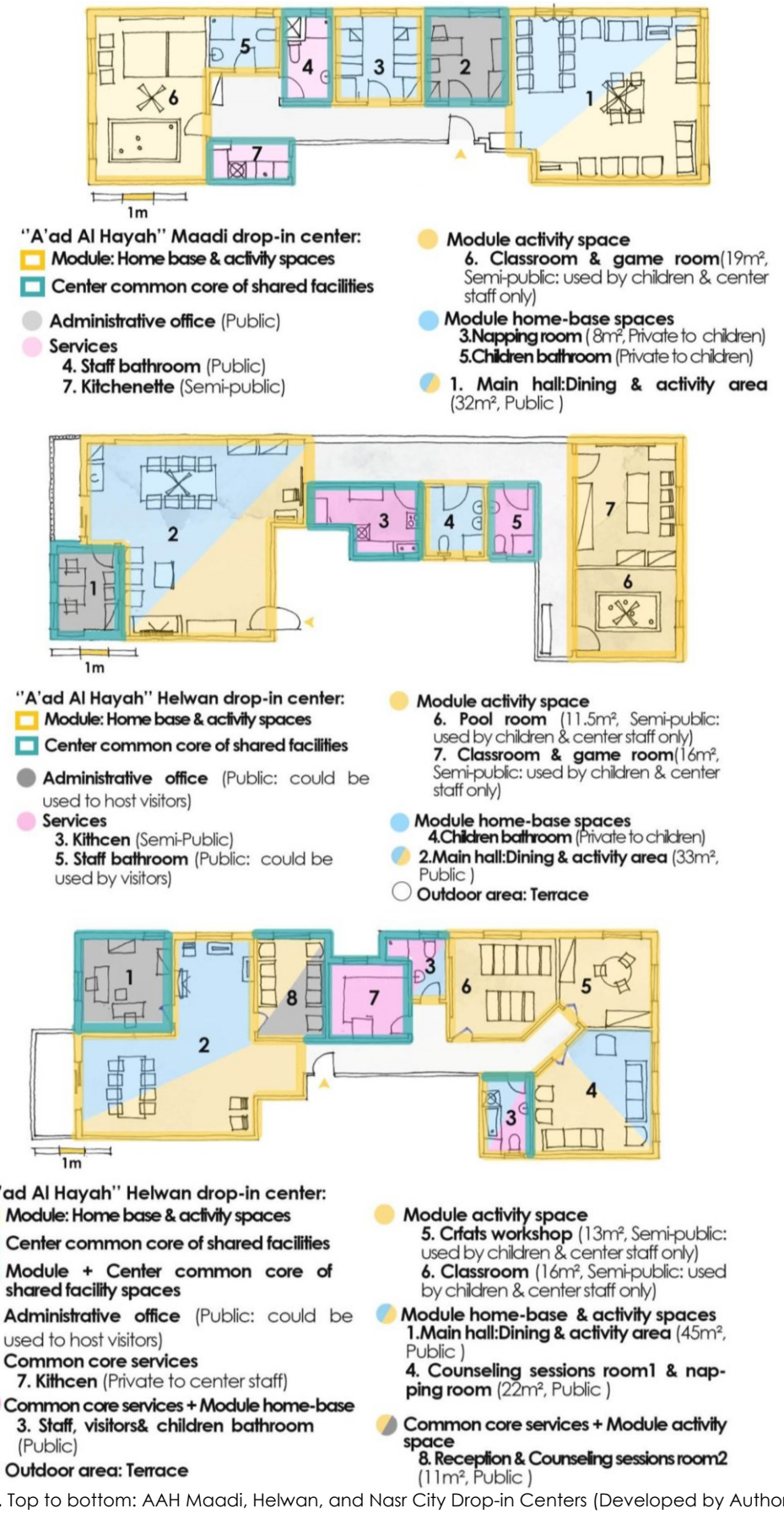
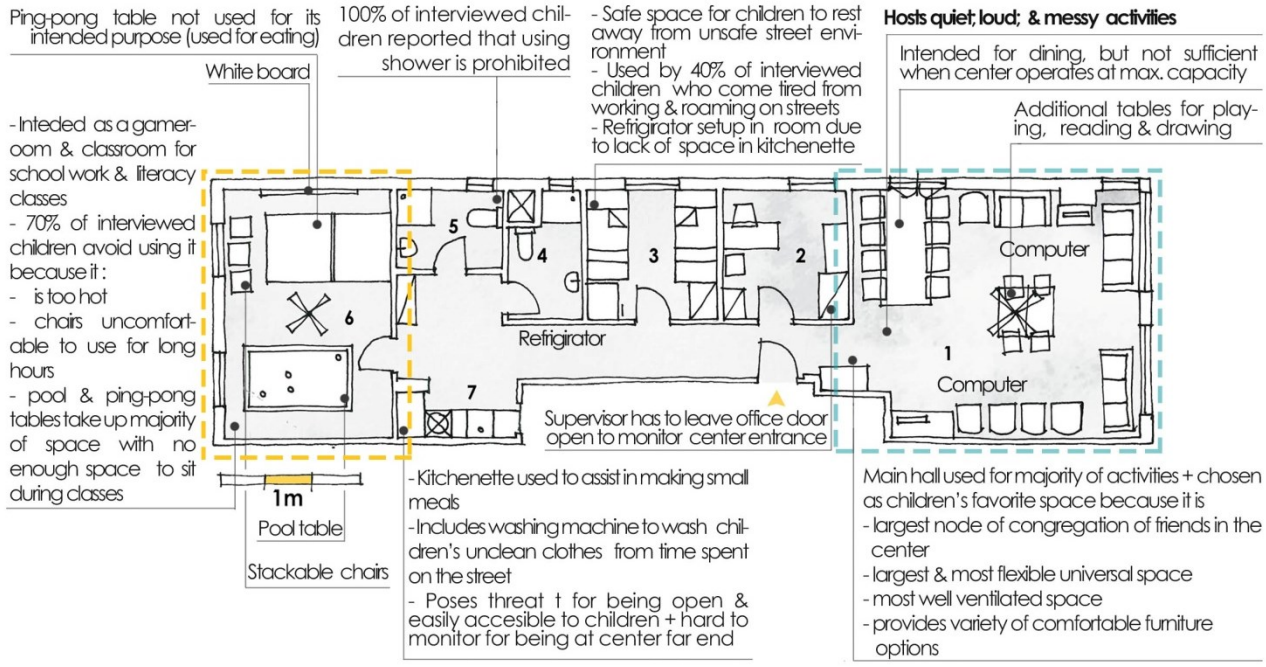
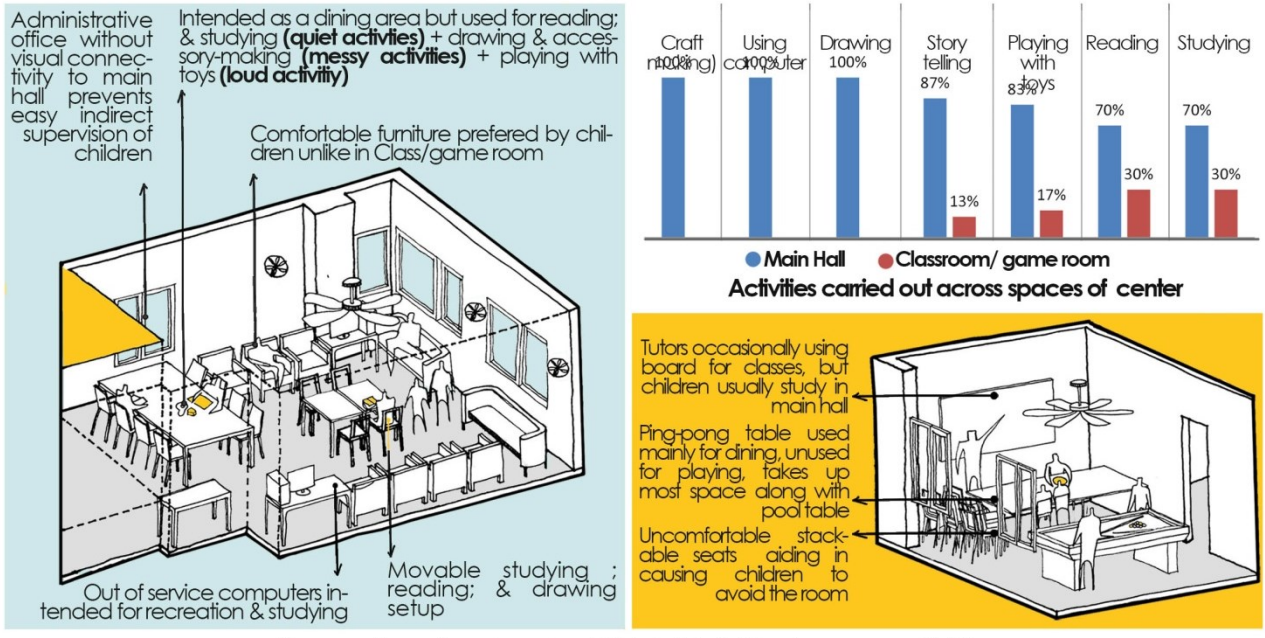


Figure 4. Top to bottom: AAH Maadi, Helwan, and Nasr City Drop-in Centers (Developed by Authors).



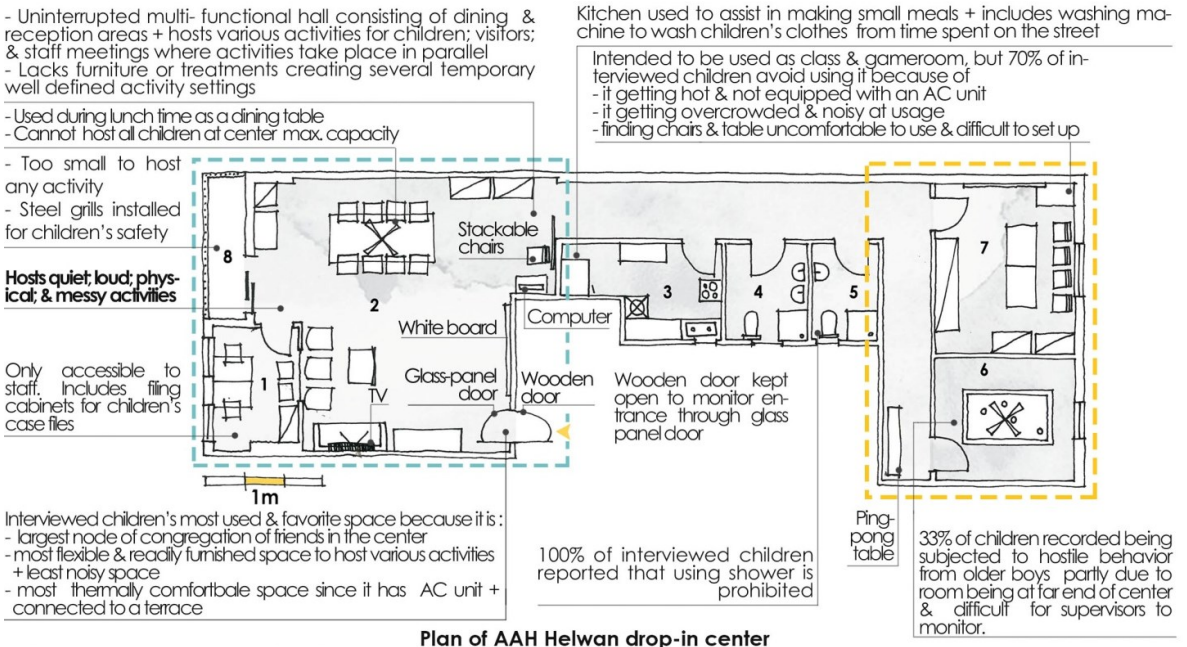
Plan of AAH Maadi drop-in center
(1. Main hall, - 2.Adminstrative office - 3. Napping room - 4. Staff bathroom - 5.Children bathroom - 6.Study room & play room - 7. Kitchenette)

Panoramic image of the main hall



Usage patterns of center spaces (Main hall, Left; Class/game room, Right)

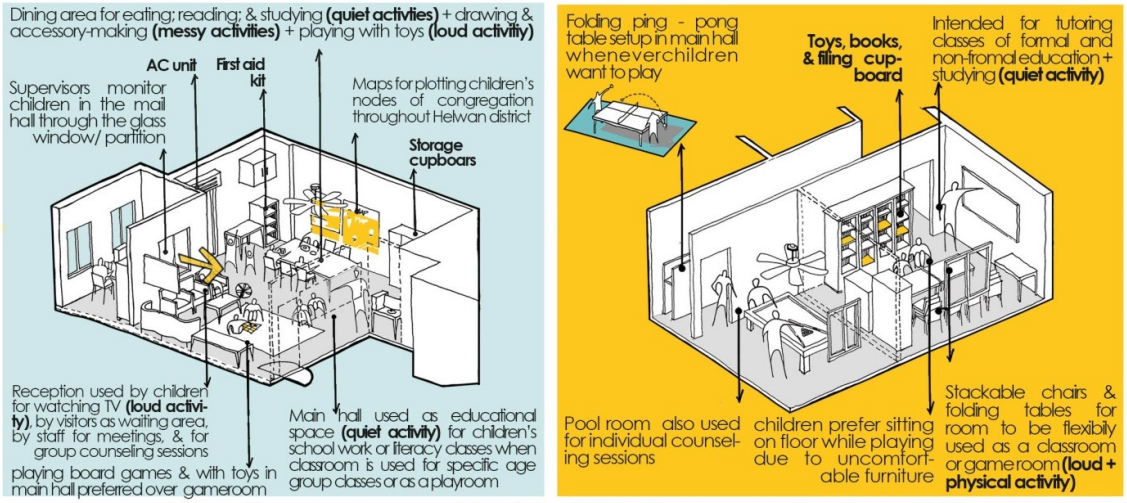
Figure 5. AAH Maadi drop-in center design and usage patterns (Developed by Authors).



Plan of AAH Helwan drop-in center

(1. Adminstrative office - 2. Main hall - 3. Kitchen & Laundry - 4. Children bathroom - 5.Staff bathroom - 6. Pool room - 7. Classroom & playroom - 8. Terrace)

Panoramic image of the main hall



Usage patterns of center spaces (Main hall, Left; Class/game room and pool room, Right)

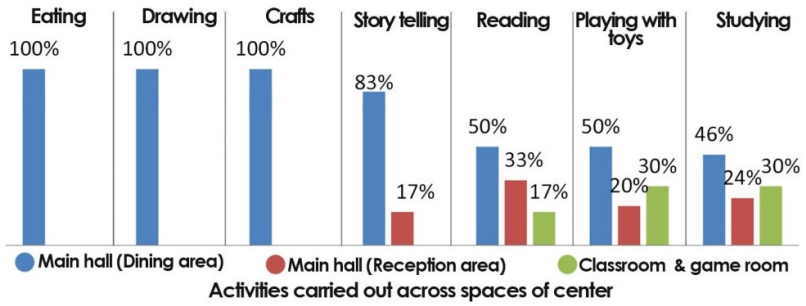
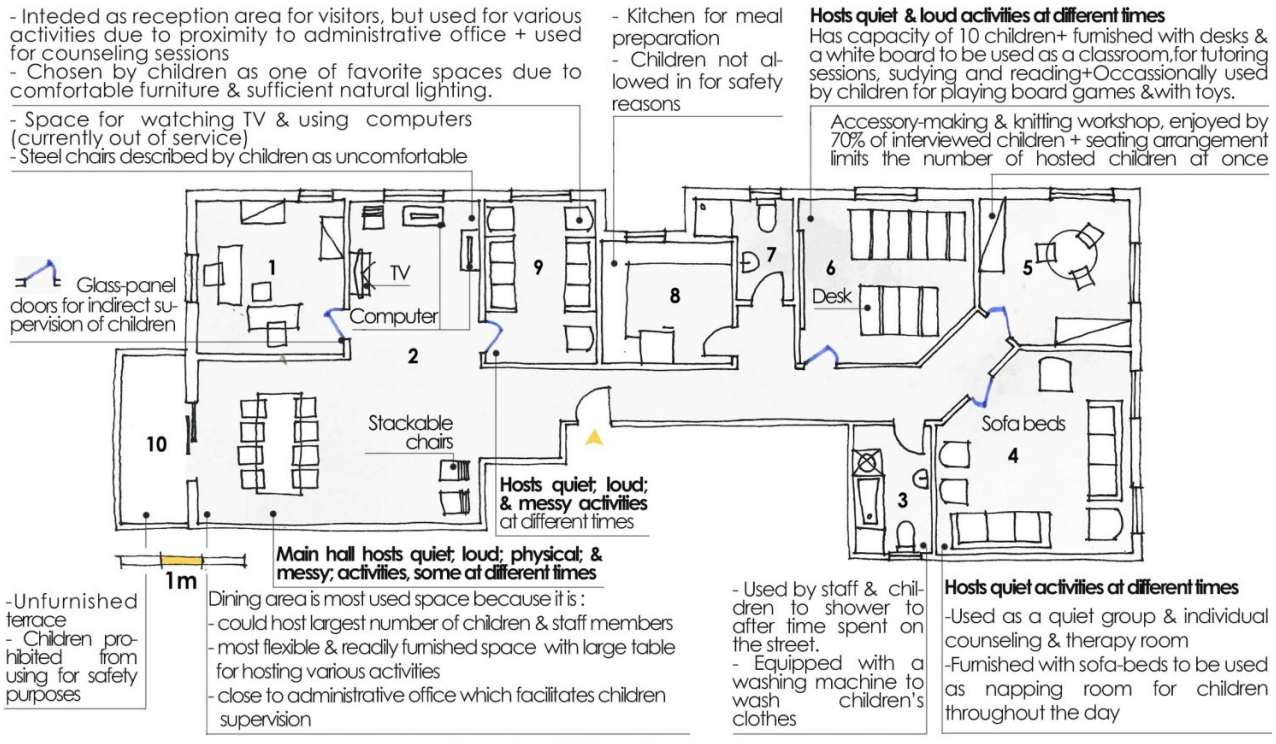
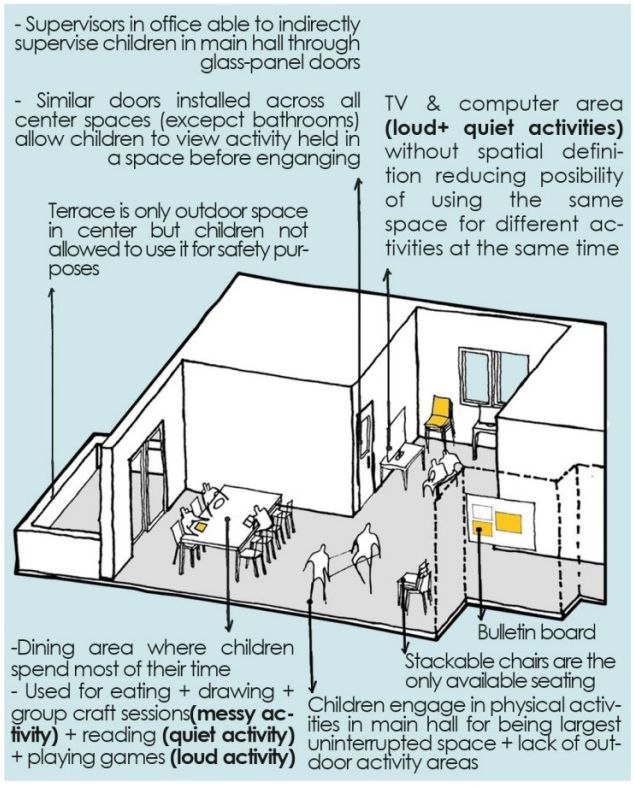


Figure 6. AAH Helwan drop-in center design and usage patterns (Developed by Authors).

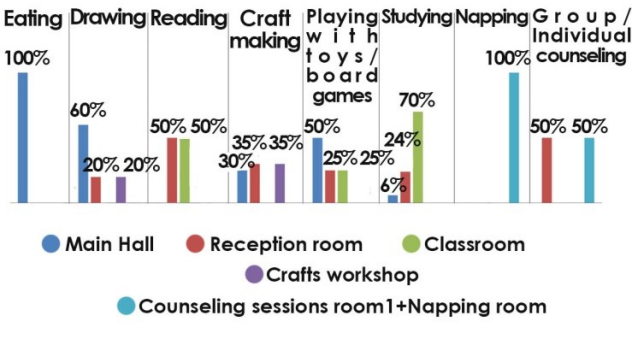


Plan of AAH Nasr City drop-in center
(1.Adminstrative office - 2. Main hall - 3. Bathroom 1 - 4. Counseling sessions room 1 +Napping room - 5. Crafts workshop - 6. Classroom - 7. Bathroom 2 - 8. Kitchen - 9. Center reception room - 10. Terrace)



Usage pattern of center main hall

Children knitting in crafts workshop (Left); Classroom setup (Right)



Activities carried out across center spaces

Figure 7. AAH Nasr City drop-in center design and usage patterns (Developed by Authors).

Based on the previous review of the AAH drop-in centers, utilized spatial programs and rates could be analysed as shown in Table 1.

Table 1. Standard rates analysis of utilized spaces in AAH drop-in centers.

Drop-in Center Location	Space	Space Rate	Standard Rate (AbdelRasheed,2004)	Space Rate Status (Above/Below/Within Standards)
Maadi District (Center max. Capacity= 25 children)	**A.1. Main Hall** (As activity space)	**1.28** m²/child	**0.92-1.85** m²/child	Within
	A.2. Main Hall (As dining hall)	**1.28** m²/child	**1.4** m²/child	Below
	Napping room	**2**children/room	**-**	Violating
	Children bathroom	**1**toilet	5toilets	Below
		1sink	8sinks	
		1shower	3showers	
	Classroom & game room	**0.76** m²/child	**2.8** m²/child	Below
Helwan District (Center max. Capacity= 35 children)	**A.1. Main Hall** (As activity space)	**0.94** m²/child	**0.92-1.85** m²/child	Within
	A.2. Main Hall (As dining hall)	**0.94** m²/child	**1.4** m²/child	Below
	B.1. Classroom & game room (As classroom**)**	**0.45** m²/child	**2.8** m²/child	Below
	B.2. Classroom & game room (As game room)	**0.45** m²/child	**0.92-1.85** m²/child	Below
	Children bathroom	**1**toilet	**7**toilets	Below
		2sinks	**12**sinks	
		1shower	**4**showers	
Nasr City drop-in center (Center max. capacity= 30 children)	**A.1. Main Hall** (As activity space)	**1.3** m²/child	**0.92-1.85** m²/child	Within
	A.2. Main Hall (As dining hall)	**1.3** m²/child	**1.4** m²/child	Below
	B.1. Counseling room1+napping room (as counseling room)	**2 children/room**	_	Violating
	B.2. Counseling room1+napping room (as napping room)	**11** m²/child	_	_
	Classroom (10 children capacity)	**1.6** m²/child (2children/desk)	**2.8** m²/child	Below
	Crafts room (3 children capacity)	**4.3** m²/child	_	_
	Children bathroom	**2**toilets	**6**toilets	Below
		2sinks	**10**sinks	
		2shower2	**3**showers	

Notes:
- Napping rooms should generally not host only 2 children at once
- Standard rates referenced in table are of residential facilities hosting children. They are only used in this analysis as a general comparison reference point.

While the latter tables highlight numerous missing spaces in the AAH centers, mainly due to limited center space and resources, centers rely on surrounding public and community facilities to provide such services. However, this did not stop playgrounds from being the most requested space to be added by interviewed children (64%) given their role in allowing for creative play and child NFE. Another major challenge facing the centers is their inability to adequately cope with the fluctuating numbers of hosted children. For instance, on days with high capacities (more than 25 children) the Maadi center is unable to host all the children due to limited and un-expandable spaces, while many of the center spaces remain unutilized during periods of low capacity as in the case of the Nasr City center for the past 5 years. Finally, since 100% of the hosted populations by Helwan center in 2018 were street-connected children who live 30 minutes away from the center, dedicated buses are readily available for a daily pick up to and from the center. This situation highlights issues arising with using fixed structures for drop-in centers and their inability to cope with the children's changing nodes of the congregation or varying origins along the years. The other challenges, the latter are echoed in GO's preparing proposals for using mobile units of readapted vehicles to provide accessible protective- rehabilitative services to at-risk and street children across various specified nodes in Greater Cairo. In this sense, identified design gaps and challenges deduced from the phenomenon literature and contextual study make it possible to proceed to the secondary axis investigating CFS's targeting children during humanitarian emergencies.

4. CFS's During Humanitarian Emergencies: Design Considerations and Properties

Undeniably, the extant global condition shows a humanitarian crisis with skyrocketing numbers of displaced people (UNHCR, 2019). Such realities caused by various economic, environmental, political, and healthcare-related forces have created affected populations in urgent need of aid necessary for their survival and rehabilitation (Brès, 1986; Jensen, 1996). In response to these, governments and aid organizations have long provided humanitarian aid hosted in specially designed structures and spaces, creating an architectural field famously known as Emergency Architecture or Architecture for Humanitarian Emergencies (HE) (Dorent, 2011; Lobos, 2011). There are several architectural applications for HE, yet those specifically designed to cater to the millions of children affected by disasters yearly are CFS's (Ager et. al, 2013). They are safe spaces devised and operated to provide children with thorough healthcare, psychosocial support, educational, and recreational programs in situations of armed conflict, natural disasters, or protracted crises as child labour (Davis & Iltus, 2008; IFRCS, 2017).

When it comes to their design, CFS's have three structure/ setting typologies: (a) fixed/ permanent settings as CFS in already existing community centers or schools; (b) temporary settings as emergency shelter-like structures attached to fixed or temporary settings similar to the CFS in Emirdağ tent city in Turkey following the 1999 earthquake; and (c) mobile settings as the UNICEF mobile CFS for Syrian children refugees in Turkey (UNICEF and University of Pitsburg, 2004; IFRCS, 2017; Lorch, 2017; Azzam et. al; 2019) (Figure 8). The latter typology is of significant importance given its ability to more easily and efficiently reach affected children in difficult-to-access locations due to geography or political sensitivities and provide them with rehabilitative services.

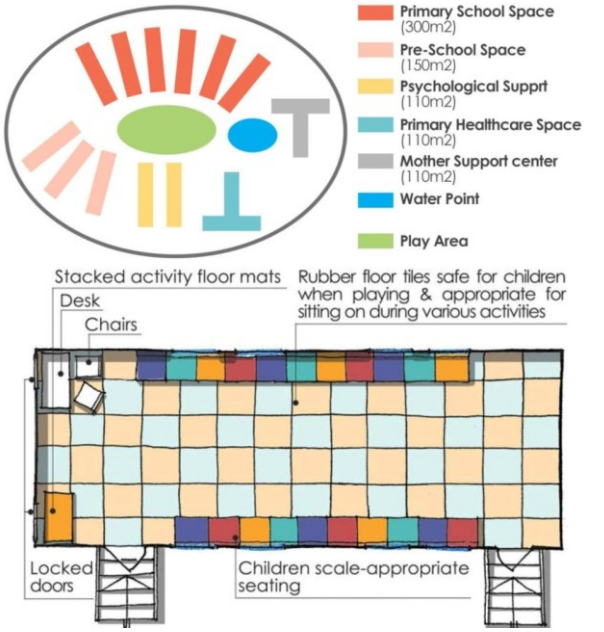


Figure 8. Top: Temporary CFS in Emirdağ tent city (Developed by Author based on UNICEF and University of Pitsburg, 2004), Bottom: UNICEF truck-based mobile CFS in Turkey (Developed by Author in Azzam et al., 2019).

To provide the intended services, CFS's should operate at a maximum capacity of 125 children per CFS/shift in case of non-mobile CFS's. Moreover, they should include, but not be limited to, the following spaces (Davis & Iltus, 2008):

- Recreational Facilities: Safe multifunctional indoor and outdoor spaces supporting physical, intellectual, and social development of various age groups.
- Medical Facilities: Private spaces for treatment from injuries, minor illnesses, and counselling
- Toilets: Separate facilities for both genders and adult staff

For CFS's to achieve their role, research efforts and aid organization manuals have highlighted several properties. For instance, such spaces should be characterized by including multi-functionality, rapid construction, spatial flexibility, adaptability to different contexts, and scalability to cater to changing numbers of children. Furthermore, CFS's should have low construction and operational costs and provide rapid and easy access to target populations possibly through relatability via mobility or portability (Davis & Iltus, 2008; IFRCS, 2017).

5. Intersections between Street Children Drop-in Centers and CFS's

Based on the literature review of the primary and secondary study axes, the contextual study of drop-in centersand the reviewed international precedents, several areas of intersections on four different levels could be deduced between the architectural applications of both axes. The first intersection level focuses on target populations since applications of both axes target vulnerable children in need of protection and rehabilitation. Additionally, CFS's target children in protracted crises as working children. This indicates the suitability of CFS's in catering to street children.

The second level is that provided services for drop-in centers provide protective and rehabilitative services very much similar to those of CFS's.

The third is the level of spatial properties, which architectural applications should meet. Several similarities could be drawn between the identified spatial requirements of drop-in centers and CFS as they are both being flexible, adaptable, quick in construction and operation, low cost, user friendly, age-appropriate, multi-functional, community involving and easy to reach. Moreover, there are several identified missing properties from drop-in centers, despite them being crucial for more efficient performance as the study revealed and which are found in CFS's. Such design properties include structures being relocatable through mobility and/or portability, which as in the case of mobile CFS's, can help the centers address challenges of not being able to cope with street children's changing nodes of the congregation. Other properties include drop-in centers structures being temporary and expandable.

Finally, the fourth level is of the architectural typology where the study reveals that both drop-in centers and CFS's could be created in adaptively reused permanent/ fixed settings. However, given the established un-sustainability and inflexibility of fixed structures as well as benefits of the property of relocatability, creating mobile/ portable drop-in centers, which might be vehicle-based, can provide more accessible and efficient intervention solutions.

6. Street Children Drop-in Centers: Design Guidelines, Areas of Improvement, and adaptations of CFS Concepts

The previously conducted study of the primary axis of the street children phenomenon helps deduce that intermediate-stage interventions using drop-in centers, whether based in readapted facilities or specially designed, play a significant role in providing transitional safe spaces for the protection and rehabilitation of the children. This is ensured through the popularity such centers have in related academic literature and their usage by both international NGO's and other local centers in Egypt. Furthermore, they play a vital role in introducing children to options of living off the streets. Nevertheless, fixed drop-in center settings require design improvements to address issues of inflexibility, limited space and un-sustainability due to difficulties in coping with children's changing origins and nodes of the congregation.

In this light, the contextual study, secondary research axis and previously discussed areas of intersection all result in suggesting the usage of mobile/ portable, temporary and possibly modular structures for drop-in centers. This is because structures of such nature can easily expand when needed through the use of multiple units, and when there is no need for additional space the units could be moved to serve other locations. Moreover, previous issues could be addressed through using already existing community facilities like schools, parking lots and vacant land to set up drop-in centers according to pre-set schedules and day shifts. These previous suggestions are also backed up by international practice, where NFE and recreational services are provided in relocatable structures to vulnerable children as in the case of the UNICEF mobile CFS in Turkey. Additionally, interviewed intervention-program staff requires flexible and mobile solutions for easy reach of children at different locations. Eventually, these revelations along with the study axes as well as Greater Cairo's contextual analysis enable this study to formulate considerations to improve the design and operation of drop-in centers for street connected children. The considerations, in Table 2, are classified into technical, psycho-social and administrative aspects, in which case, properly applied technical aspects guarantees realizing the latter two.

Table 2. Design guidelines and considerations for street children drop-in centers.

Design Guidelines and Considerations		2nd Intervention Stage: Drop-in Center Stage
1.Location of used Structure	**1.1. Technical**	**1.1.1.** Nodes throughout city close to children's congregation nodes; community facilities; transportation nodes
	1.2. Psycho-social	**1.2.1.** Giving children a sense of control and possibility of self-referral, avoiding isolation from the community
	1.3. Administrative	N/A
2.Facility Image	**2.1. Technical**	**2.1.1**. Creating non-Institutional, child-friendly image using single-story structures whenever possible; verandas; scale appropriate windows; welcoming entryways; and natural finishing materials as stones instead of concrete blocks or large glass surfaces
		2.1.2. Allowing children to view activities from outside through glass windows
	2.2. Psycho-social	**2.2.1.** Creating a sense of familiarity; safety; and control
	2.3. Administrative	N/A
3.Facility Capacity	**3.1. Technical**	**3.1.1.** Unspecified due to fluctuating numbers of hosted children per day, but low capacities preferred (min.7-11 children/unit, max. 21-30 children/unit)
	3.2. Psycho-social	**3.2.1.** Avoiding over-crowdedness and high noise levels inducing stress; aggressive behaviours; and anxiety
	3.3. Administrative	**3.3.1.** Facilitating supervision of children and management of the facility, enabling the provision of care to each child
4.Size and Modules	**4.1. Technical**	**4.1.1**. Using several modules in cases of centre hosting different age groups and/ or large numbers of children
		4.1.2. Classifying some activity spaces, especially classrooms and educational spaces, according to educational level
	4.2. Psycho-social	**4.2.1.** Allowing socialization and building friendships, avoiding institutional stressful environments resulting from over-crowdedness
	4.3. Administrative	**4.3.1.** Facilitating supervision of children and management of the facility, enabling the provision of care to each individual child and establishing relationships with children
5.Zoning and Spatial Program	**5.1. Technical**	**5.1.1. Home bases:** napping rooms, dining area, children bathrooms (both genders in 2nd stage), separate locker area grouped in a zone
		5.1.2. Activity areas: quiet activity areas as reading; studying; computer halls + loud activity areas as TV, music, and toy/playroom; drama theatre; arts and crafts room grouped in a zone
		5.1.3. Common core of shared facilities: administrative offices, staff meeting rooms, visitors reception area, staff bathrooms, central kitchen, in-house clinic, vocational training workshops, gym, storage
		5.1.4. Outdoor areas: playground or accessible roofs providing a variety of activities and socialization and creative play options
	5.2. Psycho-social	**5.2.1.** Elements of the spatial program and categorizing spaces into private, semi-private, semi-public and public give children a sense of privacy, builds concepts of sharing and friendships
	5.3. Administrative	**5.3.1.** Clear spatial functional definition, property boundary, and categorization of spaces facilitate running facilities by determining the responsibility of spaces among children.
6.Spatial Properties	**6.1. Technical**	**6.1.1. Flexibility and adaptability:** Avoiding permanent walls and using movable partitions, square-shaped rooms, and using foldable; modular; movable; and stackable furniture
		6.1.2. Physical Spatial definition: Using partially surrounding partitions, transparent glass walls, low furniture, changing levels of floors or ceilings, creating implied boundaries through hangings; overhead lighting units; strong visual elements as posts; and changing floor covering/ texture, semi-enclosed spaces and clustering similar behavioural settings
		6.1.3. Spatial Connectivity: Using partially surrounding partitions, transparent glass walls, low furniture items + avoiding placing spaces hosting children in isolation from other spaces
		6.1.4. Multi-functioning: Including at least one multi-functional activity space to host various activities and a large percentage of hosted capacity, making use of properties and techniques of previous points 6.1.1., 6.1.2., and 6.1.3.
	6.2. Psycho-social	**6.2.1. Flexibility and adaptability:** Allowing children to adjust spaces according to their needs, giving them a sense of control and ownership
		6.2.2. Physical Spatial definition: Contributing to longer attention spans of children generating greater involvement in activity spaces
		6.2.3. Spatial connectivity: Viewing activities in spaces before entering them providing a sense of personal choice to engage in them
		6.2.4. Multi-functioning: Giving children of different age groups and backgrounds bigger opportunities to interact and bond over positive activities
	6.3. Administrative	**6.3.1. Flexibility and adaptability:** Facilitating provision of several services to children in cases of space and resource limitations
		6.3.2. Physical Spatial definition: Decreasing interruptions within spaces, providing a clear spatial functional definition

		6.3.3. Spatial connectivity: Facilitating interaction with and supervision of children, avoiding un-favoured behavioural activities, and insuring safety and security of children
		6.3.4. Multi-functioning: Facilitating interaction with and supervision of children
7. Furniture and Architect-ural Elements	**7.1. Technical**	**7.1.1.** Using furniture items to provide previous spatial properties (see point 6.1.) , without sharp edges, age-appropriate, personal to each child in case of personal lockers + using covers for electrical outlets
	7.2. Psycho-social	**7.2.1.** See points 6.1 and 6.2
		7.2.2. Security of children: using furniture without sharp edges, furniture that is age appropriate, doors without locks and with glass panels to view spaces from outside, covers for electrical outlets
		7.2.3. Sense of ownership, and belonging: using personal and age-appropriate furniture
	7.3. Administrative	**7.3.1.** See points 6.1 and 6.4
8. Finishing Materials	**8.1. Technical**	**8.1.1. Floors:** Anti-slippery and easy to clean finishes especially inactivity and workshop areas, sound-absorbing finishes in loud activity areas as carpets and wood floors
		8.1.2. Walls: Using easy to clean finishes in wet areas, sound-absorbing textured finishes and tiles in loud activity areas, washable paint, artwork that is cheerful and/or created by children
		8.1.3. Ceilings: sound-absorbing finishes and tiles in loud activity areas, paint otherwise
	8.2. Psycho-social	**8.2.1.** Creating calming settings and reducing anxiety and stresses by usage of cool-toned paint colors like blues and greens; cheerful soft artwork; sound-absorbing finishes
		8.2.2. Creating a sense of privacy, belonging and ownership through hanging children's artwork, allowing them to change the wall colors and decorations
	8.3. Administrative	**8.3.1.** Creating clear spatial functional and property boundaries definition and identification of responsibilities through usage of appropriate finishing materials according to activities hosted by spaces and allowing children to participate in the design of spaces
9. Indoor Environmen tal Quality	**9.1. Technical**	**9.1.1. Ventilation and thermal comfort:** Naturally ventilated spaces; proper building orientation, usage of effective-cross ventilation; high ceiling vents; aligned doors and windows, natural and mechanical ventilation in kitchens and bathrooms
		9.1.2. Lighting: All spaces should be naturally and artificially lit
		9.1.3. Acoustics**:** Sound level not exceeding 35 decibels + points 8.1.1.,8.1.2.,8.1.3.
	9.2 Psycho-social	**9.2.1** Reducing anxiety and creating positive attachments to spaces due to being comfortable
	9.3. Administrative	N/A

7. Conclusions

Undeniable, there is a scarcity in architectural research addressing the design of drop-in centers hosting street-connected children during intermediate-stage interventions and how the design responds to challenges facing these centers during operation. Thus, investigating drop-in centers used in practice and the possibility of adapting design principles of CFS's can help create efficient solutions for this intervention stage, given the common need for rapid, flexible and easy to access responses. Indeed, this possibility itself became the study hypothesis which was asserted by intersections drawn between the structures of both study axes. As a result, the study can constitute a set of design considerations for drop-in centers, which would assist parties working with street children to create such structures and also serve as a documented baseline for future research and design improvements.

Despite the previous findings, the study encountered several limitations. Obtaining architectural documents on precedents of working street children was challenging given that the organizations approached for this refused sharing data for privacy policies, except for SONNE foundation, which shared drawings of their future center. Additionally, fully tracking changes in the Egyptian participating centers over the years according to the children's needs and operational requirements was difficult due to frequent changes in staff members and lack of architectural documentation. Moreover, exclusive usage of secondary data sources of CFS's, - specifically mobile CFS was outside the research context. Lastly, evaluating the cost-effectiveness of the inspected center design was difficult due to the inability to obtain cost estimates of building and center operations.

Finally, these limitations pose opportunities for future research to explore interior design alterations to be introduced to existing drop-in centers to become expandable and adapt to constant changes in the number of hosted children. Specific to the Egyptian context, studies could focus on mapping vulnerable communities with children at risk of forming street connections, their needs and the possibility of introducing preventative permanent, temporary or mobile drop-in

centers to suitable urban pockets and existing community facilities.

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Conflict of interests
The authors declare no conflict of interest.

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E-participatory Approaches in Urban Design

* [1] Araf Öykü Türken, [2] Assoc. Prof. Dr Engin Eyüp Eyuboğlu

[1] Department of City and Regional Planning, Faculty of Architecture, Yildiz Technical University, Turkey
[2] Department of City and Regional Planning, Faculty of Architecture, Istanbul Technical University, Turkey
Email [1]: araf.turken@gmail.com, Email [2]: eyuboglu@itu.edu.tr

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ABSTRACT

The phenomenon of planning involving citizen's participation in planning literature has been from the second half of the 20th century. Indeed, different methods and techniques have been used in the process. However, participatory practices are time-consuming and negotiations are tiresome. Accordingly, the integration of developing digital technologies into participatory processes has been seen as a potential to reach large audiences and provide time-space independence. Within the scope of this research, a detailed literature review was done regarding e-participation, and ten (10) examples representing the upper levels at the ladder of participation were examined within the context of the project, participation, and socio-technical criteria. SWOT analyzes were structured by grouping similar applications, and current trends for the use of e-participation in urban design have been revealed. The analysis showed that citizens e participation- participation tend to allow citizen design or location-based interaction, playful interfaces and game elements which can be sources for encouragement.

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1. Introduction

Participatory planning/design practices have become increasingly widespread since the second half of the 20th century and have begun to replace top-down practices. These approaches, which focus on the interaction between actors, have become stronger with concepts such as the right to the city, civic participation, and citizen power. Since the 90s, the use of digital technologies in the world and the emergence of systems such as ICT and GIS have undergone a radical change in the production process of the urban space. The forms of communication in daily life have changed, data production has reached maximum levels, and the traditional participation processes has become time-consuming and costly. This situation required the integration of participatory planning with digital technologies. In its simplest terms, the concept of e-participation refers to the use of ICT in participatory processes. Accordingly, the ladder of participation was redefined, participatory planning met with digital

***Corresponding Author:**
Department of City and Regional Planning, Faculty of Architecture, Yildiz Technical University, Istanbul, Turkey
Email address: araf.turken@gmail.com

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methods and different specialities (such as IT experts, developers) were included in the inclusive design practices. In the focus of planning and urban design, various approaches have been developed that target active participation of citizens, such as systems that allow citizen design in three-dimensional models, civic engagement platforms and participatory planning apps, co-design apps amongst others. These systems are generally designed as web-based or mobile applications. They have multiple digital methods and have goals such as collecting data by addressing large audiences, motivating participation using game elements or playful interfaces, making services transparent, creating dialogue, and increasing interaction between actors. In this context, this research examines the impact of e-participation on urban design and planning processes and aims to understand current trends and approaches. In doing so, it adopted extensive literature research and detailed reviews of 10 international examples.

2. Methodology

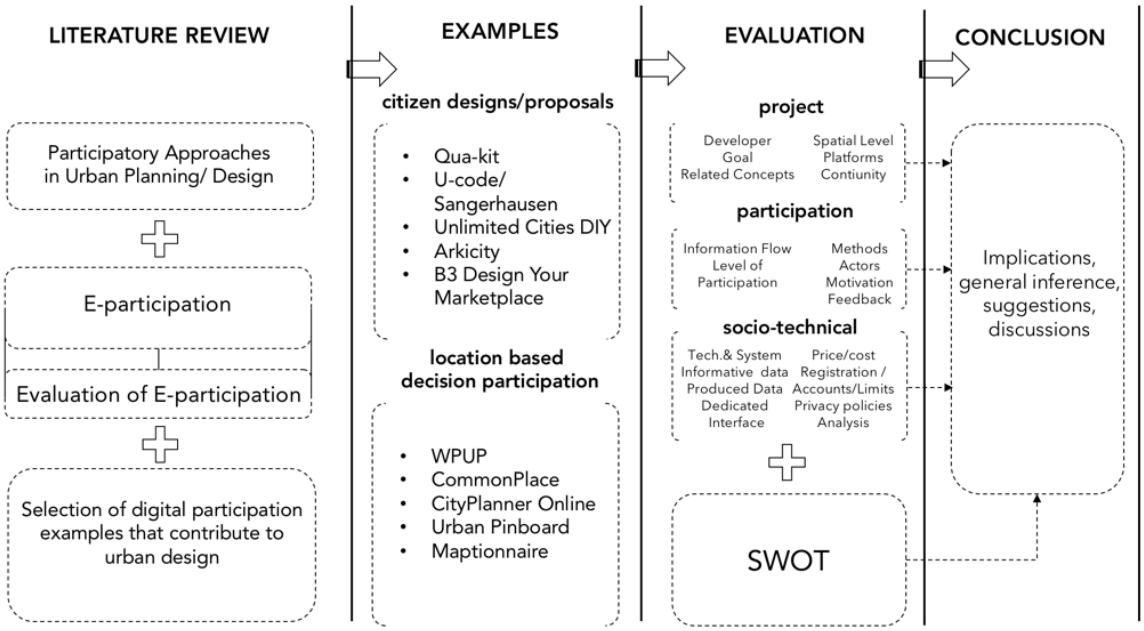

Figure 1. Structure of the Study.

Within the scope of the research, the development of participation in urban design and planning will be examined in historical order. A comprehensive literature review was conducted on e-participation, m-participation and the use of digital tools in the participation processes. Co-design and civic engagement platforms using digital tools are searched, and the relationship with innovative city concepts such as sustainable, smart, and responsive is examined. Advanced examples focused on the spatial design on a range of street, neighborhood, and public space rather than strategic approaches, transportation was selected, and comparative studies were made on the 10 examples (Figure 1). While choosing digital participation platforms and mobile applications that contribute to urban design processes, study preference was the high levels of the participation ladder and as a system developed based on geographical or spatial data. Accordingly, in the first examples examined, citizens can visualize their ideas about the urban space (2D or 3D), while in others, citizens report decisions and suggestions for projects to be developed through urban models and online mapping. While detailing the cases, different researcher's evaluation criteria for digital participation and mobile platforms were examined, common points were determined and review parameters were structured in line with the inferences. Subsequently, 10 examples were examined in the context of the project, participation, and socio-technical criteria. Comparisons were made on parameters such as developers, goals, spatial levels, continuity, information flow, methods, actors, motivation, technologies,

data, price, privacy policies and analysis. Afterwards, SWOT analysis was done by grouping samples with similarities. In line with the data obtained, innovative trends and methods regarding the use of digital tools for community participation in urban design were introduced.

3. Conceptual Framework of Participation in Urban Design/Planning

Participation is often associated with the concept of democracy and it has a multidisciplinary, inclusive nature. In the 1930s, the Chicago School carried out field projects in disadvantaged neighborhoods, and citizen involvement was mentioned for the first time in the context of architecture and planning (Janowitz, 2015). In the 1960s, top-down transportation and transformation projects implemented in the USA increased the inequality in urban space. During this period, bottom-up approaches emerged and became widespread. In 1967, the concept of "right to the city" was introduced by Henry Lefebvre, and it was stated that only groups and societies that could take revolutionary initiative could solve urban problems (Lefebvre, 2016). Afterwards, pluralist planning approaches have replaced top-down practices; participation has been seen as a collaborative process beyond 'information'. In 1969, Arnstein published an article entitled "The Ladder of Participation", classifying participation at eight different levels (Arnstein, 1969). Simultaneously, under the principle of pluralism, planning models such as transactive, communicative and advocacy have brought a new perspective to urban planning (Table 1) differently from the rational comprehensive approach (Lane, 2005). These models targeted local mobilization and emphasized the public's role in planning and design.

Table 1. Planning Approaches and Relation with Public Participation (Arnstein, 1969; Friedmann, 1987; Hall, 1992 as cited in Lane, 2005).

Level of Participation	Planning Tradition	Planning School	Planning Models
Citizen Control Delegated Power Partnership	Societal transformation	Pluralism	Communicative Bargaining Marxist Advocacy Transactive
Placation Consultation Informing	Societal guidance	Synoptic	Mixed scanning Incrementalism Synoptic planning
Therapy Manipulation	Societal guidance	Blueprint	Blueprint planning, Geddes, Howard Precinct planners

Thereafter, Arnstein's participation ladder was criticized as a one-way system that always aimed to reach higher levels and was reinterpreted by different professionals. In 1998, Davidson developed an approach called the "The Wheel of Participation" which has four main categories: inform consult, participate and empower. Later on, OECD (2001) established an active participation framework and categorized it by information flow directions and level of empowerment and the IAP2-Spectrum of Public Participation (2007) published an internationally accepted table emphasizing that participation levels are related to factors such as goal, promise and techniques (Commons, 2011). With the integration of digital technologies into participatory processes, different participation ladders have emerged that consider the new requirements. Although details about e-participation are critically examined in this study, it is a point of fact that the participation processes have transformed with social needs and planning dynamics.

4. Integration of Digital Tools into Participatory Processes

The development of ICT has inevitably changed daily life habits, created new public spaces and redefined virtual interactive environments. In its most basic sense, digital forms of communication have great potential to eliminate communicative barriers between people and increase their networking capacity. parallel to this, the way of communication between institutions and people evolved in this new direction and created concepts such as e-democracy, e-governance, and e-participation. Macintosh (2004) expresses e-democracy as the use of ICT to support decision-making processes; he defines e-voting and e-participation as sub-

layers of e-democracy. Accordingly, it will be useful to interpret digital technologies that affect planning and design processes.

Although the development process of computer technologies started in the 1960s, mathematical approaches in this period were insufficient to solve complex problems for the city. In the 1980s and 1990s, due to the developing GIS and other technologies, more comprehensive approaches have been developed that can provide solutions to problems related to planning and design, including topics such as data collection, data processing, visualization, analysis and project management. Following this, developments such as planning support systems and decision support systems that give priority to professional use have emerged (Klosterman, 2012). With the development of Web 2.0, content production of citizens became widespread and collaborative use of the network increased. Besides, web-based and online GIS systems have also been developed. These systems have created the PPGIS formulation integrated with the idea of community participation. Contrary to the fact that the systems in previous years were professionally oriented, these systems have great potential to ensure civic engagement and interaction between actors. It is seen that with every developing new technology, e-participation processes are evolving.

Table 2. Ladder of E-participation Through Different Perspectives.

(Carver, 2001)	(Kingston, 2002)	(Hudson-Smith, Evans, Batty, & Batty, 2002)	(Macintosh, 2004)	(Krabina, 2016)	
Online Decision Sup. Sys.	Online Decision Making	Virtual Worlds	e-Empowering	Impact	
Online Opinion Surveys	Online PPGIS	Virtual Design Studio	e-Engaging	Effective	implementation
Online Discussion	Online Comments on App.	Community Design Sys.	e-Enabling	Intended	goal/agenda
Communication barrier	Online Service Delivery	Online Decision Support Systems		Active	dedicated interface
Online Service Delivery	Online Discussion Forums	Online Opinion Surveys		Implicit	awareness/connection
	Communication barrier	Online Discussions		Non-interaction	
	Online Opinion Surveys	Communication barrier		Passive	action
	Basic Website	Online Service Delivery		Indifference	caring/opinion
				Unawareness	information

One of the main parameters used when examining e-participation processes is the ladder of e-participation and e-democracy. As with Arnstein's ladder, e-participation levels increase depending on citizen empowerment. Besides, the information flow direction and the technology adopted in e-participation processes are directly related to authorization. Accordingly, the e-participation ladders developed by different professionals are compared in Table 2. For example, in the system created by Carver (2001), online services are classified as one-way, and the level of participation increases as we go towards online discussions, opinion surveys, and decision support systems. On the other hand, Kingston (2002) has positioned simple websites and opinion polls in one-way information flow while describing interactive processes as discussion forums, services, comments on apps, online PPGIS, and online decision making. Subsequently, Smith and others have added advanced technologies that can contribute to the ladder (such as community design systems, virtual design studios and virtual worlds) and re-structured high levels of participation (Hudson-Smith et al., 2002). In his article published in 2004, Macintosh displayed an attitude similar to OECD's approach (information, consultation and active participation) and grouped e-participation as enabling, consultation and empowering. Unlike other systems, in Krabina's (2016) approach, some key issues such as the user who acquires information while unconsciously browsing the internet, implicit participation of citizen, dedicated interface, continuity of participation process are integrated into the ladder.

E-participation and collaborative participation processes are not two mutually exclusive elements; on the contrary, they contain

methods that can be used to support each other in line with needs. The reasons for the increasing preference of e-participation today can be listed as follows: addressing large audiences, ensuring time and space independence, reducing costs, and providing support for young groups to decision-making processes for urban space. Hence, aside from methods involving face-to-face interaction such as city councils, consultation groups, workshops, negotiations, interviews, city meetings which are frequently used in the participation processes, the use of methods such as forums, online surveys, podcasts, blogs, e-petitions, e-voting, gis tools, decision-making games (Kubicek, 2009, s. 177) have increased. The technology-related structure of e-participation also made it necessary to adopt the new actor relationships to the participation processes. With the change of tools, the processes supporting dependent or independent developers (IT professionals) have suddenly become imperative for creating dedicated interfaces, managing and analysing data exchange, ensuring the sustainability of the system and reconstructing the systems. This allowed innovative ways such as application/software competitions, media and press support to be used in designing e-participation processes (Kassen, 2018).

It was mentioned earlier that the participation processes have been transformed in line with the prevailing technology and the needs of the age. Accordingly, e-participation processes have continued to evolve with the introduction of mobile technologies and the emergence and widespread use of devices such as smartphones and tablets. In this context, m-participation, which is a new concept, represents the latest developments in e-participation processes, while focusing on ensuring civic engagement through specialized 'apps' (Ertiö, 2013). These applications are expressed with names such as "participatory planning apps," "citizen apps," and "civic engagement apps". It takes solutions one step further for "time/space problems" than e-participation. While classifying these applications, Ertiö (2018) separates it as environmental-centric and people-centric; he went further to mention eight different categories such as information sharing, experience, trend monitoring, integrator, nudge, local network, citizen impact, public dialogue (Ertiö, 2018). Parallel to these, m-participation can act as a catalyst by providing advantages such as those involving passer-by citizens in the process, collecting data while providing information through applications and providing opportunities for different socio-economic groups (Fathejalali, 2017).

4.1 E-Participatory Approaches and Related Urban Concepts

The phenomenon of participation has been an essential component of the globally accepted sustainable city concept since the 1970s. In conferences, covenants and agreements starting with the Stockholm conference and sustainable cities such as the Rio-World Summit, The Aarhus Convention, Local Agenda 21, UN Sustainable Development Goals 2030; participation was emphasized with themes such as access to environmental information, cooperation, policymaking, active citizenship. Sustainable development goals guide not only green cities but also data-driven city concepts, smart city, digital city and responsive city. Among these, literature evidence suggests conference on the concept that is seen as a 'smart city' as dominant. Smart cities consist of six basic components: smart economy, smart governance, smart citizen, smart mobility, smart environment and smart living (Giffinger et al., 2007). Gupta, Mustafa, & Kumar (2017) define the main elements of governance in smart city as participatory decision making, public and social services, transparent governance, political strategies and perspectives. Subsequently, what a smart citizen should have is expressed with features such as the level of qualification, open-mindedness, social and ethnic plurality, flexibility, creativity, democratic, participation in public life (Gupta, Mustafa, & Kumar, 2017). In this regard, it can be said that citizens are attributed to leading roles in data products within the scope of smart cities concept. Another city model that attributes the relationship between ICT and citizen participation to the spatial organization of the city is "responsive city." The responsive city takes citizens to the "action center" and is interested in "bringing the city back to citizens" (ETHx, 2017). Contrary to sensor data, 'responsive city' focusses on the information and data voluntarily shared by citizens (ETHx, 2017). Dominant terms in the responsive city concept are citizen science, citizen design

science and it enables non-experts to develop ideas, considering the creative participation of the crowd (ETHx, 2017).

4.2 Evaluation Criteria for E-participatory Platforms

One of the first studies on the creation of e-participation evaluation criteria were presented by Macintosh & Whyte (2008) with e-participation activities managed by the local government were evaluated through democracy, project, and socio-technical criteria. Within the purview of contemporary processes, the production and use of e-participation platforms have gained speed, and they have been evaluated by many professionals for different purposes and parameters. Within the scope of the research, five articles that evaluate web-based and mobile applications to ensure community participation concerning urban space have been examined in detail (Table 3), considering the parameters, common points, and classifications used by experts.

Table 3. Evaluation Criteria for Participatory Platforms from Different Perspectives

E-participation (Desouza & Bhagwatwar, 2012)		**E-participation** (Desouza & Bhagwatwar, 2014)		**E-participation** (Falco & Kleinhans, 2018)		**M-participation** (Höffken & Streich, 2013)		**M-participation** (Fathejalali, 2017)	
General Information	Name Developer Launch year Locations served Platforms Purpose Website	**General Information**	City Name Founders Year Goal	**Participatory Levels of Platforms**	Self-organization Co-production Interaction Consulting Informing	**Intention**	Name Aim Topic Participants Target group Spatial definition Driving institution	**Project Criteria**	Name Goal of application Beneficiaries Medium Topic Spatial Level Driving institution Motivation of developer Country
Typology of Application	Transportation Utilities Transparency and corruption Information & awareness & access Health and recreation Public Safety Housing	**Models**	Citizen-Centric& Citizen-Sourced Data Citizen-Centric& Gov.Open Data Government-Centric&Citizen-Sourced Data Government-Centric&Citizen-Developed Solutions	**Overview of Digital Participatory Platforms**	Name Website Description Coverage Case studies Main technological features Pricing	**Participation**	Approach Impact (of the information) Ability to comment /data Activity Cost Barriers to registration Complexity Level of participation	**Technology Criteria**	System of project Data Source channel Form of communication Platform Deployed Complexity Location-based verification. Used eTools Registration Devices
Data Source	User feeds Government Data Hybrid	**Components**	City Platforms Attractors Medium Information and knowledge flows Technological features Overall framework			**Technology**	System Channels App-based	**Citizen Participation Criteria**	Involved actors Level of participation Cost for participants Communication direction Information flow Cross-media communication Relation between actors Network Stage in the urban planning process
Goal of Application	Opinion seeking Prob. identification Prob. resolution Info, access & Awareness								

Motiva.	Prizes Solving soc. iss. Open data app stratus
Platfor.	Web based Mobile devices
Range	Local /City National Global

5. Examination of Digital Participation Platforms

Ten examples contributing to community participation in urban design have been selected, and current trends and developments were examined concerning the examples. The selected cases were analysed in two groups: those that enabled the citizen to design in 2 or 3 dimensions and those that focus on making citizens' decisions or suggestions through location-based systems. The examinations are detailed under three main headings: general information about the project, parameters concerning the participatory aspect of the platforms and criteria focusing on the social and technological process. Detailed examinations of the samples can be accessed from Table 4 and Table 5 and SWOT analysis was made from the groupings.

Table 4. Examination of Platforms and Applications that Enable Citizen Design

		Qua-kit	U-code / Pilot Test in Sangerhausen	B3 Design Your Market Place	Unlimited Cities DIY	ArkiCity
Main Source/ References		(Mueller & Lu, 2017) (Mueller, Lu, Chirkin, Klein, & Schmitt, 2018)	(Jannack, ve diğerleri, 2019) (U_CODE, 2019)	(Poplin, 2013) (Geogames Lab) (Thiel, 2017)	(Hasler, Chenal, & Soutter, 2017) (World Urban Campaign, 2016) (Unlimited Cities DIY, 2017)	(Arki_lab, 2014)
PROJECT CRITERIA	**Developer**	ETH Zurich Information Arc. Artem Chirkin	U_CODE EU Horizon 2020 Research and Innovation Prog.	(Student Project) HafenCity and (HCU) Florida Atlantic University	HOST Lab. UFO (NGO)	Arki_lab Smart Inf. Facilities University of Wollongong
	Goal of Application	Crowd-creative participation (non-experts) on different urban scales, by arranging geometries.	A co-design platform for urban design allows participation.	Creating a serious digital game that supports playful learning through a real-world.	Generate a new photo-realistic image/collages of urban space by playing with various objects.	Transformation of urban space by taking a picture, making a collage and share online.
	Related Concepts	Responsive City Citizen Design Science	Smart City Smart Design	Gamification in Urban Planning	Sustainable City Collaborative Urbanism	Smart City
	Spatial Level	Urban Design, Public Spaces etc.	Campus Design, Public Spaces, Urban Design etc.	Public Spaces (Market hall)	Neighbourhood, public space, streets etc.	Neighbourhood, public space, streets etc.
	Platforms	Web-Based	Web-Based + Mobile Devices	Web-Based	Web-Based + Mobile Devices	Mobile Application

	Continuity (Cases)	Yes	Pilot Test	Prototype	Yes	Beta Version Yes
PARTICIPATORY CRITERIA	**Information Flow**	Two-way	Two-way	Two-way	Two-way	Two-way
	Level of Participation	High Making decisions online	High (Co-design) Making decisions online	High Making decisions online	High (Co-design) Making decisions online	High (Co-design) Making decisions online
	Methods of Participation	Community design (online), e-voting, add comments	Community design (online), touchtables, VR tools, ranking/voting, workshops	Community design (online), e-voting, discussion forums etc.	Community design (online), e-voting, add data/comments, workshops	Community design (online), discussion forums, workshops
	Main Actors	Professionals, Stakeholders, Lab. Universities, Citizen.	Initiator, Super Mediator, Planning Authorities, Professionals, Citizen	Universities, Professionals, Students, Citizen	Municipalities, Urban Professionals and Civil society	Municipalities, Professionals, Universities, Labs and Citizen.
	Motivation	Gaming aspects, Playful Design	Crowdsourcing Design Gaming	Serious Game Playful Design	Playful Design	Playful Design
	Feedback & Communication Direction	Citizen ↔ Citizen Gov/Professionals ↔citizen	Citizen ↔ Citizen Gov/Professionals ↔citizen	Citizen ↔ Citizen Gov/Professionals ↔ citizen	Citizen ↔ citizen Citizen ↔ Gov /Professionals	Citizen ↔ Citizen Citizen↔ Gov /Professionals
SOCIO-TECHNICAL CRITERIA	**Used Tech & Sys.**	Qua-kit software by Artem Chirkin	Gamification/ VR-AR Applications/ Crowd Analysis	Digital Serious Game Design/ Adobe Flash	Artificial Intelligence Analysis engine Automatic generator	Augmented Reality Mobile software (for Ios and google play)
	Information data	3D typologies Instructions for use, Criterias,	3D models of urban space, informative data etc.	Informative data through project, 3D & 2D Objects	Project packages & cutouts	Project-specific data collection packages & cutouts
	Produced Data	Citizen Design Models	Citizen Design Models	Citizen Design Models	Citizen Design Images/Collages	Citizen Design Images/Collages
	Dedicated Interface	Yes	Yes	Yes	Yes	Yes
	Price/cost	-	-	-	No info	No info
	Registration / Accounts/Limits	Professional / Local Qua-kit Accounts	Tested in semi-controlled with a limited user.	Tested with a limited user. (students &elder)	No info	PROJECT code is required.
	Privacy policies	No info	No info	Defined	No info	Defined
	Analysis	Comprehensive Analysis /Form and Perception Based	Comprehensive Analysis/Participant &Contribution Istatis.	User feedback and ranking.	Comprehensive Analysis /artificial intelligence, semantic analysis, image recognition	Analysis /Data Collection & Professionals

As detailed in Table 4, five different digital approaches aimed at community participation in an urban design titled Qua-kit, U-code / Sangerhausen, B3 Design Your Marketplace, Unlimited Cities DIY, ArkiCity were examined. Strengths, weaknesses, opportunities and threats within the scope of these examples are listed as follows:

Strengths: They allow users to visualize their ideas about space. The information flow is two-way and interactive. They enable the inclusion of different actors in the system and the leading roles of universities and laboratories in

the production of the projects examined. Once the software is produced, it can be adapted to different projects and it helps to execute different participation processes with similar instructions. The sustainability of the system can be achieved in this way. Defined three-dimensional and two-dimensional objects make the system easy to understand and use. Open-source software focuses on transparency without profit. Comprehensive spatial analysis is included in most applications. Gaming and entertainment elements are used.

Weakness: The production of platforms and applications is time-consuming and costly. Expert support is required for the production of the system and adaptation to new projects. In systems with limited typology, creativity is restricted in the design process of the citizen.

Opportunities: Accessible and understandable to use. Purposeful interface design makes citizen participation enjoyable and has the potential to involve young groups in the process. Features such as authorizing the user at the point of project production, comprehensive spatial analysis capability, high level of participation, feedback systems, and open-source increases the preferability by local authorities and planning agencies.

Threats: The users may not prefer platforms whose policies of use are not defined in terms of the privacy and protection of the user's data. Applications without restrictions on registration use may cause non-local users to participate in the voting and may affect the accuracy of the data.

Table 5. Examination of Location Based Participatory Platforms.

		WPUP	Commonplace	City Planner Online	Urban Pinboard	Maptionnaire
	Main Source/ References	(Mansourian, Taleai, & Fasihi, 2011) (Fasihi et al. 2009)	(Commonplace, 2013) (Falco & Kleinhans, 2018)	(CityPlannerOnline, 2003) (Falco & Kleinhans, 2018)	(Haeusler, Asher, & Booth, 2017)	(Maptionnaire, 2011) (Falco & Kleinhans, 2018)
PROJECT CRITERIA	**Developer**	K.N. Toosi University of Technology Faculty of Geodesy and Geomatics Engineering	CommonPlace Inc.	Agency9 Bentley Systems Company	Product of City Live Labs (Competition Organizers: Cox Arc. & New South Wales University & Urban Development Institute of Aus-tralia) AAM group (Geospatial Services Com.)	Maptionnaire Inc. / Mapita / Aalto University
	Goal of Application	Create participatory urban development control activities for land use development	Ensuring citizen participation by using Community Heatmap and Design Feedback	Sketch, analyse, and export from 3D cities Share/publish projects and crowdsource	Platform for 3D map visualisation, development proposals & citizen engagement	Creating map-surveys to get idea from citizen
	Related Concept	Participatory Planning	Participatory Planning/ Design	Sustainable City Smart City	Smart Cities	Participatory Planning/ Design
	Spatial Level	Urban Planning/ Land-use Dec. / Development Control	Neighbourhood, Transportation, Urban Design etc.	Architecture& Urban Design& Planning	Architecture& Urban Design& Planning	Urban Design & Planning
	Platforms	Web-Based	Web-Based	Web-Based	Web-Based	Web-Based
	Continuity (Cases)	Prototype System	Yes	Yes	Beta Version Yes	Yes
PARTICIPATORY	**Information Flow**	Two-way	Two-way	Two-way	Two-way	Two-way
	Level of Participation	High Dec. Sup. Sys.	High Co-production	High Co-production	High Co-production	High Co-production

		Online PPGIS	Map-Based Consultation	Map Based Contributions + 3D models	Map Based Contributions + 3D models	Online PPGIS
	Methods of Participation	Application submission, discussion forum.	Online mapping, surveys, e-voting, discussion forums etc, interviews, meetings.	Discussion forums, e-voting, location-based addition to projects to be developed	Discussion forums, e-voting, location-based addition to projects to be developed	Online mapping, surveys, e-voting, discussion forums etc.
	Main Actors	Planning Authorities, Citizen (submit and participate), Utility Organizations	Developers, Local Authorities, Citizen	Professionals, Developers, Local Authorities, Citizen	Professionals, Developers, Local Authorities, Citizen	Municipalities, Professionals, Companies, Agencies, Citizen
	Motivation	To offer decisions/ suggestions for land use development	To offer ideas/suggestions for urban space	To offer decisions/ suggestions for projects to be developed	To offer decisions/ suggestions for projects to be developed	To offer ideas/suggestions for urban space
	Feedback & Communication Direction	Citizen ↔ citizen Citizen ↔ Local Authorities	Citizen ↔ Gov /Professionals Citizen ↔ citizen	Citizen ↔ Gov /Professionals Citizen ↔ citizen	Citizen ↔ Gov /Professionals Citizen ↔ citizen	Citizen ↔ Gov /Professionals Citizen ↔ citizen /depending to project
SOCIO-TECHNICAL CRITERIA	**Used Tech & Sys.**	Web GIS, GIS, SDSS, AHP	Software, Location Based Techs.	Software, PPGIS, GIS & CAD integration, WMS & Geo content	Software, WebGIS, geoIT	Software, PPGIS
	Information data	Plan decisions, spatial analysis and data, evaluation parameters	Maps, project images, information, notifications	3d project, city models, images and information	3d project, city models, images and information	Maps, project images, information, notifications
	Produced Data	Online spatial analysis maps (citizen specific), synthesis of the participants' data, opinion statement.	Citizen input to urban problems (report, suggestions, decisions on projects to be developed)	Citizen input: decisions, comment, vote Professional input: models, informative data etc.	Citizen input: decisions, comment, vote Professional input: models, informative data etc.	Citizen input to urban problems (report, suggestions, decisions on projects to be development) /depending project
	Dedicated Interface	Yes	Yes	Yes	Yes	Yes
	Price/cost	-	Yes/ For Driving Institution	Yes/ For Driving Institution	No info (Beta Version)	Yes/ For Driving Institution
	Registration / Accounts/Limits	Only Prototype	Depending on the project	User login with user-specific interfaces	User login with user-specific interfaces	Depending on the project
	Privacy policies	No info	Defined	Defined	Defined	Defined
	Analysis	Comprehensive Analysis (Spatial Analysis, Analytical Hierarchy Process)	Comprehensive Analysis (Data analysis, statistics)	Comprehensive Analysis (+Spatial analysis)	Comprehensive Analysis (+Spatial analysis)	Comprehensive Analysis (collect, analyse and visualise)

As detailed in Table 5, five different digital platforms aimed at community participation in urban planning titled WPUP, Commonplace, City Planner Online, Urban Pinboard, Maptionnaire were examined. Strengths, weaknesses, opportunities and threats are listed as follows within the scope of these examples, which are similar in terms of location-based data production methods and technologies and information flow aspects.

Strengths: Users can view projects that are planned to be developed on real-time maps and three-dimensional city models (in 2D or 3D). With the help of simple interfaces, they

can share location-based data, view the comments of other citizens, vote, and participate in surveys. In systems such as Maptionnaire, there are options such as mapping and route creation. All of the systems perform comprehensive analysis and have specialized interfaces. Citizens can interact directly with developers and local authorities. Examples of Maptionnaire, Commonplace, CityPlanner Online, Urban Pinboard allows the production of many different participation projects, thereby providing a time-cost advantage.

Weakness: Platforms do not allow citizens to create their designs directly. Some of the examples are poorly integrated with mobile devices. The fact that the developer and local authorities can use the systems more comprehensively has a devastating effect on the perception of the bottom-up participation process. Production of platforms and their adaptation to projects require expertise.

Opportunities: Adaptation to different projects increases preference. Three-dimensional urban models, CAD, and GIs integration enable these platforms to be used in line with different planning needs and not necessarily only in terms of community participation.

Threats: Paid uses (for beneficiary institutions) can reduce preferability. Participation in programs with three-dimensional interfaces can turn into a secondary goal. On platforms without registration limitation, the user can feel unsafe in terms of privacy and prefer not to participate. Indeed, such platforms can be manipulated.

6. Results

The use of digital technologies has gradually increased to enhance public participation in urban design. Platforms with strong communicative interaction have been created by using different technologies in an integrated way. Most systems are using systems without the need for additional effort and learning from the user. When the driving institutions on the platforms are examined, it is seen that universities and the private sector play leading roles especially in terms of location-based platform development and distribution. When analysed from a general perspective, common trends in digital participation platforms can be listed as follows:

- participation and community engagement as the primary goal
- allowing citizens to make their designs(2/3D) or to report their decisions and suggestions on projects to be developed with location-based systems
- providing consultation processes through three-dimensional city models and real-time maps
- enabling interaction between citizen to citizen, citizen to professionals/ local authorities/ developers at the same time thereby providing a two-way information flow through the platforms
- designing playful and dedicated interfaces to motivate citizens and increase participation. Likewise, the use of game elements or 3D city models are other supportive approaches
- to provide citizens with data security by defining terms of use and privacy
- the flexibility of systems and adaptability to more than one project; thus, ensuring continuity in the use.
- analysing process outputs and converting them into meaningful data.

Finally, it can be stated that e-participation processes will continue to evolve with developing technologies and that it will continue to support traditional participation practices. In this regard, providing freedom of design and decision making and empowering citizens in the process will strengthen the democratic aspect of e-participation.

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Conflict of interests

The authors declare no conflict of interest.

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Original scientific paper

The Impacts of Urban Morphology on Housing Indoor Thermal Condition in Hoi An City, Vietnam

[1] * M.A. **Thien Huong Luu**, [2] Dr. **Juan-Carlos Rojas-Arias**, [3] Dr. **Dominique Laffly**

[1and 2] Laboratory of Research in Architecture (LRA), National School of Architecture of Toulouse, France
[3] University of Toulouse-Jean Jaurès, France
E-mail [1]: thien-huong.luu@toulouse.archi.fr , E-mail [2]: juan-carlos.rojas-arias@toulouse.archi.fr ,
E-mail [3]: dominique.laffly@gmail.com

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ABSTRACT

Assessing the impact of urban morphology on the indoor thermal condition of housing in a tourism city in central Vietnam — Hoi An City is the main objective of this study. The research process is carried out by a variety of methods including in situ surveys, measuring with temperature sensors, data analysis and map analysis. Four houses, located in two areas with different urban forms, were selected for measurement within one month to investigate the differences in housing indoor temperature. The impact of urban morphology on housing was thereafter determined. Temperature sensors were permanently installed in 4 houses; based on these empirical measurements and data collected, the paper addresses solutions to improve urban morphology and indoor thermal condition.

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1. Introduction

Hoi An City is located in central Vietnam, with severe weather amidst diverse natural disasters. Therefore, the life of the people there is very difficult. The city has an ancient town and in 1999, it was recognized as a world cultural heritage by UNESCO. Since then, Hoi An tourism has grown rapidly and it became an international tourism destination. The development of tourism has promoted this unique heritage, but the city also faces potential risks due to rapid but poor-quality infrastructure development, incoherent and sporadic planning between old and new areas

***Corresponding Author:**
Laboratory of Research in Architecture (LRA), National School of Architecture of Toulouse, France
Email address: thien-huong.luu@toulouse.archi.fr

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(Do & Phan, 2018; Jones, 2002; Hong Nguyen, 2016). The Inconsistencies in the planning orientation entailed many consequences which include amongst others an uneven population distribution, increased construction density in the central areas and increased urban pressure on the historical relic.

Boukhabla, et al. (2013), the open streets promote air movement and enhance street cooling better than the narrow streets. It was reported that the technical parameters of the micro-climate have a close connection to energy consumption (Vallati et al., 2015) and the physical shape of urban morphology (Wei et al., 2016; Racine, 2019). Indeed, the leading concern with housing projects in central of Vietnam is to provide a comfortable temperature environment for residents since, it has a hot humid climate and high temperature year-round (Privitera et al., 2018; Humphreys et al., 2007). Therefore, research on urban morphology in Hoi An and assessing its effects on indoor thermal conditions is the subject of this paper.

In this study, two (2) research areas in Hoi An City have proposed: the old town area and the old town buffer zone. Morphological analysis of the 2 areas helps to understand the characteristics and morphology of each area, thereby also helping in making comments on their advantages and disadvantages. Secondly, attempts are made to conduct surveys and measurements to estimate the impact of surrounding urban morphology on the housing indoor thermal condition in each area. Two houses in each area have temperature sensors installed to monitor the indoor temperature. After a month survey, the results show that indoor temperature in the vernacular houses is higher than in modern terraced houses. This is quite surprising because vernacular houses have been proven to adapt well to local climatic conditions through solutions in materials, orientation, structure and housing form. Therefore, in addition to architectural elements, urban morphology also plays an important role in affecting the housing indoor temperatures. Based on the analysis of the results obtained, the paper addresses solutions to improve urban morphology to lower housing indoor temperature.

2 . Materials and methods

The survey and measurement period for this paper is within June 2019 (one month). The work consists of two main phases. The first phase is a survey of two (2) urban areas in Hoi An City. The methods used during this period include site surveys; measurements of road widths, pavements, house height; and analyses of the collected image data. The second phase is the installation of indoor temperature measuring devices and data collection on the two houses selected in each of the urban areas. In this phase, the research methods include site survey, installation of measuring equipment, making housing drawings with AutoCAD and analysis of the temperature data obtained.

2.1 The Urban morphology of Hoi An City

2.1.1 Positions of research areas and criteria of their selection

Hoi An Ancient Town is located in Quang Nam Province, Vietnam, a city that has developed over time, captured opportunities and adapted to new changes. Hoi An developed significantly during the period of international commerce in Southeast Asia from the 16th to the 17th centuries with different names such as Fayfo, Faifoo, Faifo, Hoai Pho, etc. Hoi An survived after devastating wars in the late 18th century and it is one of the few places in Vietnam that retained most of the main urban structure (National Committee for the International Symposium on the Ancient Town of Hoi An, 2006).

Hoi An is located on the geology of the accretion area of the Thu Bon River, due to the accretion of the river, which has shaped the appearance of the ancient Town till now. Before the 19th century, Hoi An was a city running along Tran Phu Street. By 1841, the accretion of the river was allowed to open another road, paralleling Tran Phu street to the south (Nguyen Thai Hoc Street today). By 1886, the accretion of the river allowed to open a new road, Bach Dang Street as it is called today, parallel to the two roads. Thus, the old Japanese street corresponds to Tran Phu street now, while the west of the Japanese bridge stretches to the end of Nguyen Thi Minh Khai, which is the Guest Town (Chinese Town) (Showa Women's University Institute of International Culture, 1996).

In fact, in the late 1980s, most of the relics in Hoi An Ancient Town were seriously degraded and in danger of collapsing at any time. Therefore, the conservation project of the Ancient Town of Hoi An was approved by the government in

1997. As a result of establishing the boundary of Hoi An, the city can be divided into two areas: the old urban area (Hoi An Ancient Town) and the new urban area. (Figure 1)

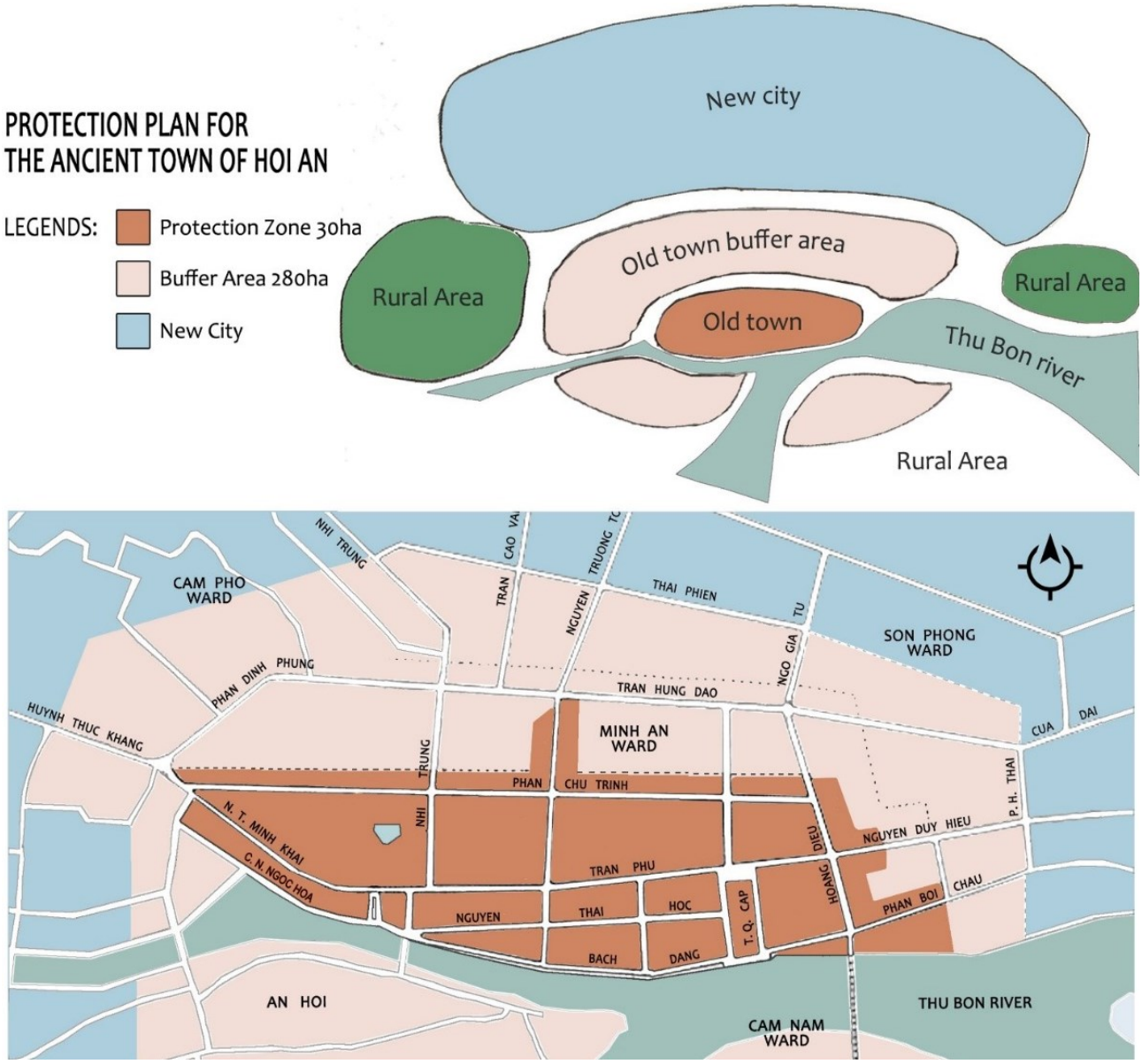

Figure 1. City map of preserving the Ancient Town of Hoi An.

Hoi An Ancient Town belongs to three wards: Minh An, Son Phong and Cam Pho with its length and width being 1000 meters and 300 meters respectively. The town is small but dense with historical buildings, antiquities and a traditional pattern of the street networks of commercial port towns (Hong Nguyen, 2016). Until now, many building types in Hoi An Ancient Town are still used and conserved. The buildings are located on main streets running along with the old town in an East-West direction and on cross streets in a North-South direction. The limits are: East by Hoang Dieu street, West by the intersection between Phan Chu Trinh street and Nguyen Thi Minh Khai street, South by Bach Dang street and Cong Nu Ngoc Hoa street, and North by Phan Chu Trinh street. New urban areas are also formed by urban expansion due to urban pressures and they are divided into two parts. Part 1, called an old town buffer area, is an urban area with direct access to the old town. This buffer zone has the function of preserving and connecting the old town area with the remaining urban areas. Part 2 is the whole new city on the outside. In addition, there are areas of agriculture (rural area) located nearby but in

the control and joint activities of the whole (Figure 1).

There are two areas selected for surveying: the old town area (Hoi An Ancient Town) and the old town buffer area. In every two areas, a typical road is selected to survey. The first area is the old town area, the road chosen is Tran Phu — the oldest street in Hoi An. On this street, there are two selected vernacular houses for measurements: 80 Tran Phu (House A) and 129 Tran Phu (House B). The second area is the buffer zone of the old town and Nguyen Duy Hieu street is selected. Nguyen Duy Hieu street is a continuation road of Tran Phu street and runs to the East of Hoi An. Two modern terraced houses located at 259 Nguyen Duy Hieu (House C) and 296 Nguyen Duy Hieu (House D) have also been selected. The characteristics of the two urban areas are reflected through the two selected streets, so the morphology of the street is carefully investigated. The measurement of housing indoor thermal conditions of the four selected houses was also conducted with the detailed measurements in section 2.2. The location of the survey and measuring was based on the following three parameters (Figure 2):

- **Geographical location:** the distances between these two surveyed areas to existing river surfaces are similar. Therefore, they will be able to receive the same impacts of river wind and moisture from the river. Moreover, the locations of the surveyed areas are in the centre of the city and adjacent to each other, so the differences in weather (temperature, humidity, wind, etc.) are not too far apart.
- **The contrast between ancient and modern:** the two adjacent areas are without any physical barriers but the differences in age and the planning orientation create different morphologies in the areas. Tran Phu Street is the oldest street in Hoi An Ancient Town, so it brings out most of the characteristics of the old town while Nguyen Duy Hieu street has a modern trend.
- **The characteristic of building:** the selected streets are in the East-West direction, so the selected houses will have the same directions. House A and House B are the typical vernacular houses in Hoi An Ancient Town in layout, facade form and roof material while, House C, and House D, are modern houses with the common layout and form.

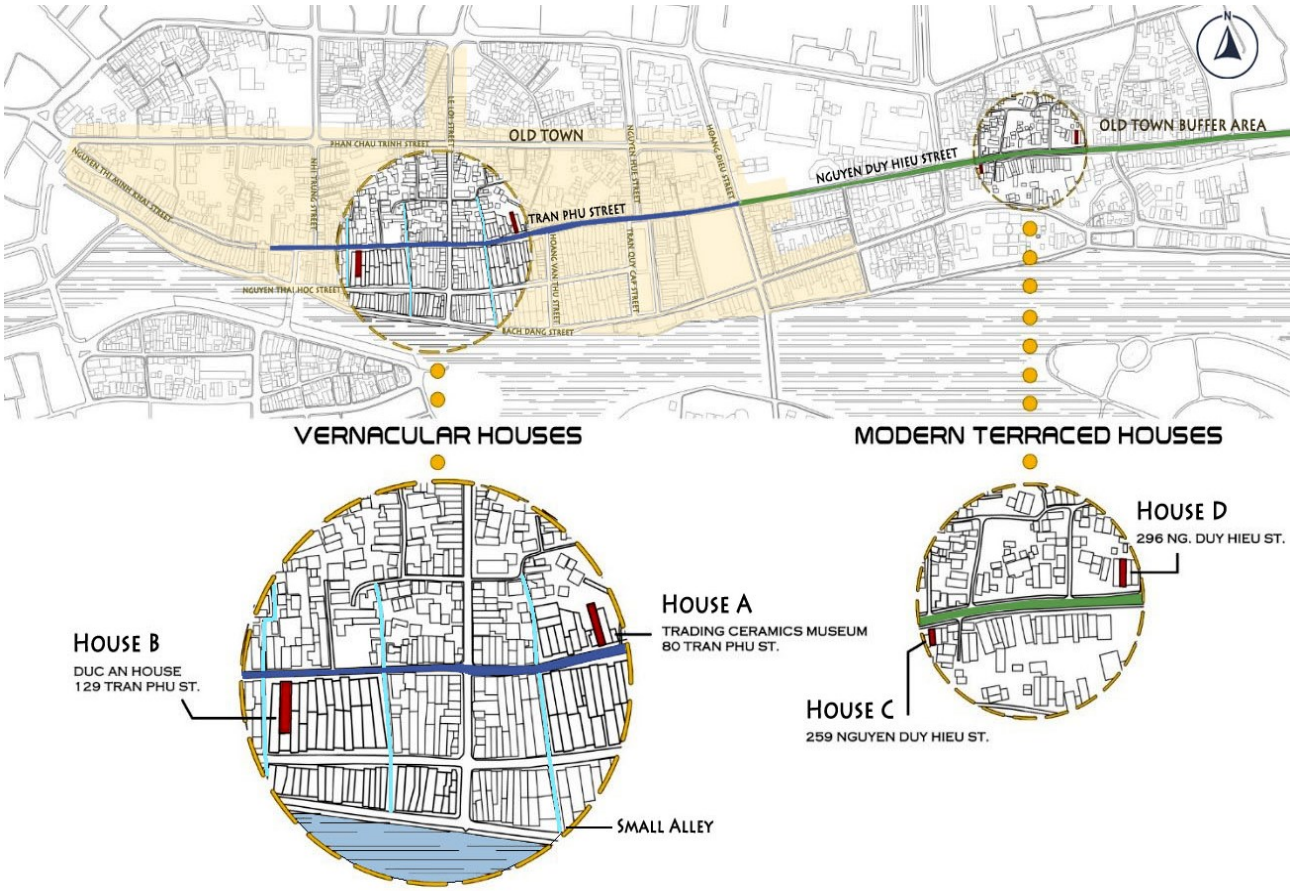

Figure 2. Diagram of research areas.

2.1.2 Hoi An Urban Morphology

The study of urban morphology focuses on the analysis of the panoramic map and analysis of building shapes in the process of urban formation and development (Doan, 2017). In this research, both study areas (old town and the old town buffer zone) are in a relatively flat area with their topography generally lowered from the North West to the South East and having an average slope of 0.015°. Therefore, analysing urban morphology is based on the analysis of the general plan, front facades and cross-sections of two selected streets in this study (Tran Phu St. and Nguyen Duy Hieu St).

Analysis of the general plan

Hoi An Ancient Town is located in the three wards Son Phong, Minh An and Cam Pho. They are also the three wards identified as having the highest population density in Hoi An City. Besides, Do and Phan (2018) showed that the construction density of Hoi An gradually decreased from the historical nuclear zone to its buffer zone. Therefore, the construction density and population density in the old town area are higher than the old town buffer zone. In the old town, there are small alleys whose width is only one meter to nearly two meters. They start from Bach Dang street (waterfront road) crossing the old town and into the residential areas behind Tran Phu street. These alleys are not only for moving purposes, they also provide the cool breeze from the river to the buildings deep inside the old town (Figure 2).

The map below shows the distribution of canopy trees and climbing plants in the two surveyed areas (Figure 3). Data of the tree was collected by the author based on in situ surveys. The size of dots represents the relative size of trees in the general map.

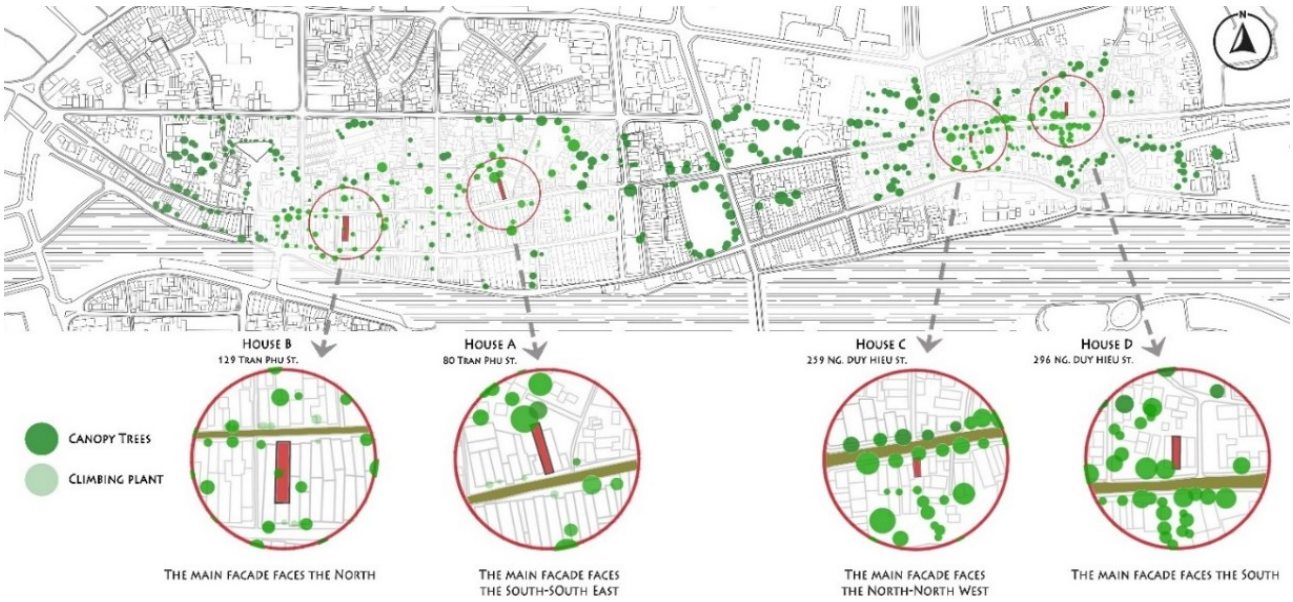

Figure 3. Map of tree position within a radius of 50 meters around the survey houses.

Based on the map, it was realized that the old town area has fewer canopy trees than the buffer area. There are very few canopy trees on both sides of Tran Phu street, mainly climbing plants. The tree density of the old town increases when going to the edge of the old town (some locations have many trees as Hoi An market, Phan Chau Trinh street, Nguyen Thi Minh Khai street). On Nguyen Duy Hieu Street, there are many canopy trees along both sides of the road, the trees here have wider coverage than the trees on Tran Phu Street. In Figure 3, the radius of 50 meters around the four surveyed houses was enlarged to show the amount and location of trees around them. The direction of the main facade of the housing is also stated (Figure 3).

Analysis of the street facade

The images of the street facades around surveyed houses were taken separately and put together to visualize the street where the surveyed house was located. Figure 4 shows that in all cases, the vernacular houses have front porches and that there are not too many canopy trees around the surveyed houses. At

the same time, there are only some few climbing and ornamental plants. However, the large front porches reduce the direct sunlight into the houses. The common form of roof in the old town is the sloping roof, which is covered with yin-yang tile. Facades of vernacular houses are usually built of bricks or wood, and the walls on both sides of these houses are bricks. The wooden houses are usually older than the brick houses. Houses A and B dated from about 1858 and 1837 respectively. Most of the vernacular houses in this old town are trading local goods for visitors or making restaurants, coffee shops. Nonetheless, the activities of trading and displaying products inadvertently shield all spaces in front of the house, restricting access and circulation of air. Some houses are famous because of their histories, age, and architectural form. To visit, they are organized into historical sites (House A and B are included).

Figure 4. Street facade around House A (80 Tran Phu St.) and House B (129 Tran Phu St.)

Figure 5 indicates that most of the houses shown for the modern areas do not have front porches. Awnings are added after construction; the main material of the awnings is the canvas and corrugated iron. Particularly, for House D, there is no porch and awning, the front part of this house is used as a shop. There are many canopy trees around House C and House D; these trees create shade for the main façade of the building, replacing the porch. The roof form of two-story houses or more around houses C and D is the slopping tile type. However, for the one-story houses in these pictures, they mainly use the corrugated iron roof. This can cause an increase in heat in the area because of the heat reflection characteristics of the corrugated iron roof.

Figure 5. Street facade around House C (259 Ng. Duy Hieu St.) and House D (296 Ng. Duy Hieu St.)

Analysis of the street cross-section

Figure 6 shows the street cross-section at the houses where the temperature measuring sensors were installed (vernacular houses A, B and modern terraced houses C, D). It is recognized that the width of Nguyen Duy Hieu street is larger than Tran Phu street. As mentioned in the introduction, the open streets will promote the movement of the air which enhances streets cooling better than narrow streets. In the old town, the movement of people on Tran Phu Street is basically by walking. With the number of tourists visiting Hoi An Ancient Town, it has become very crowded, so much so that the release of heat in the old town area is quite enormous. Conversely, the width of Nguyen Duy Hieu street is large, the sightseeing activities are not strong on this street and people use vehicles to travel, so that congestion is minimized and vehicles are rare on street. The Figure also provides information on the dimensions and relative proportions between the height of surveyed houses and the width of the road.

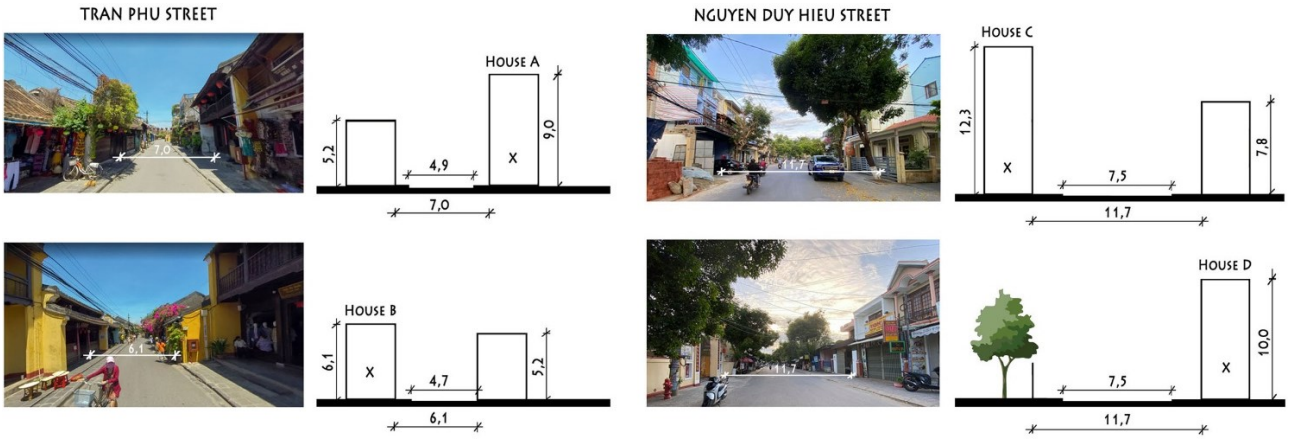

Figure 6. Cross-section of Tran Phu Street and Nguyen Duy Hieu Street

2.2 Field measurement work

The assessment of the impacts of urban morphology on indoor thermal conditions in this study is mainly based on indoor air temperature. Measurements were made by installing temperature sensors at similar locations in the four surveyed houses. These sensors are connected and transmitting data to an Arduino circuit. This Arduino is connected to Wi-Fi and continuously records the measurement parameters every two hours. The measurements were performed for one month. The temperature data obtained were compared with each other and with meteorological weather data, obtained from the Da Nang weather station (the nearest

meteorological station to Hoi An city, about 30 km away), in the same period. Da Nang meteorological station is located in Hoa Thuan Ward (near Da Nang International Airport). The location map of the measurement points is shown in Figure 2.

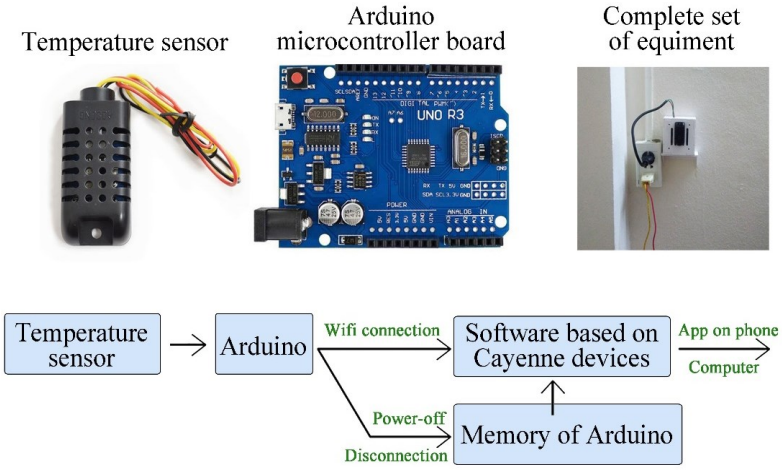

Figure 7. Instrumentation and their principle of operation.

The temperature sensor used is the AOSONG AM2301 sensor. The temperature range of the device is from -40 °C to 80 °C with a precision of ±0.5 °C. The Arduino microcontroller board used is Arduino Uno R3. The principle of operation of the temperature measurement works is described in Figure 7. In case of a power outage or loss of Wi-Fi connection, the data will be stored in Arduino's memory and updated later.

2.2.1 Positions of measurement stations

As mentioned earlier in section 2.1.1, there are four houses selected for installation and instrumentation. The first house is House A, located at 80 Tran Phu street in the old town area. This house was built in 1858 with a two-story. The house is 7.7 meters wide and 32.8 meters long. The main material of House A is wood including the main facade, pillars and frames. Particularly, the walls on both sides of House A are made of bricks. The roof is covered with yin-yang tile, a popular roof in Hoi An Ancient Town. House A is now the Museum of Trading Ceramics in Hoi An. The second house in the old town is House B at 129 Tran Phu street. House B dates over 180 years. The front part of House B (main building) is one-story with the wooden facade, while the rear part is two-storey building. The house is 7.2 meters wide and 44.2 meters long. Materials of pillars, frames, roofs, sidewalls are similar to those of House A. Due to the cultural influence of Chinese merchants migrating to live in commercial ports, these shophouses have a spatial organization similar to the traditional Chinese courtyard buildings (Han & Beisi, 2016). Vernacular houses A and B in Hoi An commercial port are examples of such shophouse cases.

House C is located at 259 Nguyen Duy Hieu street in the buffer zone old town. This is a three-story house built-in 2003. The size of the house is small with 5.6 meters wide and 11.6 meters long. The house was built entirely of bricks. The roof form is sloping and tiled according to the regulations of the Hoi An government for buildings located in the buffer zone. House D at 296 Nguyen Duy Hieu was built in 2014. This is a two-story house with dimensions of 4.3 meters in width and 24 meters in length. This house is built with bricks, sloping roof with tiles.

The temperature measuring device is located 3 to 7 meters away from the main door and at a 1.2-meter height above the ground. The main reasons for choosing this position are the following:

- The structure of a vernacular house in Hoi An is different from that of a modern terraced house. Vernacular houses, which have a long length, are divided into 3 building blocks along the length of houses. Conversely, the length of modern terraced houses is shorter. It is, therefore, necessary to find the device's locations so that they are equivalent between the two kinds of houses. In the vernacular house, measuring devices are put within the main building and in the modern house, they are put in the living room. The distance of 3 to 7 meters for the main door to avoid direct

sunlight on the device causes deviations when measuring the temperature. Another important reason is that the device needs to be mounted near the power supply.

● Temperature measuring device is located about 1.2 to 1.5 meters from the ground because if placed too close, the instrument will report the ground temperature. If placed too high, the temperature recorded will be skewed by height.

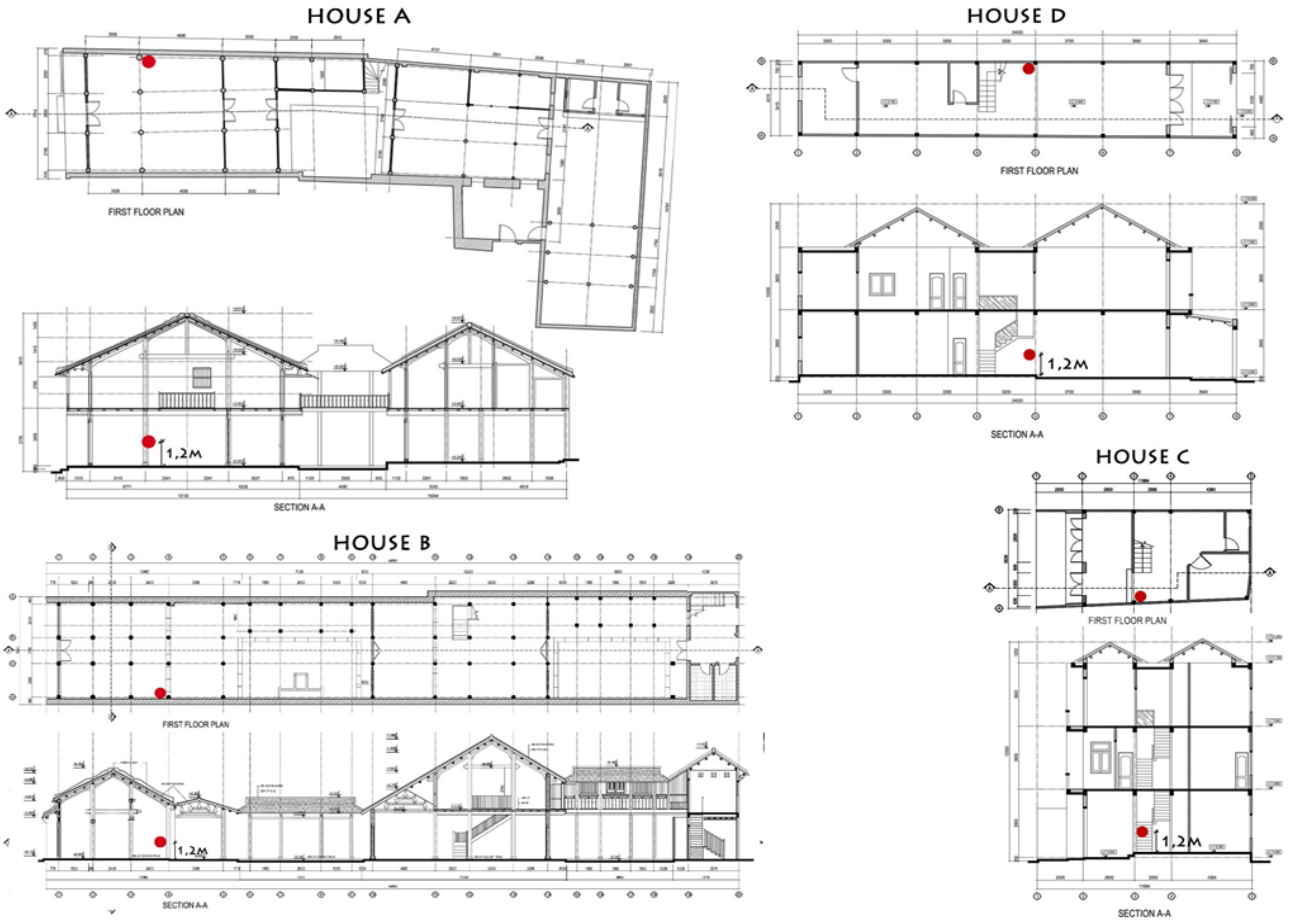

Figure 8. Location of temperature measuring devices in four surveyed houses

2.2.2 Measurement period

The measurement operation took place in June 2019 as earlier pointed out. June is recorded as one of the months with the highest average temperature in Vietnam. Therefore, the month of June is appropriate for monitoring indoor air temperature conditions as the outside air temperature rises significantly. Besides, 27th June has the highest average temperature in June (according to data from the Da Nang Meteorological Department). Hence, it is selected to investigate temperature variation every two hours at the surveyed houses.

3. Result and discussion

3.1 Variability of indoor air temperature at four measurement stations for one month

According to the measured data, this study introduces the average air temperatures at the four stations within one month. Figure 9 and Table 1 illustrate this measurement. Accordingly, numerical values in Table 1 include the measured average air temperatures at four stations, average air temperatures at Da Nang meteorological station, and their mean values (Tm). Observing Figure 9 shows that of the four temperature measurement stations, the average air temperature data at House A is the highest compared to the remaining houses and it is higher than the data obtained from the meteorological station from 1.5 °C to 3 °C. Following House, A is House C with

approximately the same temperature as House A. House B is the third-highest average house temperature and most of the days, it is lower than Houses A and C by about 1.5 °C. In particular, it can be seen that the air temperature variation for houses A and B are the same as those in the meteorological station. House D is the house with the lowest average temperature background and the lowest temperature fluctuation range amongst the four houses.

Nguyen, et al. (2011), pointed out that vernacular houses have adjusted quite well to the local climate conditions where they are located. Utilizing natural ventilation, shading solutions, construction orientations and building shapes are important criteria to decrease indoor temperatures. Vernacular houses A and B with a courtyard in the center of the house contribute to the horizontal natural ventilation. Besides, using traditional materials such as wood and yin-yang roof tiles will limit the absorption of heat for the building envelope more than other materials such as concrete, bricks, and glass used for modern houses. In terms of architectural form, vernacular houses have an advantage over modern houses in creating a comfortable indoor temperature environment. However, this temperature survey showed the opposite result. It can be explained that, in addition to the impact of architectural form, indoor temperature conditions are also affected by urban morphology. According to the analysis in section 2.1.2, there are some disadvantages in the old urban area such as narrow streets that restrict air circulation, lack of greenery that increase the ground temperature and display goods that take up horizontal ventilation space for housing. On the contrary, modern houses C and D are located on an open road with many trees, reducing the impact of sunlight on the roof and road surface showing that limiting heat build-up increases the air temperature.

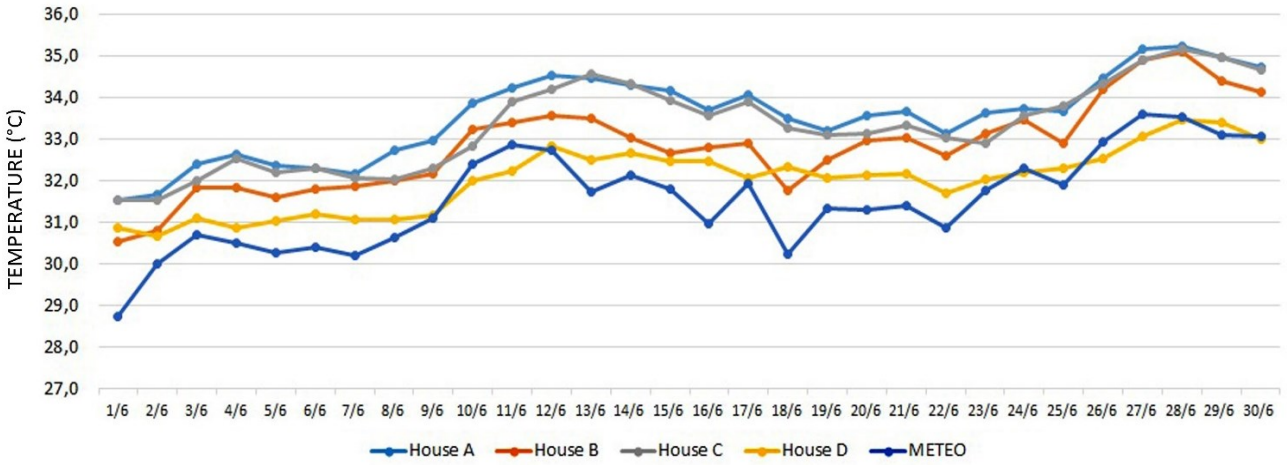

Figure 9. Graph of measuring the average air temperature at four stations compared to the temperature recorded by the Da Nang Meteorological Station in one month.

3.2 Variability of indoor air temperature at four measurement stations for one day

It is easy to see that the air temperatures obtained at the four survey stations is higher than the temperatures recorded at the meteorological station from after the 18h to 07h next day (Figure 10). For station at House A, the measured air temperatures are higher than those recorded by the Da Nang Meteorology Station from 17h to 07h30 the next day. For station at House B, the increase in temperatures appears from 15h to 08h. For Station at House C, the observed increase in temperature is from 17h to nearly 09h the next day. For station at House D, the increase in temperature is from 18h to 07h. Looking at Table 2, we see that the 24 hours mean values of temperature (Tm) of the meteorological station is lower than the mean values of temperature of houses A, B and C from 1.2 °C to 1.4 °C, and higher than the mean values of temperature of House D is about 0.5 °C. Discrepancies in temperature after 17h to 07h the next day at four houses and the meteorological station fluctuated between 1.3 °C and 5.1 °C (as shown in Table 3). This can be explained by the increase in traffic activity (working time off in the afternoon is from 16h30 to 18h) and the temperature absorption characteristics of surfaces such as roads,

pavements, walls, and roofs. The amount of heat absorbed by the building materials during the day dissipates heat to the surrounding air at night, resulting in the increase in indoor temperature.

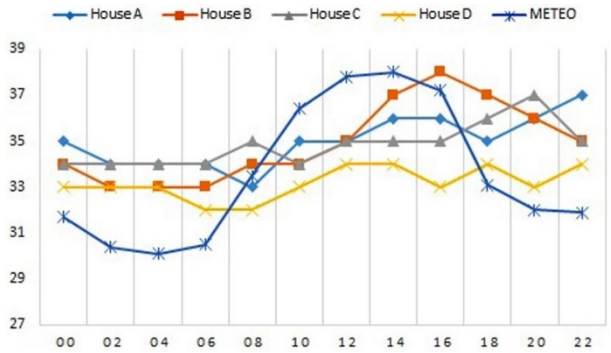

Figure 10. Comparison of temperature variation in 27th June 2019 between four temperature station and the meteorological station

According to Table 2, the maximum temperature obtained by a meteorological station is 38 °C at 12h to 14h. Meanwhile, the temperature at House A also increases sharply from 14h to 16h and reaches its maximum at 22h. The maximum temperature at House B is 38 °C at 16h (both Houses A and B have a time lag of two hours compared to the meteorological station). When air temperatures rise, the housing indoor temperature also increased rapidly thereafter. This can be explained by the fact that the narrow road in front of houses A and B has limited the movement of air and enhanced the accumulation of long wave radiation that increase the temperature of this area and buildings. Meanwhile, with the open street, air movement is enhanced but long wave radiation is minimized; hence the indoor temperature of House C reaches a maximum of 37 °C at 20h, with a time lag of six hours compared to the time of maximum temperature at the meteorological station. After reaching the maximum temperature of the meteorological station (14h), the indoor temperature in House D changes according to the Sine graph and the difference between T max and T min is only one degree Celsius. At 22h, when the meteorological station temperature has dropped significantly and the indoor temperature of surveyed houses still high at the same time. House A has a temperature of 37 °C, which is higher than House D (4 °C). House B and House D have the same temperature of 35 °C. This is due to the impact of heat radiation which has been absorbed in the daytime from buildings and roads. From 0h to 6h the temperature at the meteorological station decreases by about two degrees Celsius. However, at the four surveyed houses, the indoor temperature is stable or reduced by one degree Celsius from 00h to 02h and continues to maintain this temperature thereafter.

Table 1. Measured air temperatures for Figure 9 and their mean value Tm.

DAY	House A	House B	House C	House D	METEO
1/6	31,5	30,5	31,5	30,9	28,7
2/6	31,7	30,8	31,5	30,7	30,0
3/6	32,4	31,8	32,0	31,1	30,7
4/6	32,6	31,8	32,5	30,9	30,5
5/6	32,4	31,6	32,2	31,0	30,3
6/6	32,3	31,8	32,3	31,2	30,4
7/6	32,2	31,9	32,1	31,1	30,2
8/6	32,8	32,0	32,0	31,1	30,7
9/6	33,0	32,2	32,3	31,2	31,1
10/6	33,9	33,3	32,8	32,0	32,4
11/6	34,3	33,4	33,9	32,3	32,9
12/6	34,5	33,6	34,2	32,8	32,7
13/6	34,5	33,5	34,6	32,5	31,7
14/6	34,3	33,0	34,3	32,7	32,1
15/6	34,2	32,7	34,0	32,5	31,8
16/6	33,7	32,8	33,6	32,5	31,0
17/6	34,1	32,9	33,9	32,1	32,0
18/6	33,5	31,8	33,3	32,3	30,2
19/6	33,2	32,5	33,1	32,1	31,3
20/6	33,6	33,0	33,1	32,1	31,3
21/6	33,7	33,0	33,3	32,2	31,4
22/6	33,1	32,6	33,0	31,7	30,9
23/6	33,6	33,1	32,9	32,0	31,8
24/6	33,8	33,5	33,6	32,2	32,3
25/6	33,7	32,9	33,8	32,3	31,9
26/6	34,5	34,2	34,3	32,5	32,9
27/6	35,0	34,9	34,8	33,2	33,6
28/6	35,3	35,1	35,2	33,5	33,6
29/6	35,0	34,4	35,0	33,4	33,1
30/6	34,8	34,1	34,7	33,0	33,1
Tm	**33,6**	**32,8**	**33,3**	**32,0**	**31,6**

Table 2. Measured air temperatures for Figure 10

Hour (h)	House A	House B	House C	House D	METEO
00	35	34	34	33	31,7
02	34	33	34	33	30,4
04	34	33	34	33	30,1
06	34	33	34	32	30,5
08	33	34	35	32	33,5
10	35	34	34	33	36,4
12	35	35	35	34	37,8
14	36	37	35	34	38,0
16	36	38	35	33	37,2
18	35	37	36	34	33,1
20	36	36	37	33	32,0
22	37	35	35	34	31,9
Tm	**35,0**	**34,9**	**34,8**	**33,2**	**33,6**

Table 3. Temperature discrepancies between the air in four surveyed houses (TsA, TsB, TsC and TsD) and meteorological temperatures (Tmt)

Hour (h)	TsA - Tmt	TsB - Tmt	TsC - Tmt	TsD - Tmt
00	3,3	2,3	2,3	1,3
02	3,6	2,6	3,6	2,6
04	3,9	2,9	3,9	2,9
06	3,5	2,5	3,5	1,5
08	-0,5	0,5	1,5	-1,5
10	-1,4	-2,4	-2,4	-3,4
12	-2,8	-2,8	-2,8	-3,8
14	-2,0	-1,0	-3,0	-4,0
16	-1,2	0,8	-2,2	-4,2
18	1,9	3,9	2,9	0,9
20	4,0	4,0	5,0	1,0
22	5,1	3,1	3,1	2,1

4. Conclusions

Through field surveys, it can be seen that the urban morphology in the old town and the old town buffer zone has its advantages and disadvantages. Experimental work was conducted to evaluate the impact of different urban morphologies on indoor temperature conditions. Vernacular houses A and B are rated as environmentally adaptable, providing comfortable indoor temperature conditions. Modern terraced houses, especially House C is small, not well-ventilated, and the temperature measuring device is located near the kitchen area. However, the temperatures inside vernacular houses A and B are approximately the same as those in modern terraced Houses C and significantly higher than House D in a monthly survey. For a day temperature survey, at the time the temperature of the meteorological station reaches the highest value (from 10h to 16h), the indoor temperature of House C and House D will only increase slightly then stabilize or decrease. In contrast, the temperature at houses A and B is increasing sharply, at this time, the temperature discrepancies between the two old houses and the two modern terraced houses are from 1 to 5 degrees Celsius. From these shreds of evidence, it can be stated that urban morphology forms the street pattern that influences the variation of indoor temperature. Open streets will promote air movement that lowers the temperature of horizontal surfaces such as roofs and road surfaces. Road covering material in the old town area and the old town buffer zone are both asphalts. Therefore, the shading should be enhanced such as with canopy trees, vegetation to limit the absorption of heat and radiation back to the surrounding. Limiting construction density is also a factor contributing to better regional temperature control. Likewise, increasing the use of traditional local materials with good thermal performance instead of modern materials such as corrugated iron, concrete and glass improves indoor temperature.

The drawback to this study is reflected in the fact that there is no specific statistic of cooling devices (fans) used at measurement locations in the 4 surveyed houses. Also, the measurement of outdoor air temperature at the surveyed housing locations would have enhanced the credibility of this paper. Future studies can improve on this.

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Conflict of interests

The authors declare no conflict of interest.

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Original scientific paper

Community Participation in Decision Making Processes in Urban Planning: The Case of Kaunas

M.A. **Laura Jankauskaitė-Jurevičienė**, Dr. **Aušra Mlinkauskienė**

[a and b] Kaunas University of Technology, Civil engineering and architecture faculty, Kaunas, Lithuania
Email [1]: laura.jankauskaite-jureviciene@ktu.lt , Email [2]: ausra.mlinkauskiene@ktu.lt

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ABSTRACT

Participation in decision-making processes foreshadows enabling citizens, communities, non-governmental organizations and other interested parties to influence the formulation of policies and laws affecting them. The purpose of this study is not only to review Lithuanian legal documents but also to analyse recent processes in Kaunas city planning. Kaunas city is undergoing various urban processes, which do not always meet the needs of the community. This study presents an analysis of the forms of community involvement in the urban planning processes and survey data on the effectiveness of community involvement. The methodology requires using a sociological survey with representatives of the city community and a comparative analysis between legal obligations and actual urbanization process.

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1. Introduction

Public participation has become an important topic of governance in the 20ttcenturyArnstein in 1969 described public participation as follows: "The idea of citizen participation is a little like eating spinach: no one is against it in principle because it is good for you". In her article, the author describes the influence of society in government decision-making as a ladder, where at the bottom of the ladder are Manipulation (first step) and Therapy (second step), at the topmost - (seventh step) are Delegated Power and (eighth step) Citizen Control (Arnstein, 1969). Today, planning theorists and practitioners actively advocate public participation in spatial planning. Accordingly, Marcus Lane observed that government has been replaced by governance (Marcus, 2005). Activity, due to public participation, is driven by theoretical

***Corresponding Author:**
Kaunas University of technology, Civil engineering and architecture faculty, Kaunas, Lithuania
Email address: laura.jankauskaite-jureviciene@ktu.lt

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and practical reasons. In practice, public participation is the key of the democratic process. This makes government institutions accountable to the society, enables it to incorporate non-professional knowledge into decision-making, improves public policy support and improves planning outcomes. Participation in itself is valuable as a political goal, as it increases social capital and gives citizens more opportunities when they want a stronger voice in decision-making.

Lithuanian researchers examine the issue of public participation both on a theoretical (legal basis) and on an empirical basis (Bardauskienė, 2007; Jakaitis, 2005; Cirtautas, 2011). However, the activity of society in political life and decision-making is more often examined (Merkys, 2020). In the field of urban planning, the attitude of the population in the formation of urban architecture, the activity of the society in the consideration of urban plans, and the causality of the passivity of the society are most often examined. Examining the articles of foreign authors on sociological research related to public participation, it is noticeable that the connections with certain social aspects are usually examined. Most authors have studied community participation through social and demographic factors and less analysis of the impact of social and physical variables on a given problem (Bottini, 2018).

This article discusses short historical development and the main spatial planning documents related to public participation in spatial planning processes in Lithuania, and the opportunities for residents to express their views and make suggestions on the projects. A pilot sociological survey was conducted using community social networks to find out how active and involved the population is in Kaunas city spatial planning processes. The survey aim was also to understand the activity of the social network, its main audience and the rational for this type of audience.

2. Materials and Methods

A pilot study was conducted to analyze public participation in spatial planning by literature analysis and spatial planning documents, raising a hypothesis, conducting the research and drawing conclusions. An analysis of the literature and documents is provided in chapters 3.1 and 3.2. The results of the study are presented in chapter 4 and the conclusions and suggestions in chapter 5.

Historical analysis of public participation in spatial planning was performed to find out the development of involvement in decision-making, historical stages, implemented reforms and their impact. The analysis of the most important documents describing the public participation in the territorial planning processes was performed to find out the ways, means and emerging problems of public involvement in the territorial planning processes in Lithuania.

Non-random convenient selection, voluntary sampling was used for the sociological survey. Data were collected using social networks vis-a-vis: i). Facebook, by submitting a survey on multiple community accounts and sharing the profile through personal accounts. This method of data collection was used purposefully to find out who and the extent of those active in social networks and how much they are interested in territorial planning problems. Before the survey, it was hypothesized that Kaunas city residents were very little interested in participating in the spatial planning processes.

The following sociodemographic variables were examined in the study: Gender, Age, Education, Occupation, Community activities and Place of residence. Analysis in this study is quantitative and Quantitative analysis and IBM SPSS was used for the analysis. The level of statistical significance was defined as $p < 0.05$.

3. Historical and document analysis of public participation in spatial planning

3.1. Historical analysis of public participation in spatial planning in Lithuania

Changes in the territory of Lithuania are closely related to the political, economical, social and other factors. These factors have a direct impact on the spatial structure of the landscape. Lithuania has undergone many land reforms over the centuries, but land reforms in the last few centuries are of particular importance. According to the Wallachian reform (16th century), the land of all manors was declared as the complete property of the Grand Duke and was combined into one area measured into the Wallachians (about 21.38 ha). The villages were organized and distributed, a three-field system was established. As part of the land reform, towns and church villages were established, manor houses, street-planned and scrappy

villages, residential areas were also connected with the road network (Jankauskaitė-Jurevičienė, 2016).

From the middle of the 19th century until the middle of the 20th Lithuania territory was managed and used as an individual farming system. At the time of these reforms, public participation in land management was not possible, because land management was sorely within the jurisdiction of the nobility.

The annexation of Lithuania in the 1940s by the Soviet Union began the destruction of traditional, cultural and spiritual values and the creation of new political-social structures - collective farms. During the Soviet land reform, private land was nationalized, after which manors and small individual farms disappeared (Jankauskaitė-Jurevičienė, 2016). Thus, the period from the 1940s until 1991 is the collective farm period (Jankauskaitė-Jurevičienė, 2016). Spatial planning activities between 1950-1965 in Lithuania involved the planning of individual objects in a territory and later the planning of administrative district schemes and settlements and industrial objects which were regulated by centralized state administration bodies. It was only after the 1970s when the complexional natural protection scheme and other spatial planning documents were prepared that the management of the territory of Lithuania can be called complex and linked to the management of the whole country (Gurskienė, 2008). However, public participation was not possible in territory planning because of the policies of the Soviet Union.

After the Restoration of the Republic of Lithuania which was March, the rights and obligations of the state and municipal institutions were established on December 12, 1995, by the Law of Territory planning. This law also established the rights and obligations of natural and legal persons in the planning processes. The objectives defined in the Law on Spatial Planning of the Republic of Lithuania are: i) to balance the development of the territory; ii) to create a healthy environment and equal living conditions; iii) to formulate territorial development policy; iv) to preserve, rationalize the use and restore natural resources, natural and cultural heritage values, and maintain or restore ecological balance; v) encourage investment for socio-economic development; vi) harmonize the interests of the public, non-governmental and governmental organizations regarding the conditions for the use of the territory and land plots and the development of activities in Lithuania territory (Law on Spatial Planning of the Republic of Lithuania, 1995, 2019). Thus, spatial planning is a complex process that combines the interests of the groups interested in spatial development, the needs of society and the protection of the environment.

Major changes in the regulation of spatial planning took place in 2014 and are valid until now. The new regulation aims at simplifying, accelerating and improving the spatial planning process. With the creation of the new spatial planning system, new levels of this planning were established, the principle of parcel planning was abandoned and the projects of land holdings were removed from the system of spatial planning documents. Therefore, it is very important to identify the existing problems in the context of spatial planning, to solve them and not to repeat them in the future (Valstybinio Audito Ataskaita, 2019). In 2020, by the principles of spatial planning currently in force, a new state master plan should be drawn up, which should determine the directions and priorities of spatial development. Following this strategic document, efforts will be made to coordinate various activities in the country: agriculture, tourism, business, cultural heritage protection and infrastructure. To prevent this document from becoming formal, it is necessary to ensure its proper implementation, especially in the field of public participation.

3.2 Documents defining public rights

The Constitution of the Republic of Lithuania enshrines the aspiration of the nation to create an open, just and harmonious civil society. Since the right of any society is to have their convictions and to freely express them as guaranteed by the Constitution, this same is enshrined in the Constitution of the Republic of Lithuania in 1992. It is also noticeable that the Lithuania municipal institutions are remote from the majority of the society and often the decisions they make do not meet the needs and interests of the society even if their participation were involved in the preparation of territorial planning documents as defined by the different laws: Law of the Republic of Lithuania on Territorial Planning (Seimas, 2004), Regulations on public information, consultation and participation in spatial planning decisions (Regulations on public information,1996).

Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters adopted on Aarhus Convention (Ekonomikos komisijos Konvencija, 2001). Certain planning documents for urban problems and their management of urban, social and economic development are widespread in European countries (*area-based initiatives*, *neighbourhood strategies, urban development programmes*). These documents are usually advanced examples of harmonious cooperation between local or national/regional authorities and local people (Cirtautas, 2011).

To ensure public participation in the implementation processes of spatial planning in Lithuania, there is a legal obligation to make public all spatial planning documents under preparation. The public shall be given access to get acquainted with the document under preparation stage, submit proposals and comments.

Territorial planning audit control report (2019), which aim to assess whether the system is in place to ensure an effective spatial planning process, provides facts about public participation in spatial planning. According to the data from the restoration of Independence of the Republic of Lithuania in 2019, 73400 territorial planning documents were registered in the spatial planning documents (approximately 2400 documents are registered annually) (Figure 1). This report showed that 12% of spatial planning documents, prepared in Territorial planning documents preparation and territorial planning process state supervision information system (TPDRIS) of the Republic of Lithuania, did not properly pass the final stage publicity procedures (State Territorial Planning and Construction Inspectorate,2020). It is also noted that over 50% of project publicity procedures took place after the approval of the spatial planning documents (Valstybinio Audito Ataskaita, 2019).

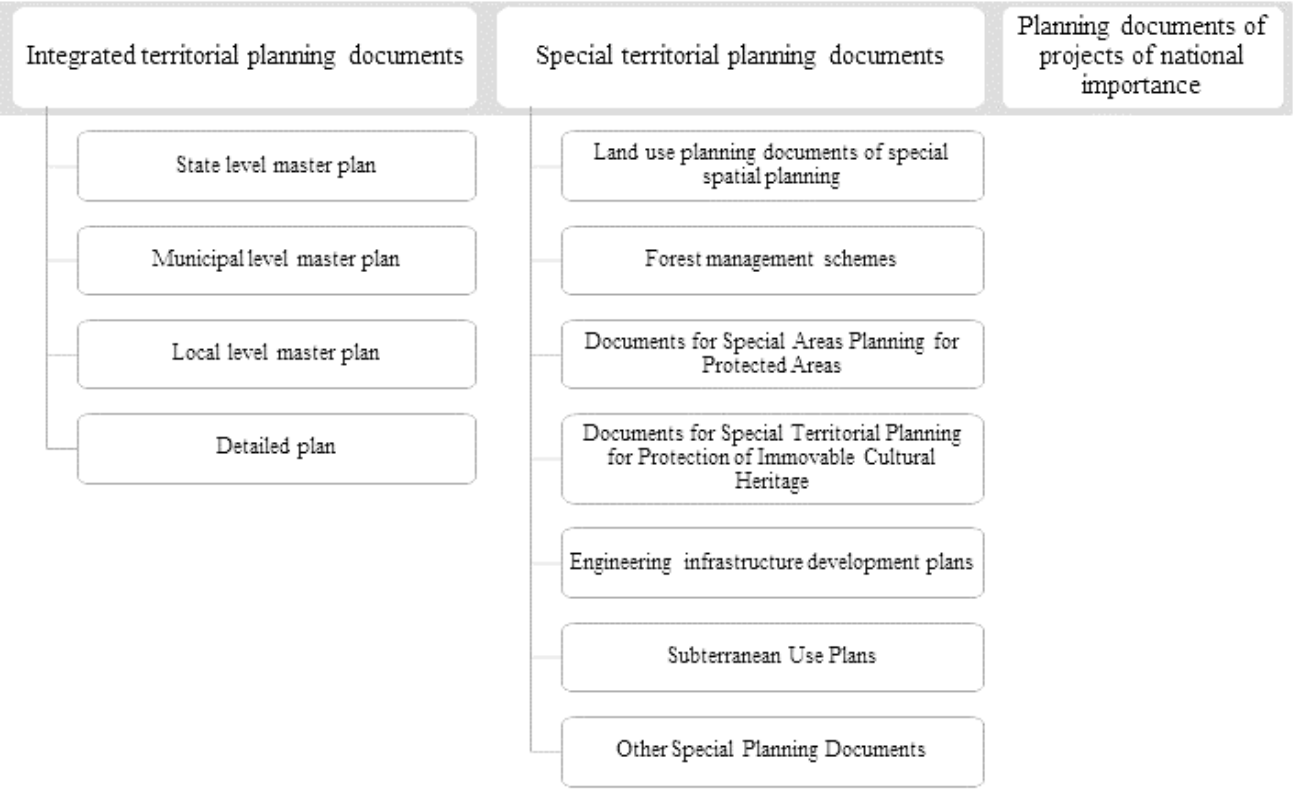


Figure 1. Classification of Territorial Planning Documents.

Several amendments were made regarding the Law of the Republic of Lithuania on Territorial Planning, which came into force in 2014 before it was adopted. The amendments were based on the necessity to speed up the planning and construction of territories, open the way for investments and to reduce the procedural burden on business. The new version of the law was drafted under intense business pressure from public authorities. This

social group welcomed the changed regulation in a very positive way. The question, therefore, arises whether the introduction of such business-friendly legal regulation has left the safeguards in place to ensure that the interests of other segments of society are not prejudiced during spatial planning (Lastauskienė & Bakšienė , 2015).

Following the adoption of the new version of the Law of the Republic of Lithuania on Territorial Planning, many changes have been made to the public's ability to participate in spatial planning. The analysis of Articles 33, 34, 35 of this law and the subordinate legal acts show that in the sphere of public information and participation in spatial planning, the terms of public information and submission of proposals were halved (presumably to speed processes), and only the master drawing, the ad serving in local newspapers was abolished and the information moved to the webspace (i.e. made available only for targeted search). Besides, only registered landowners and land users whose access rights are restricted by the special land use conditions set out in the detailed plan decisions shall be informed by registered mail. To sum up, the concept of a "marginal norm" under which the public can expect to defend an extremely narrow range of interests, defined by specific provisions, and thus unregulated by law, even though existing and the interests of the principle of sustainable development remain outside the remit of legal protection (Lastauskienė & Bakšienė, 2015). Significant restrictions on public participation in the area are also reinforced by another innovation – distinction between projects of national importance. Although the public is involved in these planning processes in some form, the status of such object is granted by government resolution without informing the public or their representatives. The new legal regulation created a situation in which the municipalities were left responsible for the implementation of an independent function - spatial planning, limiting the possibility for them not to approve spatial planning solutions, which creates preconditions for questioning the constitutionality of such regulation (Figure 2).

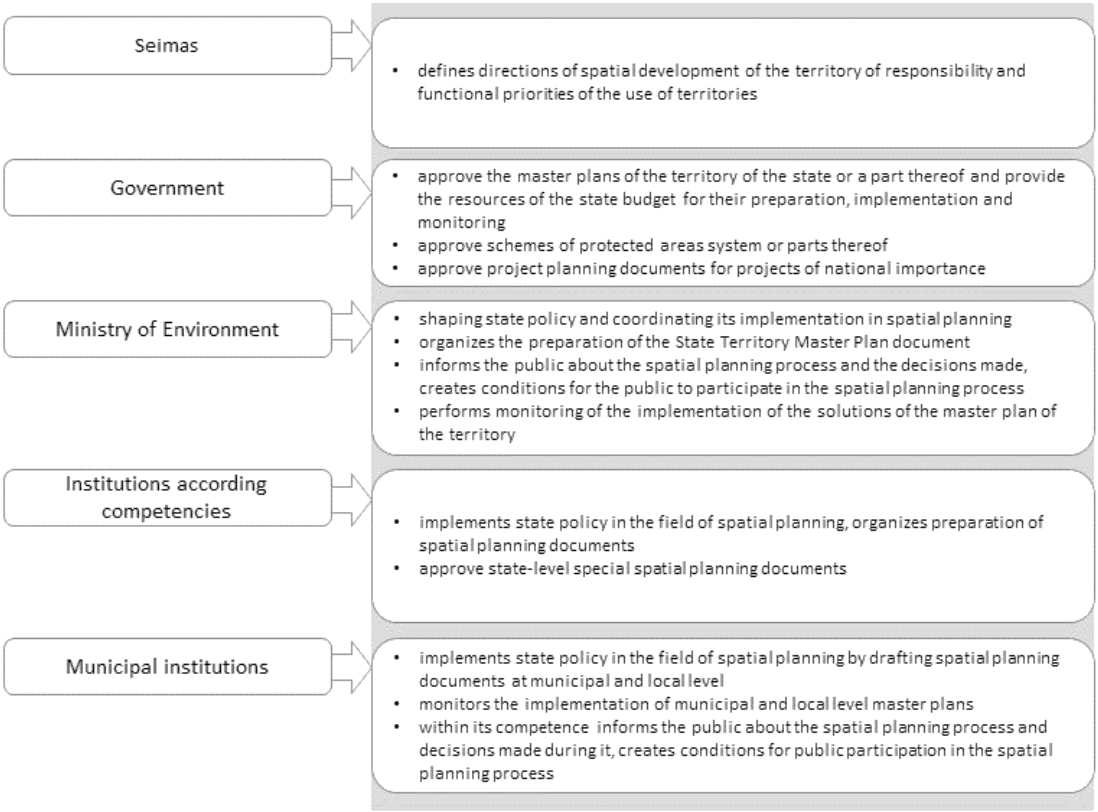


Figure 2. The main institutions involved in the formulation and implementation of spatial planning policy.

According to Cirtautas, society is involved in urban planning processes in the following ways: i) only by informing it (lowest level), ii) in consultation with it, and iii) allowing its members to participate directly in decision-making (highest level). An analysis of the legal acts regulating the territorial planning of the Republic of Lithuania shows that only the first two possibilities of public involvement are mentioned in them (Cirtautas, 2011).

The regulations for information, consultation and participation in spatial planning establish general and simplified procedures for the publication of spatial planning documents, taking into account the type and level of the spatial planning document. The regulations are binding on state and municipal institutions and bodies, legal and natural persons involved in the process of preparation of the spatial planning document, except for territories necessary for national defence purposes (Regulations on public information,1996). For these regulations, the following procedures shall be made public for the preparation of spatial planning documents: provision of information to the public on the commencement of spatial planning and planning objectives, planning work program; getting acquainted with prepared territorial planning documents; consultation of competent interested organizations or the public concerned; submission and examination of proposals; public discussion of the spatial planning document (Figure 3).

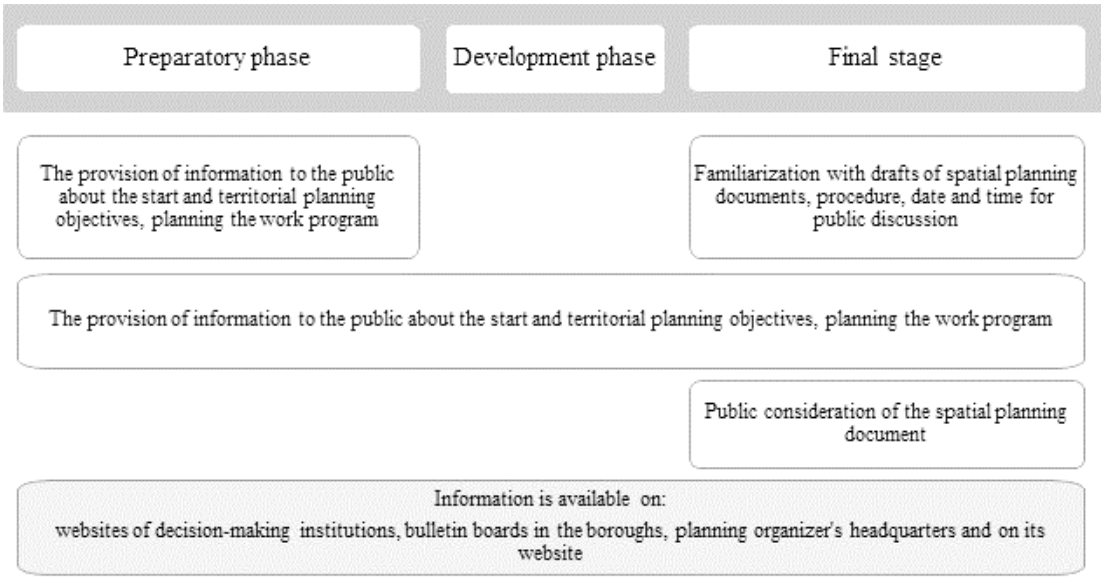


Figure 3. Spatial planning documents publicity procedures.

The Aarhus Convention: links environmental rights with human rights; emphasizes the responsibilities of all of us to future generations; states that sustainability is only possible with the involvement of all stakeholders; states that environmental protection is the government responsibility; focuses on democratic communication between the public and governmental institutions. Each country that has ratified the Convention shall guarantee the rights of access to information, public participation in decision-making, and access to justice in environmental matters (Ekonomikos komisijos Konvencija, 2001).

4. Community engagement in decision-making processes in Kaunas urban planning

Kaunas is the second-largest city in Lithuania in the central part of the country, at the confluence of rivers Nemunas and Neris. Kaunas is an important centre for industry, transport, science and culture. The population of Kaunas exceeds 286 thousand (Kaunas, 2019). Currently, many construction projects of various purposes are being carried out in Kaunas. According to the data of 2017, tangible investments by economic activities for real estate operations exceeded 20% (Kaunas, 2018).

Public participation in spatial planning can take many forms and for different reasons.

Participation strategies and means of participation also vary and are highly dependent on who organizes the participation and for what purposes. Public participation can take the form of constructive cooperation with planners and local authorities to improve spatial planning projects, or it can be a contradiction in terms of simply rejecting all planning proposals from planners and local authorities. Ideally, public participation should lead to results that are in the best interests of as many participants in the planning process as possible, not just one stakeholder group (European MSP Platform, 2014). To find out the involvement of the public in the decision-making of spatial planning documents, a survey involving 44 respondents was carried out. The questionnaire was distributed to Kaunas communities using social networks. The survey consists of few main research constructs: clarification of personal attitudes to participation in spatial planning processes and attitudes towards Kaunas city residents' participation and approach to municipal action in the process of adopting spatial planning documents. Of the 44 respondents, the distribution in the age groups 30-40, 41-50, 51-60 was almost even, respectively: 25, 30 and 27%. Interestingly, that 18-29-year-old persons, which according to Lithuanian law correspond to young adults, indicates absence between the respondents; respondents, aged 61 and over, were 20%. The majority of respondents were women (73%). It is noteworthy, that by education about 88% of respondents are from higher education – 68% of respondents are university graduates and 20% are college graduates. By occupation, 40% of respondents are specialists and 16% - public servants. 3 respondents are the chairpersons of the communities (community - residents of a municipal residence connected with the common needs and interests of neighbourhood living, usually with the status of a public body), 2 respondents are sub-eldership leaders (elected representatives of the community or part of the community with statutory rights and duties) and 16 respondents (36%) identified themselves as active members of the community. The majority of the respondents (64%) consisted of residents of Šančiai eldership (the smallest current administrative-territorial unit in Lithuania, introduced by the Law on Local Self-Government of 7 July 1994. Kaunas consists of 11 elderships - Aleksotas, Centras, Dainava, Eiguliai, Gričiupis, Panemunė, Petrašiūnai, Šančiai, Šilainiai, Vilijampolė, Žaliakalnis) and 12% - the inhabitants of Aleksotas. About 22 thousand people live in Šančiai eldership. It accounts for ~ 6.9% (Šančių, 2016) of the total population of Kaunas city, while Aleksotas population is 20 thousand, which is 6.4% (Aleksoto, 2019) of Kaunas city population. None of the respondents was from the Center, Petrašiūnai or Vilijampolė elderships, and the number of respondents from other elders did not exceed 5%. Such activity of residents of one eldership in answering the questionnaire may be based on 2019 spring disputes with Kaunas Municipality regarding the planned new street in the recreational territory along the Nemunas River. The residents of this eldership actively participated in discussions with the representatives of the municipality to seek the amendments, which were rejected by the municipality, in the general plan of Kaunas city. To the question "How active are you personally in expressing your opinion or making suggestions to the municipal authorities in the preparation of spatial planning documents?" 39% of the respondent's stated that they are neither passive nor active. However, even more than a third of respondents said they are active (27%) and very active (9%). In finding out the relationship between gender and activity in the community, it was observed that the percentage of responses between the different genders by activity was very similar: 50% of the male gender asserted they were inactive and 50% opined that they were active. Accordingly, the female gender rated their activity as follows: 53.1% inactive and 46.9% - active. Respondents had to rate their activity level on a 5-point Likert scale. The result obtained by calculating the average personal activity assessment and comparing it between the genders using the T-test showed that there is a very small difference between the groups in the assessment of their activity (average for male – 3, 0833, and for female – 3, 1250). To the question, "Do you have enough information about the spatial planning decisions made in the municipality?" as much as 84% replied that the information is too limited. Moreover, in sourcing information on spatial documents, the question "From what sources do you learn about the projects or decisions being considered in the municipality?" was considered. Respondents were able to select

several answer variations, but the vast majority (86%) noted that social networks (eg. Facebook) are the most popular source of information. Respondents also answered that they search for information on spatial planning objects on the municipal website (32%) and ask active community members (50%). Only 5% of the respondents ask the municipality about the issues of spatial planning they are concerned with and none of the respondents replied that they received information about it from the eldership. It was noticed from the survey that Kaunas city residents are equally concerned with personal residential and urban spatial planning problems, but most often, they do not discuss these problems with decision-making bodies, but with friends and acquaintances (89%). From the graph below (Figure 4), it can be seen that respondents use social networks more often in communicating with municipal representatives on spatial planning documents than participating in project presentation or interviewing authorities. Furthermore, considering that 46% respondents stated that they did not speak with municipal representatives or submit requests/complaints to the municipality regarding territory planning documents, it can be argued that most respondents only express their views in an informal environment that does not influence spatial planning decisions.

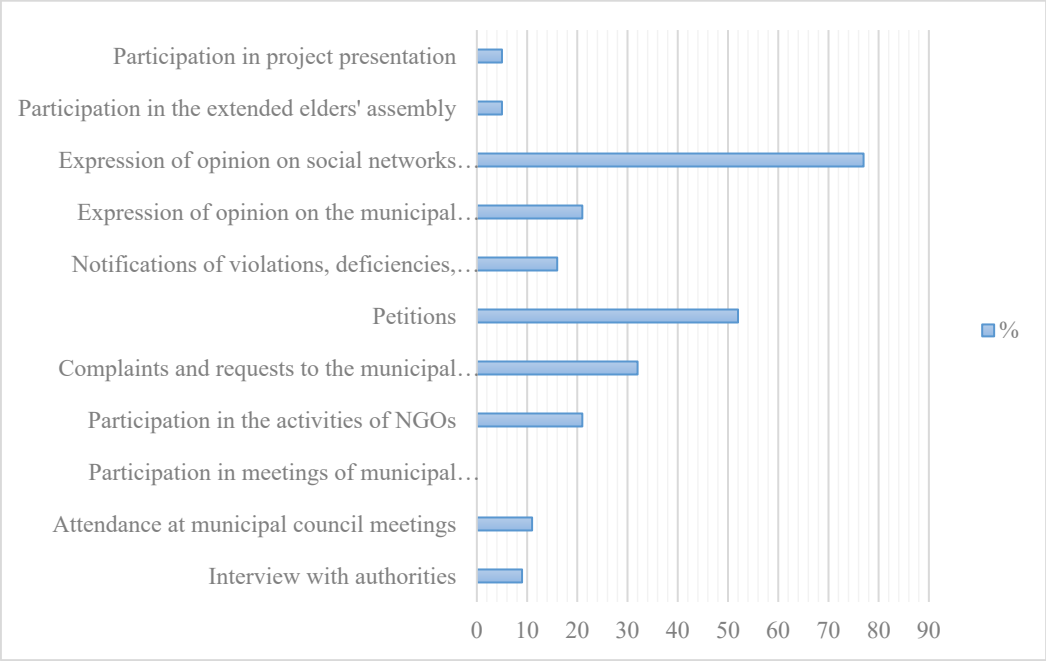
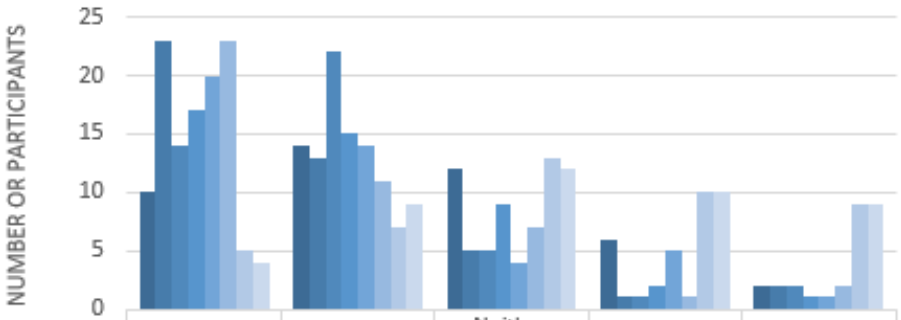


Figure 4. Communication techniques with the municipality used over the last 12 months.

The majority of respondents believe that Kaunas residents are active in seeking to express their opinion or submit proposals for spatial planning documents to municipal representatives (52%), however, it is not possible to say that the majority of Kaunas city residents think so, as the majority of respondents are residents in one eldership. Probing into respondents' opinion on the reason's citizens do not participate in public decision-making, it was noticed that disillusionment with self-government is prevalent, as participation is not expected to change anything (75%), they also do not trust their knowledge - 54% and 66% respondents think that most citizens lack information on spatial planning processes. Some respondents also chose answers that indicate a lack of personal interest – 36% have no time for that, or 18% considers that it is uninteresting to the population. Only 5% of respondents believe that citizens do not participate in public decision-making because they trust the decisions of council members. Figure 5 below sshow respondents' views on the involvement of citizens in decisions on spatial planning documents.



	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally agree
The law provides sufficient opportunities for public participation in decision-making	23 %	31 %	27 %	14 %	5 %
The municipality is interested in cooperation with the population	53 %	29 %	11 %	2 %	5 %
The information provided by the municipality on decision making is clear and easy to understand	32 %	50 %	11 %	2 %	5 %
The municipality respond to the opinion of the citizens	39 %	33 %	21 %	5 %	2 %
Citizens have sufficient information on the opportunities to participate in decision-making	46 %	32 %	9 %	11 %	2 %
Citizens trust in municipality decisions	53 %	25 %	15 %	2 %	5 %
Citizens have sufficient competence to participate in decision-making	11 %	16 %	29 %	23 %	21 %
Citizens have the skills to participate in decision-making	9 %	21 %	26 %	23 %	21 %

Figure 5. Respondents 'opinion about the citizens' participation in territorial planning document solutions (Survey data).

The statements were formulated according to two research constructs: trust in the municipality and law and the respondents' confidence in their knowledge. Respondents consider that the municipality is not interested in cooperation with the population and the information provided by the municipality is not clear and easy to understand. Nevertheless, even if the municipality does not respond to the opinion of the citizens, according to the respondents, citizens have sufficient information on the opportunities to participate in decision-making and they trust in municipality decisions. From the responses regarding self-confidence, it is observed that respondents, though in doubt, agree that they have sufficient competence and skills to participate in decision-making. Indeed, more than half of the respondents believe that municipality should not only educate the public about ways and opportunities to participate in public decision-making, but also give advice and take greater account of public needs and wishes before making decisions.

The majority of the respondents believe that there is an intense need (84%) or need (9%) for cooperation between the municipality and citizens in making decisions on spatial planning documents.

After conducting a statistical survey on whether there are relationships between the respondents of different education and the evaluation of the actions of the municipality it was observed that education is not significantly related to respondent's attitude to work in the municipality at 95% significant level.

To examine the relationship between gender and attitudes towards the average evaluation of municipal actions and the average evaluation of citizens' abilities, a T-test was also performed. The group statistics show that there is a very small difference between the average of the groups in the evaluation of municipal

actions and the average value of citizens' abilities evaluated. The average assessment of the municipality is 2.03 for male gender and 1.9 for the female gender and the average assessment of citizens' abilities is almost equal to 2.5 (ale) and 2.54 (female) respectively.

5. Discussion and conclusions

The influence of society on government decision-making has been discussed since the 20th century. Today, various forms of governance are united by the need to directly and centrally involve citizens, non-governmental organizations and social movements in policy-making and implementation. Lithuanian researchers often simply examine the activity of society in political life and decision-making. In the field of urban planning, the attitude of the population in the formation of urban architecture, the activity of the society in the consideration of urban plans and the causality of the passivity of the society are most often examined. The main spatial planning documents of Lithuania were adopted after the restoration of independence and especially from 1992. Spatial planning documents have changed several times in Lithuania for 30 years. Major changes in spatial planning took place in 2014 and are still valid. This update was intended to simplify, speed up and improve the spatial planning process, the new levels of spatial planning and to show that the principle of individual site planning has been abandoned. To ensure public participation in the processes of implementation of spatial planning in Lithuania, institutions of various levels are legally obliged to make public all spatial planning documents being prepared. The main players in this process are the Ministry of Environment of the Republic of Lithuania and the municipalities of cities and districts, which have to ensure public access to the spatial planning documents in the initial stage and to make suggestions and comments in the later planning stages.

The sample selected for the analysis was 44 respondents. Respondents in the survey are made up of the female gender and middle-aged respondents with university or college education, and by occupation are a specialist or public servants. To elucidate the relationship between gender and activity in the community, it is observed that there is a very small difference between the groups in the average assessment of their activity (0.04 points). After performing a statistical study and testing the formulated hypotheses at 95% significant level, it can be stated that the attitudes of respondents with different education to municipality commitments is statically not significant. Nonetheless, conducted data showed that more educated and personally experienced individuals participated in the online survey. From the survey, it was also noticed that the respondents are equally concerned with the urban and personal spatial planning problems of the residential area, but most often they discuss these problems with their friends and acquaintances and use the social networks for spatial planning documents than participation in project presentations or interviews with authorities. The analysis on the relationship between gender and attitudes to the averages of the evaluation of municipal actions and the evaluation of citizens 'abilities revealed that there is a very small difference between the average of groups (men, women) in the evaluation. Overall, response to the hypothesis that that Kaunas city resident is not very interested in territorial planning processes becomes imperative. To this, this study posits that owing to the non-random convenient selection, voluntary sampling and conclusions on the general public cannot be drawn. To obtain more accurate unambiguous data, the sample of the survey should be expanded and other methods of sample selection should be used. Because of the changes in the legal regulation (such that the construction is in most cases possible without a detailed plan, establishing an exhaustive list of cases in which the public interest is protected, limiting the creativity of spatial planning by linking it exclusively to public administration procedures, and reduced public access to procedures amongst others), the needs of society in the processes of spatial planning may not be heard at all. Such trends, according to the respondents in the survey are not in line with the modern concept of human rights and Lithuania's international obligations under the Aarhus Convention. This study, therefore, asserts that this situation is unfavourable to the protection of the interests of society as a whole and will undoubtedly create new challenges for the courts which should play a more active and creative role in assessing whether spatial planning solutions

comply with the principle of sustainable development.

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Conflict of interests
The authors declare no conflict of interest.

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Monitoring and Landscape Quantification of Uncontrolled Urbanisation in Oasis Regions: The Case of Adrar City in Algeria

* [1] Dr. **Assoule Dechaicha** , [2] Assist. Prof. **Adel Daikh** , [3] Prof. Dr. **Djamel Alkama**

[1, 2 and 3] Department of Architecture, Faculty of Sciences and Technology, 8 May 1945 University, Guelma, Algeria

E-mail [2]: dechaicha.assoul@univ-guelma.dz , E-mail [1]: alkama.djamel@univ-guelma.dz

E-mail [3]: daikh.adel@univ-guelma.dz

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ABSTRACT

Nowadays, uncontrolled urbanisation is one of the major problems facing Algerian oasis regions. The monitoring and evaluation of its landscape transformations remain a key step for any oasis sustainability project. This study highlights the evolution of spatial growth in the city of Adrar in southern Algeria during the period 1986-2016 by establishing a Spatio-temporal mapping and landscape quantification. The methodological approach is based on a multi-temporal analysis of Landsat satellite images for 1986, 1996, 2006 and 2016, and the application of landscape metrics. The results show two opposite spatial trends: significant growth of built-up areas against an excessive loss of palm groves. The landscape metrics allowed the identification of a progressive fragmentation process characterising the palm groves. Thus, the findings of this study show the utility of satellite imagery and landscape metrics approach for monitoring urbanisation patterns and assessing their impacts on oasis ecosystems.

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1. Introduction

Uncontrolled urbanisation is currently a major challenge for spatial planners and developers, given its irreversible effects on the biosphere at different scales. On a global level, cities contribute to the aggravation of problems related to Greenhouse gas emissions, pollution, climate change and the depletion of natural resources. At the local level, the rapid urbanisation of territories is considered responsible for the degradation of agricultural land and local biodiversity as well as problems related to socio-spatial segregation (Elmqvist et al., 2013; UN, 2018). This galloping urbanisation is more accentuated in developing countries, but with less mastery of spatial planning (Cohen, 2006; Güneralp et al., 2017). The arid regions of southern Algeria have not escaped this universal phenomenon,

***Corresponding Author:**
Department of Architecture, Faculty of Sciences and Technology, 8 May 1945 University, Guelma, Algeria
Email address: dechaicha.assoul@univ-guelma.dz

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and the consequences are more marked because of the fragility of their ecosystems. (Côte, 2012; Dechaicha & Alkama, 2020a).

The spatial translation of this urban growth is a rather disproportionate sprawl of the urban perimeters of the Algerian Sahara cities. Urban areas are constantly increasing their surface area, harming environmental potential, thereby altering the oasis landscape and endangering its ecosystem. The oasis, based since its origin on the ecosystem trilogy of water, habitat and palm grove, has undergone a morphological and functional upheaval due to uncontrolled urbanisation (Dechaicha & Alkama, 2020a; Dechaicha & Alkama, 2020b; Kouzmine, 2012).

However, this accelerated growth is less estimated in the urban master plans and development projects. Until today, local authorities do not have appropriate tools to control and manage the sprawl of oasis cities (CNES, 2002; Sidi Boumedine, 2013). The recent advent of remote sensing has raised the expectations of urban planners and other city actors. Satellite images allow the observation of terrestrial phenomena, objects and provide more reliable spatial information of regular temporality. Satellite images are currently a relatively important source of information because of the nature and quality of the data they carry (Ban, 2016).

This study aims to map and assess the spatial growth of a large oasis city, Adrar, through a quantitative approach based on the use of multi-date satellite images and the application of landscape metrics. The paper is structured in four sections. Section 1 presents the conceptual elements related to satellite imagery and landscape metrics. Section 2 presents the study area and the methodology adopted. The results obtained and their interpretation is presented in Section 3. Section 4 concludes the paper and highlights some perspectives for future work.

1.1 Remote Sensing to Monitor and Map Uncontrolled Urbanisation

Remote sensing is the system of acquiring biophysical information about land areas from a distance. It includes the process of detecting, recording and analysing the data obtained. Through multiband images provided by satellite sensors, this technology facilitates the monitoring and understanding of terrestrial processes. A satellite image is a digital representation of the earth's reality, captured and recorded by a satellite sensor (Tempfli et al., 2004). Since the first generations of civilian satellite sensors were put into orbit in the early 1970s, satellite images have played an important role in studying terrestrial phenomena. Satellite images provide several opportunities. On the one hand, they offer data-rich in spatial information, covering large geographical areas, regularly updated, easily accessible, and lower economic costs. On the other hand, the digital nature of satellite images makes them suitable for integration into Geographic Information Systems (GIS). Indeed, satellite imagery has become an essential tool for studying Spatio-temporal dynamics occurring on land territories such as urban sprawl (Ban, 2016; Kadhim et al., 2016; Netzband et al., 2007).

1.2 Application of Landscape Metrics to Quantify and Assess Urbanisation Patterns

In urban landscape ecology, the city is spatially considered a complex landscape consisting of diverse fragments interfered with according to anthropic and natural logics (Wu et al., 2013). The evaluation of the spatial growth impacts of cities uses landscape metrics developed within Landscape Ecology during the 1980s. These metrics, also called spatial metrics, are used to describe landscape structures through the measurement of certain properties characterising their composition and spatial configuration. Composition corresponds to the diversity and abundance of elements constituting the landscape; configuration concerns the shape, size and spatial arrangement of these compositional elements. Three scales of study can be considered: the patch level, the class level and the landscape level (McGarigal et al., 2012). Numerous studies have shown the importance of these metrics to describe cities' growth process and assess its impact on the environment (Herold et al., 2005; Liu & Yang, 2015).

2. Material and Methods

2.1 Study area

The city of Adrar is located 1400 km south of the capital Algiers (Figure 1). It is the capital of a large district and the capital of the historic oasis region of Touat in southwest Algeria. Geographically, this oasis is situated at

latitude 27° 52' N, longitude 0° 17' W, and altitude 258 m. Climatically, this region belongs to the hyper-arid climate, characterised by dry and hot summers and relatively cold and mild winters, particularly during the night. The dry period occupies most of the year, with a period from April to November. Average temperatures vary between a maximum of 45.2°C (July) and a minimum of 5.8°C (January). The average relative humidity varies between 39.6% (December) and 12.10% (July). Precipitations are rare, with an annual total of around 11 mm, falling mainly in autumn and spring. On the other hand, solar irradiation is very high in this region, with an estimated average sunshine duration of 3 978 hours/year.

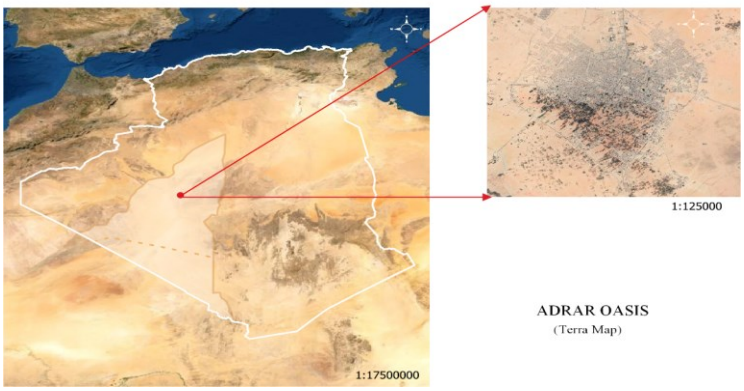

Figure 1. The study area (Source: Authors, based on Terra Map images)

This city has experienced significant population growth, particularly following its promotion to the status of district chief city. The population has grown from 4,468 inhabitants in 1966 to 85,650 in 2016 (a more than 19-fold increase). Spatially, this demographic boom has resulted in an excessive spread of built-up areas. Numerous problems currently persist, such as the uncontrolled consumption of space according to development models less adapted to local bioclimatic and landscape specificities (Maachou et al., 2018; Trache, 2011).

2.2 Data and materials

This study aims to characterise the urban area evolution of Adrar City over 30 years, between 1986 and 2016. A period during which urban sprawl seems to be more significant. A sequential series of four Landsat multispectral images were acquired via the USGS (United States Geological Survey). The images acquired correspond to the following years: 1986, 1996, 2006 and 2016. These four satellite images were selected for their temporal similarities (scenes taken in the same seasons of the year and with very close daylight hours) to ensure a better similarity in atmospheric and phenological conditions. Table 1 lists the characteristics of the images obtained.

Table 1. Characteristics of the Landsat images used

Image	Sensor	Date	Bands	Cloud cover	Spatial resolution (m)
Image 1	Landsat 5 TM	15-04-1986	1-2-3-4-5-7	0	30
Image 2	Landsat 5 TM	26-04-1996	1-2-3-4-5-7	0	30
Image 3	Landsat 5 TM	22-04-2006	1-2-3-4-5-7	0	30
Image 4	Landsat 8 OLI-TIRS	17-04-2016	2-3-4-5-6-7	0	30

Auxiliary maps were used as reference documents. These are three plot plans from 1988, 2006 and 2015, an aerial photo taken in 2006 and four Geotif images in natural colouring supplied by the USGS, corresponding to 1986, 1996, 2006 and 2016, respectively. The classification and post-classification process of the satellite images was carried out using QGIS software. The calculation of landscape metrics was carried

out using FRAGSTAT software (McGarigal et al., 2012).

2.3 Methodological approach

The analysis process is structured in four steps: pre-processing and normalisation of the acquired images, classification and refinement of the classification, validation of the classification, and calculation of landscape metrics (Ban & Yousif, 2016; Herold et al., 2005).

2.3.1 Image pre-processing and normalisation

The images selected for this study are L1TP. This category of images is geometrically self-correcting and geocoded before released by the USGS, according to the WGS 84 geographic referencing system, zone 31 North. The study area was extracted through a cutting window, including the current urban perimeter and its immediate surroundings (longitude 0°20'08"W, 0°14'44"W and latitude 27°49'23"N, 27°54'26"N). Thus, a radiometric calibration, consisting of converting image radiance into reflectance, was performed by executing a TOA (Top of Atmospheric) correction and applying the DOS1(Dark Object Subtraction) model (Congedo, 2016; Gao et al., 2009; Tucker et al., 2004). Subsequently, an enhancement operation was applied to the images to improve their quality and facilitate their visual interpretation. A false colour composition was maintained (Figure 2), with the combination of bands (4-3-2) for the TM images and (5-4-3) for the Landsat OLI-TIRS image (Congedo, 2016).

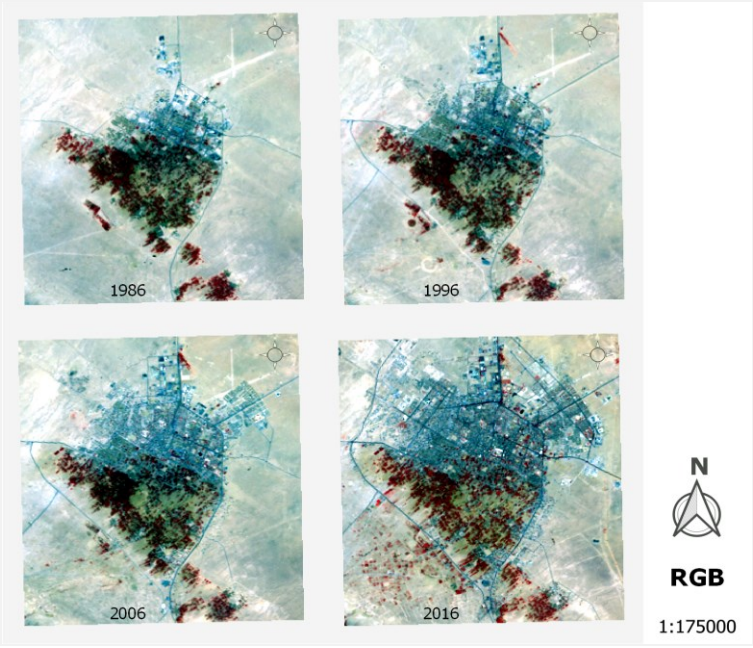

Figure 2. False-colour compositions of the images used (1986 - 1996 - 2006 - 2016). (Source: Authors, based on USGS images)

2.3.2 Classification and refinement of the classification

The classification of satellite data is a widely used method for the extraction of spatial information. It consists of assigning to each pixel its land-use belonging. The supervised classification method is chosen for this study, considering the knowledge of the field and the documents available. Before proceeding with the classification of the images, four land use classes were defined according to the FAO nomenclature (2016):

1) Urbanised areas (built and developed areas);
2) Palm groves (phoeniculture);
3) Low vegetation (grasslands, market gardens and agricultural land);
4) Bare soil (undeveloped and uncultivated land).

The sampling of test areas was established by photo-interpretation of images in coloured compositions (Figure 2), corresponding to reference maps (Munafò & Congedo, 2017). Representative polygons of different classes were generated through the Region Growing algorithm. This sampling step was used to measure the spectral properties of each land-

use class, from which the spectral classification of the set of images used was made (Congedo, 2016).
The maximum likelihood classification (MLC) algorithm was used to perform the supervised classification (Lu & Weng, 2007; Mather & Tso, 2016; Phiri & Morgenroth, 2017). Subsequently, a post-processing enhancement of the maps generated by the classification was carried out. It consists of correcting the confusions induced by the classification and eliminating isolated pixels by applying a 3x3 pixel filter. At the end of this stage, a reclassification treatment was applied to the three maps to make them homogeneous and comparable (Lu & Weng, 2007). Regarding vegetation, two classes were again distinguished: urban vegetation in the current urban perimeter, which corresponds to the palm grove, and peri-urban vegetation beyond the built-up area. The latter class represents the new farms established on the outskirts of the city. This reclassification allowed us to visualise the Spatio-temporal evolution of the palm grove within the urban perimeter, separately from that on the periphery.

2.3.3 Validation of the classification

The evaluation of the classification is important to proceed to the thematic analysis. It provides information on the level of accuracy of the maps produced by the classification. There are several methods for evaluating classification. The most common is the confusion matrix (Congalton, 1991). A synthetic index derived from the confusion matrix is also used in the evaluation of accuracy. This is the Kappa (K_{hat}) index. It is a quality indicator used to measure the performance of multiclass classification. For a K_{hat} value greater than or equal to 0.8, the classification is statistically significant. If K_{hat} varies between 0.4 and 0.8, the classification is of medium consideration (Congalton & Green, 2008; Landis & Koch, 1977). In this study, the accuracy assessment was carried out by digitising 200 control points, created and randomly distributed over the study area. The confusion matrix was generated after the GIS comparison matrix calculation.

2.3.4 Calculation of landscape metrics

Since this is an assessment of the evolution of land use and land cover classes, the landscape metrics selected for the measurement of Spatio-temporal change correspond to the class metrics level. Six metrics were selected for this study (Herold et al., 2005; McGarigal et al., 2012):
- **Number of Patches (NP):** the calculation of the number of fragments constituting a given class makes it possible to determine the abundance or scarcity of compositional elements. The monitoring of this index allows us to see whether certain fragments appear or disappear, which reveals the Spatio-temporal trend (growth or decline).
- **Percentage of Landscape (PLAND):** this index refers to the surface percentage occupied by a land-use class. It is an index that can indicate dominance in the composition of the landscape.
- **Mean patch size (AREA_MN):** the mean area of patches belonging to the same class, measured in hectares (ha). Combining this index with the NP index makes it possible to describe the landscape evolution between aggregation and/or fragmentation. For built-up areas, it reveals the mode of spatial growth (by densification or fragmentation).
- **Largest Patch Index (LPI):** this shape index represents the portion occupied by the largest fragment for a given class. The calculation of this metric indicates the level of dominance of the largest fragments of the different classes. If LPI is close to 0, it means that the largest fragment of the class in question is minimal in the constitution of the landscape. On the other hand, if LPI = 100, this fragment occupies the whole landscape. An increase in the value of this index means that the dismayed class tends to dominate the landscape.
- **Aggregation Index (AI):** this is a synthetic configuration index describing the organisation and arrangement of the fragments of a given land-use class. The measurement of this index reveals the level of compactness (aggregation) or isolation of the fragments composing a landscape class. The value of AI varies between 0 and 100%. As AI tends to increase, the class concerned tends to become more compact and vice versa.
- **Normalized Landscape Shape Index (nLSI):** this index corresponds to the total edges (m) ratio between fragments to the total landscape area. The landscape's compactness (or otherwise the disaggregation of fragments) can be assessed with this index and its geometric complexity. The value of nLSI varies between 0 and 1. nLSI

= 0, which means that the landscape is perfectly compact (it is a square shape). Increasing the value of nLSI implies a decrease in the aggregation (or compactness) of the landscape and its shape becomes more complex, i.e., the edges become more elongated. Table 2 provides the equations for calculating these parameters and a description of their ranges.

Table 2. Method of calculation of the selected metrics (Neel et al., 2004; O'Neill et al., 1988).

Metric	Description	Range
NP (Units)	$NP = n_i$ n_i: number of patches in the landscape of patch type (class) *i*	NP ≥ 1
PLAND (%)	$PLAND = P_i = \frac{\sum_{j=1}^{n} a_{ij}}{A}(100)$ P_i: proportion of the landscape occupied by patch type (class) *i*. a_{ij}: area (m^2) of patch *ij*. A: total landscape area (m^2).	0 < PLAND ≤ 100
AREA_MN (ha)	$AREA\_MN = \frac{\sum_{j=1}^{n} x_{ij}}{n_i}$ x_{ij}: total class area (m^2) of patch *ij*. n_i: number of patches in the landscape of patch type (class) *i*	AREA_MN ≥ 0
LPI (%)	$LPI = \frac{\max(a_{ij})}{A}(100)$ a_{ij}: area (m^2) of patch *ij*. A: total landscape area (m^2).	0 < LPI ≤ 100
AI (%)	$AI = \left[\frac{g_{ii}}{max\text{-}g_{ii}}\right](100)$ g_{ii}: number of like adjacencies (joins) between pixels of patch type (class) *i*. max-g_i: maximum number of like adjacencies (joins) between pixels of patch type (class) *i*.	0 ≤ AI ≤ 100
nLSI (without unit)	$nLSI = \frac{e_i - \min e_i}{\max e_i - \min e_i}$ e_i: total length of edge (or perimeter) of class *i*. min e_i: minimum total length of edge (or perimeter) of class *i*. max e_i: maximum total length of edge (or perimeter) of class *i*.	0 ≤ nLSI ≤ 1

Using the thematic maps from the satellite image classification as input, the calculation of these metrics was carried out using the free software FRAGSTAT. As for evaluating the results and considering the complexity of the studied landscapes, we proceeded to a correlation of these metrics to develop a synthetic interpretation considering the whole behaviour of the different metrics examined.

3. Results and Discussion

3.1 Validation of the classification

Four thematic maps were generated as a result of the classification (Figure 3). These maps correspond to the years 1986, 1996, 2006 and 2016, respectively. The calculation of the confusion matrices shows a satisfactory level of accuracy, both for the overall accuracy (98.20, 92.60, 91.34 and 94.16, respectively) and for the K_{hat} index, for which the accuracy values obtained are 0.84, 0.90, 0.94 and 0.92 respectively (Table 3).

Table 3. Classification accuracy of the four images 1986, 1996, 2006 and 2016.

Type of assessment	1986	1996	2006	2016
Overall accuracy (%)	89.20	92.60	91.34	94.16
Accuracy of "urbanised area" class (%)	90.62	94.48	94.96	97.12
Accuracy of the "palm grove" class (%)	98.54	98.21	100.00	92.82
K_{hat} index	0.84	0.90	0.94	0.92

3.2 The Spatio-temporal mapping change: a clear spread of built-up areas against an excessive retreat of the palm grove

The supervised classification resulted in four thematic maps, which are illustrated in Figure 3. The diachronic reading of these maps reveals a clear growth of the built-up areas along the study period, against an equally remarkable decline of the palm grove. Different spatial growth patterns can be distinguished between the different study periods.

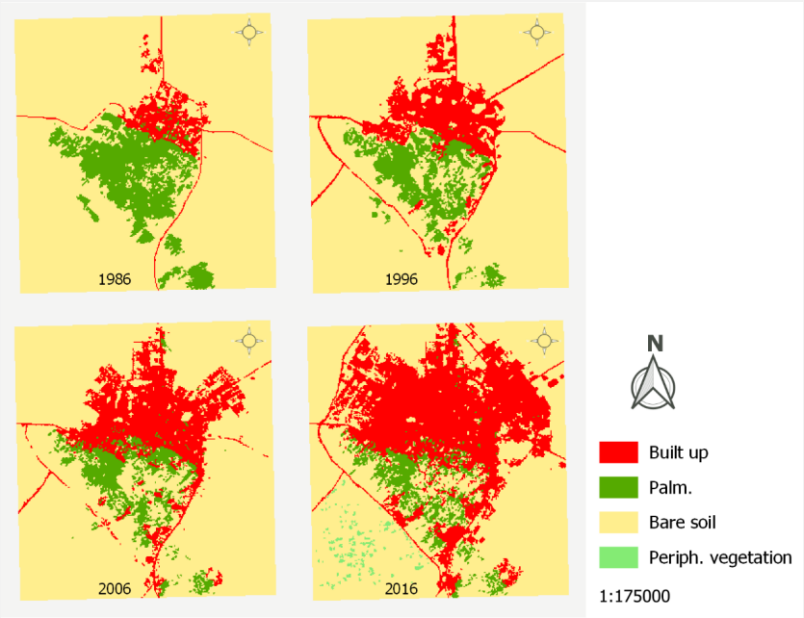

Figure 3. Spatio-temporal LUC evolution between 1986 and 2016.

During the first period (1986 - 1996), the spatial growth of the city of Adrar was characterised by a continuous mode with the existing fabric, especially towards the west (new city of Sidi Mohamed Belekbir), and towards the north along the national road RN° 6. The palm grove plots in contact with the urban fabric started to disappear after their conversion into built-up areas. During the second period (1996 - 2006), the city's evolution is dominated by two spatial trends. On the one hand, there is a densification of the western part of the city in the same logic as the previous period. On the other hand, there is a stretching of the urban area towards the north-east (new city of Tililane) and the south (along the road to Tamentite). As a result of this last extension, the palm grove is affected, especially in its western part, where the penetration of urban extensions is observed. A city's sprawl in all directions characterises the last study period (2006 - 2016).

The two new cities (Belekbir in the west and Tililane in the north) continued to receive new extensions through densification, as did the neighbourhoods along the Tamentite road. The quarters of this south-eastern strip (Ouled Ahmed Timmi quarters) have practically filled the interstitial pockets of the palm grove in its eastern part. Urban fragments appeared and spread along the southern edge of the same palm grove. At the end of this period, the uncontrolled urban extensions within the palm grove form continuous patches linking the three northern, southern and eastern sides, thus indicating a practically completed crossing of the green oasis network. Table 4 summarises the quantitative results obtained from the space-time mapping. The results indicate a variation in the rate of growth between the three periods (1986 - 1996), (1996 - 2006) and (2006 - 2016).

Table 4. Evolution of Land Use and Land Cover classes by area.

Land use class	Area (ha)				1986 - 1996	1996 - 2006	2006 - 2016
	1986	1996	2006	2016	(ha)	(ha)	(ha)

Urbanised area	324.72	811.89	1197.54	2264.04	+48.72	+38.57	+106.65
Palm grove	878.67	596.25	479.70	395.82	- 28.24	- 11.65	- 8.39
Peripheral vegetation	-	-	-	75.6	-	-	+75.6
Bare ground	5983.29	5778.63	5509.53	4450.95	-20.47	-26.91	-105,86

Over the entire study period, the built-up area class recorded a significant increase in surface area. Between 1986 and 1996, this class increased from 324.72 ha to 811.89 ha of land area, with an increase of 487.17 ha, i.e., an annual growth of about 48.72 ha/year. On the other hand, the palm grove underwent an opposite process. Its surface area decreased from 878.67 ha in 1986 to 596.25 ha in 1996, with a loss of 282.42 ha, i.e., 32.14 % of lost surface area and 28.24 ha of annual loss. Between 1996 and 2006, the urbanised areas continued to grow to reach a surface area of 1197.54 ha in 2006, with an estimated surface gain of 385.65 ha, i.e., an annual change of around 38.57 ha per year (compared with 48.72 ha/year recorded between 1986 and 1996). A slowdown in the rate of growth compared with the first period can be noted. In addition, the palm grove continued to lose surface area, recording 479.70 ha in 2006 with an overall loss of around 116.55 ha, i.e., an annual loss equal to 11.65 ha per year. Less loss of agricultural land is also noted compared to the period (1986 - 1996).

The last period (2006 - 2016) is characterised by a significant expansion of the built-up area class. This class gained an estimated total area of 1066.50 ha (compared to 487.17 ha during the first period and 385.65 ha during the second period). In 2016, the urbanised areas reached a value of 2264.04 ha of spatial coverage, i.e., estimated annual growth of 106.65 ha per year. The rate of spatial growth is more marked in this last period than in the previous ones. The palm grove continued to lose space in the same way. Its surface area decreased to 395.82 ha, with an overall loss of 83.88 ha, i.e., an estimated annual loss of 8.39 ha per year (compared to 28.24 ha/year between 1986 and 1996, and 11.65 ha/year between 1996 and 2006). The rate of area loss is thus lower than in previous periods.

3.3 Assessing landscape changes: two opposing spatial trends

Figure 4 illustrates the results of the landscape metrics. The analysis of the evolution of the oasis landscape with the landscape metrics revealed two opposite processes: a surface growth of the urban area characterised by a compactification (aggregation) trend, against a progressive fragmentation of the palm grove. Regarding the class of built-up areas, two behaviours of the landscape indices are noted. The two periods (1986 - 1996) and (2006 - 2016) recorded simultaneous increases in the NP (number of the patch), AREA_MN (mean patch size) and PLAND (percentage of landscape) indices. This indicates the appearance of new urban fragments in contiguity with existing fragments.

In contrast, the period (1996 - 2006) saw an increase in the NP and PLAND indices but a decrease in the mean area (AREA_MN). This decrease shows the appearance of new urban fragments, but away from the existing fragments (on the periphery). Thus, a discontinuous growth mode is implemented during this period. The continuous increase of the synthetic AI (Aggregation Index) correlated with the increase of the LPI (Largest Patch Index) and the simultaneous decrease of the nLSI (Normalised Landscape Shape Index) shows that a tendency towards compaction dominates the urban fabric. The urban patch tends to have more complex morphologies during its spatial spread. As for the palm grove, the number of NP fragments recorded a continuous increase but with a decrease in the AREA_MN and PLAND indices, which means a continuous perforation of this space. The LPI and AI indices also recorded continuous decreases in their values, highlighting a process of fragmentation (disaggregation) of this green frame. The nLSI index confirms this trend of decline, which is more amplified during the first period (1986 - 1996).

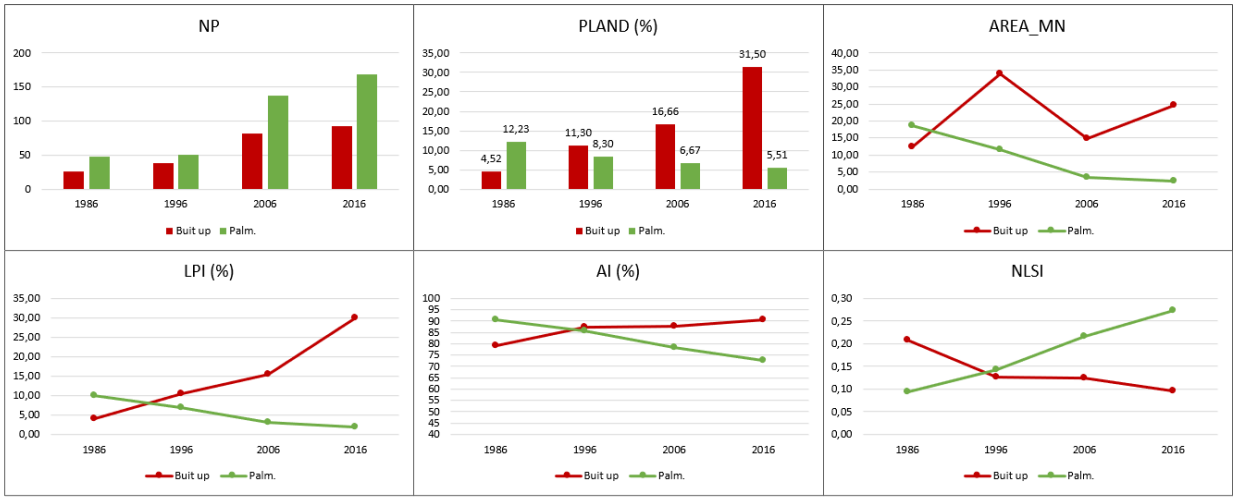

Figure 4. Evolution of landscape metrics characterising the city of Adrar (1986 – 2016).

4. Conclusion

Spatial and temporal mapping revealed two opposed spatial processes: the spread of the urban area versus the decline of the palm grove. Over the study period, the urban fabric grew considerably in area. This growth is mainly characterised by a continuous mode, with some discontinuous extensions along the Tamentit road to the south, especially during the period (1996 - 2006). The palm grove is progressively crossed by uncontrolled extensions of the built-up areas, starting with the edges' nibbling and then invading the degraded areas inside. The quantification of the evolution of the land use classes has revealed variations in the rates of evolution: a rate of growth of the urbanised surfaces that were more accentuated during the last decade (2006 - 2016) and a rate of decrease of the palm grove that was more amplified during the first decade (1986 - 1996).

The combined monitoring of landscape metrics allowed us to highlight two opposite morphological trends: a trend towards the compactification of the built-up area class versus a trend towards the degradation and fragmentation of the palm grove space. The results of the landscape metrics combined with the Spatio-temporal cartographic analysis have allowed highlighting the negative impact of uncontrolled urban expansions on the palm grove. Between 1986 and 2016, the share occupied by urbanised areas increased from 4.52% to 31.50%, i.e., a sevenfold increase in 30 years. On the other hand, the palm grove decreased from 12.23% to 5.21%, i.e., a loss of more than 55%. Therefore, it is important to adopt approaches based on remote sensing and landscape metrics to control the rapid and uncontrolled urbanisation that is currently taking place in oasis cities and reduce its adverse effects on palm groves. Indeed, remote sensing and landscape metrics can be used as tools to help assess oasis management choices and make better decisions. Therefore, these tools offer the opportunity to formalise the best solutions and alternatives that meet the needs of protection and promotion of oasis environments.

Consequently, this study highlighted the importance of satellite imagery from remote sensing for monitoring and understanding the rapid and uncontrolled sprawl of urban and peri-urban areas and assessing its impacts on neighbouring ecosystems. This approach can be replicated in a broader perspective to study the phenomenon in other oasis cities and evaluate their urban development models. On a smaller scale, at the neighbourhood level, this approach can lead to the measurement and qualification of urban vegetation, a vital bioclimatic component to be highlighted for the sustainability of the Saharan city.

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Conflict of interests

The authors declare no conflict of interest.

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Liveability Dimensions in New Town Developments: An Overview of Senri New Town and Purbachal New Town

* [1] M. Eng. **Tahmina Rahman** , [2] Dr. **Md. Nawrose Fatemi**

[1] Division of Global Architecture, Osaka University, Osaka, Japan

[2] Department of Architecture, University of Asia Pacific, Dhaka, Bangladesh

E-mail [1]: ar.tahminarahman@gmail.com , E-mail [2]: nawrose@uap-bd.edu

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ABSTRACT

Since the 1960s, new town developments within large metropolises have been widely adopted to decongest the city centres, especially in Asian cities. This paper provides a brief account of the liveability dimensions of two new townships developed in large metropolitan areas: Senri New Town in Osaka and Purbachal New Town in Dhaka. The study primarily draws on master plans of the two developments to identify how the components of the plans reflect the physical, social, functional and safety dimensions of a proposed liveability framework. The methodology combines a review of masters plans with scholarly and grey literature on the two new town developments. The findings show while the social and functional dimensions are integrated with Senri New Town; Purbachal New Town, though more recent, appears to have missed opportunities for diversifying density, social mix and mass transit. The paper concludes that the comparative case, Senri-New Town provides insights on how public-private people participation can leverage citizen-centred design for more liveable residential living environments in developing cities.

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1. Introduction

Cities continue to accommodate the majority of the growing global population (Cividino et al., 2020; Hoornweg and Pope, 2017). Since the last 200 years, the world's population has grown substantially, leading to significant shifts global population from rural areas to major towns and cities (Selhausen, 2013). Recent projections from the World Cities Report 2020 (UN-Habitat, 2020) indicates that less developed regions such as South Asia, East Asia, and Africa will provide 96 per cent of urban growth, which will be equal to 35 per cent of the global population growth in urban

***Corresponding Author:**
Division of Global Architecture, Osaka University, Osaka, Japan
Email address: ar.tahminarahman@gmail.com

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areas between 2018 and 2050. Especially in East and South Asia, the proportion of the population will continue to grow along with the scale and the number of the cities (Lerch, 2017). To address the challenges caused by rapid urbanization, UN-Habitat proposed five guided strategies of urban expansion, including planned city expansion; city-region planning; planned city infill, connectivity, and public spaces; poles development, and lastly, new town development (UN-Habitat, 2014b). Among these strategies, new town developments have been widely adopted at the fringes of several large megacities especially in Asia, Europe, Middle East and South America, to decentralize further development from the central city. For most planners and developers, these developments in form of satellite townships allow for the creation and experimentation of visionary urban design principles (Van Leynseele and Bontje, 2019). Though the idea of 'Satellite towns' was first coined by Graham R. Taylor in 1915, it was further advanced by the concept of the Garden City by Ebenezer Howard. After 1950, a few large metropolitan cities in some Western and Asian Countries developed satellite towns as part of their master planning and regional planning to ensure a balanced urban expansion (Deepthi and Shobha, 2019). In the early 1960s, urban policies in Asian cities focused on slowing down the urbanization rate by controlling the expansion of large metropolises (Yeung, 2011). Since then, such planning ideologies, with varying degrees of adaptation, have informed new town developments in large metropolises in the Asian Pacific region.

Despite a wide spectrum of insightful literature on the idea and evolution of new town developments (Deepthi and Shobha, 2019; L. Wang et al., 2010), there is little engagement with liveability aspects. This study sheds light on two new towns in Osaka and Dhaka from planning initiatives to the settlement process via liveability dimensions. Specifically, Senri New town in Osaka Prefecture is the oldest of Japan, developed in 1962 while Purbachal New Town is a recently developed satellite township within the vicinity of Dhaka. The comparison between these two new town developments, on one hand, provides insights into the liveability dimension of new towns developed during the early stage of new town experimentation. On other hand, the case of the recently developed new town in Dhaka allows us to understand whether new principles have emerged from the original experimentations over the years. The contrast of a developed and developing city context also helps to unravel possible contextual factors that influence both the development process and liveability considerations. Following the introduction, Section 2 presents a brief literature review of new town development in Asia. Section 3 introduces the research methodology. Section 4 and 5 assembles the review of masters plans regarding liveability dimensions of the two new town developments and Section 6 contains the comparison between those two new townships. Section 7 delivers the discussion and lastly, Section 8 concludes with the recommendations.

2. Review of Liveability within New Town Developments in Asia

According to Asian Development Bank-ADB (2019), more than 53% of the global population and 44% of the global urban population lives in this Asia Pacific region. The Asia Pacific region also hosts 19 of the world's 33 megacities (Razvadauskas, 2019). However, most Asian mega-cities have sought to monitor growth and to promote well-ordered trends through the application of urban planning principles originating in western countries (Yokohari et al., 2008). Among the pioneer countries in Asia, Japan and China attempted to control the growth by introducing new towns within the vicinity of large metropolises (Marcotullio, 2001; Shaw, 2004; Ye et al., 2021). Singapore and Hong Kong followed similar developments by decentralizing spatial population distribution from dense core to new satellite towns (Percival and Waley, 2012). Between 1960-1980, South Korea, for example, developed several satellite towns within the vicinity of Seoul (Shaw, 2004). In South Asia, India was the first to develop satellite towns (class I towns like Bokaro, Chandigarh, Rourkela, etc.) around major cities between 1961 and 1971 (Chatterjee and Chattopadhyay, 2020). Such satellite town developments continued with the introduction of 15 ring towns around large metropolitan cities such as Delhi, Hyderabad, Madras, and Calcutta (Shaw, 2004). On the contrary, new town or satellite town developments are a rather very recent

phenomenon in Bangladesh. The Purbachal New Town', for instance, is the first and the most recent attempt at developing satellite towns to control the rapid and unplanned urbanization of Dhaka city (Fatemi and Islam, 2014).

However, these new townships have received several criticisms, especially with respect to the socio-spatial quality of the living environment. For example, New Towns in Tehran have been found to be marked by a poor quality of life for residents (Ziari, 2006). In China, Deng and Huang (2004) report the gradual conversion of new towns into ghetto-like sprawl. More recently, evidence from Pakistan points to the incompatibility of new developments with contextual issues such as local culture, social and economic realities (Soomro and Soomro, 2018). In view of these shortcomings found in new developments, the present study sought to understand the liveability condition and future challenges of 'Purbachal New Town' in Dhaka, in comparison with 'Senri New Town' in Osaka. Moreover, according to The Global Liveability Index 2019, Osaka is the most liveable and Dhaka is the least liveable city in this Asia Pacific region (EIU, 2019).

Beattie and Haarhoff (2018) have critiqued existing urban planning methods for failing to produce high-quality citizen-centred urban design interventions that can promote liveability. Liveability impacts residents' quality of living. Liveability also ensures sustainable development and place-making with a special emphasis on the community and its surrounding spaces (Leh et al., 2020). For Girardet (2004) a liveable city includes strong neighbourhoods with sufficient supporting facilities within a walking distance, a network of pleasant public spaces, affordable and organized buildings, vibrant streets with diverse cultural activities and regional connections. Similarly, Leby and Hashim (2010) assessed urban liveability through physical dimensions (environmental quality, public open spaces, built environment maintenance), social dimensions (sense of place, community life, and social contact, etc.), functional dimensions (availability and proximity of public services, accessibility, employment opportunities) and safety dimensions (crime and sense of safety). This points to what Southworth (2016) consider as the multifaceted and dynamic components of liveability, including the built environment, natural factors and socio-economic factors. Table 1 presents an overview of liveability indicators are used in the literature. Building on this, this paper adopts the physical dimensions, social dimensions, functional dimensions, and Safety Dimensions (sense of safety) to analyse liveability conditions in the selected new town developments.

Table 1. Liveability Dimensions for New Town Developments.

Dimensions of Liveability			
Physical Dimensions	Built Environment Quality (Girardet, 2004; Paul and Sen, 2020)	Natural Features (Leby and Hashim, 2010; Southworth, 2016)	Maintenance and Organization (Girardet, 2004; Leby and Hashim, 2010; Southworth, 2016)
Social Dimensions	Social Contact and Community Life (Leby and Hashim, 2010; Southworth, 2016)		Sense of Place (Aulia, 2016)
Functional Dimensions	Availability and Proximity of Amenities (Girardet, 2004; Leby and Hashim, 2010)		Accessibility (Girardet, 2004; Leh et al., 2020)
Safety Dimensions	Sense of Safety (Girardet, 2004; Leby and Hashim, 2010)	Crime (Leby and Hashim, 2010)	Employment Opportunities (Leby and Hashim, 2010)

Source: Compiled by the authors

3. Methodology

This paper draws on two new town developments in Osaka and Dhaka—both as first experimentations in their respective countries but reflecting different time periods. Data on Senri New Town in Osaka is based on a workshop organised by the Department of Architectural Engineering at Osaka University in 2019. The workshop aimed to explore the residents' quality of life along with their community cohesion and social ties. The authors were active participants at the workshop, especially concerning the liveability dimensions of the Senri New Town.

Additional data such as the existing built environment condition, their relationship with natural features, availability and accessibility to public amenities etc. were also obtained from Senri New Town Information Centre (SNTIC). The important drawings including the masterplan of the township were also collected from them and developed during the workshop. Moreover, the authors spent the last three years (2017-2020) there and had also observed the social interaction, community management and organization, and sense of safety of this area (Figure 1).
In regards to findings on Purbachal New Town, the results rely on the master plans, reports and scholarly literature of its planning and development (Figure 1). Relevant data regarding planning strategies designed built environment and natural features, availability and proximity of public amenities and key drawings including the master plan of the township have also been collected from Purbachal New Town Project Office, Dhaka. Additional data such as the possibility and potential of community interaction and social safety features have been identified through the urban studio workshop organized by the University of Asia pacific in 2020. The authors actively participated in that workshop to explore the social and safety dimensions of the Purbachal New Town.

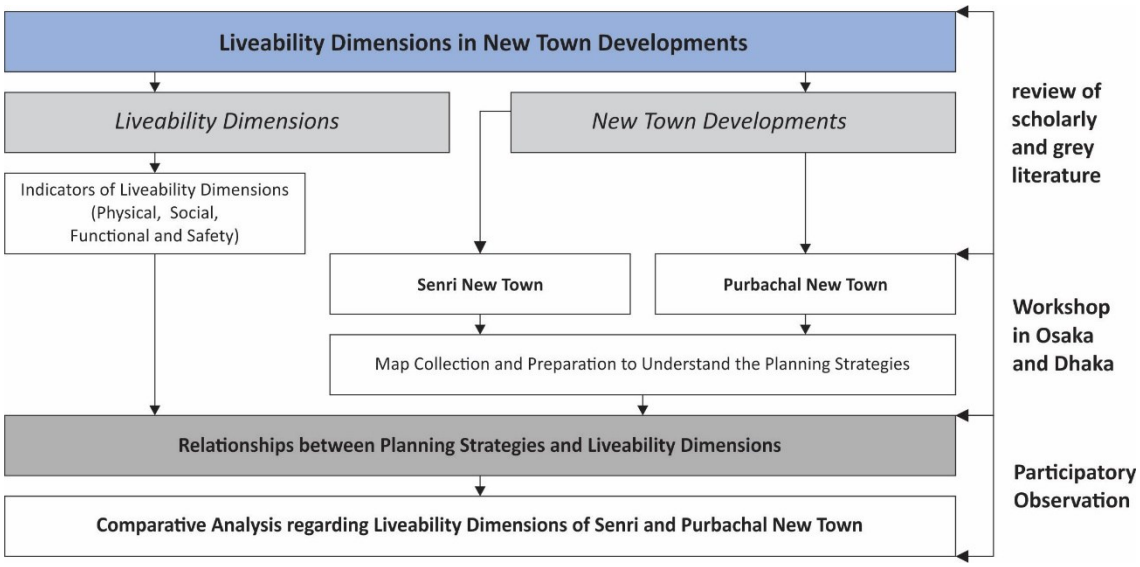

Figure 1. Methodology and Research Framework.

4. Senri New Town (Osaka)

Post-war (WWII) reconstruction in Japan was met with severe housing shortages, especially in major cities, which highly impacted the second world war. In response, the government of Osaka Prefecture planned over a million dwelling units to fill the housing shortages. As part of this, the New Town Project was initiated with the construction of Senri New Town as the first major experimentation of New Towns in Japan. The aim was to build a healthy living atmosphere by having multiple low-cost housing and suburban areas (Hauk, 2015).

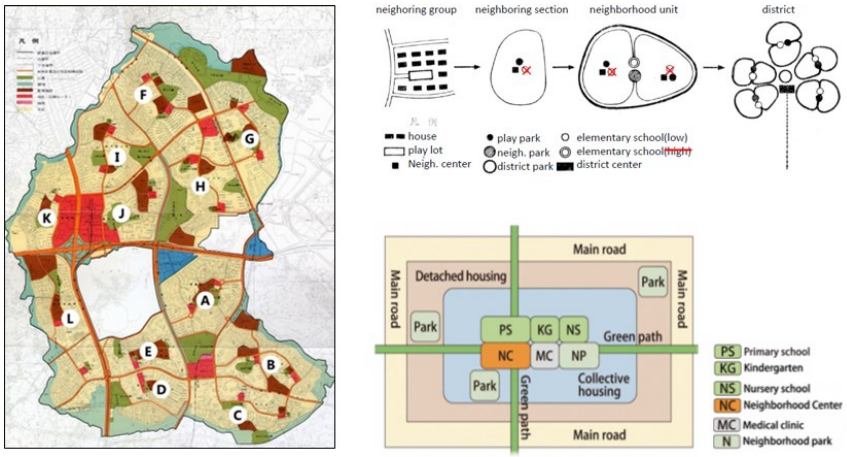

Figure 2. Senri New Town Development Plan and Planning Strategies. (SNTIC, 2020)

Following American urban planner Clarence Perry's famous 'neighbourhood unit theory', a master plan was developed for Senri New Town (Figure 2). Senri New Town, which included the north-eastern section of Toyonaka City and the north-western section of Suita City, was founded in 1962 by the Osaka Prefecture Enterprise Bureau (presently abolished). Spatially, the New Town Development is geographically distributed along north, south and central areas—each section separated by the main road. These three areas overlap the administrative boundaries of the suburban municipalities of Toyonaka City and Suita City. The three areas are further divided into twelve neighbourhood units, which conform to primary school districts in Japanese planning. Each zone consists of a park, residential area, schools, neighbourhood centre and public facilities (SNTRRC, 2006). It was designed for about 10,000 residents. In terms of land use distribution, out of the total 1,160ha, residential districts (mainly including single-family houses, apartment complexes, and condos) constitute 43.1% whereas green space and parks account for 23.8%.

4.1 Liveability Dimensions of Senri New Town

4.1.1 Physical Dimensions

Primarily, Senri New Town was built to provide a large number of new residential accommodations (Sorensen, 2002). The physical elements of Senri New Town also include a city centre, expressway system, railway stations, and recreational facilities. Here, the business facilities are categorized as narrow-service areas (daily shopping) and broad-service areas with lower usage (weekly and monthly shopping) to cater for the regular neighbouring demands. Therefore, these business facilities are gradually constructed as city-centred, district-centred, and neighbourhood-centred structures (Itami, 2018).

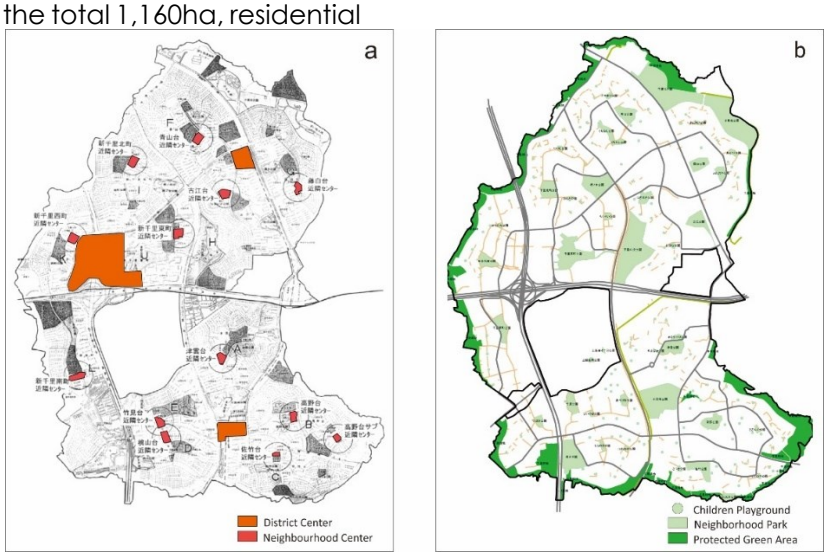

Figure 3. a) Neighbourhood Centres and b) Neighbourhood Parks in Senri New Town (SNTRRC, 2006); modified by authors.

4.1.2 Social Dimensions

From the experience of Tsutsumi (2021) and also from the authors' observation, several challenges have been tackled by local citizens collective initiatives to develop and reform society. Neighbourhood associations, usually composed of local residents, undertake place-making activities through locally oriented and community-based programs that seek to build a child-friendly community, preserving and enjoying the greenery, and pedestrianisation. Through local resident's volunteerism and collective activities, social ties and bonds with strong attachments to the neighbourhoods have emerged. Although the demographic profile of residents tends to be elderly centred and thus challenges the long term sustainability of collective activities, social activities are beginning to attract young families to diversity population (SNTIC, 2020).

4.1.3 Functional Dimensions

In terms of planning and availability of amenities, as well as the standard of the housing offered, Sorensen (2002) explained that the town developments of the 1960s in Japan were much more forward-thinking—coordinated attempts to accomplish inclusive growth with pedestrian linkages, roads, and economic uses near the commuter rail station. In the case of Senri New Town, by placing public housing in the heart of each neighbourhood unit and detached single-family dwellings on its outskirts, the residents benefitted from fast access to essential amenities like parks, play areas, education facilities, and retail services (SNTIC, 2020). In particular, neighbourhood commercial centres were placed within walking distance (Figure 3).

4.1.4 Safety Dimensions

In designing and planning the new town, safety was one of the factors that the planners considered (Hauk, 2015). In this case, following the Radburn Layout of New Jersey, USA, cul-de-sacs were introduced to segregated residents from the main roads that provide the residents with quiet and spacious enclosed open spaces with buildings. Additionally, to ensure the safety of inhabitants, pedestrian, and automobile traffic lines are separated as far as possible (SNTIC, 2020).

5. Purbachal New Town (Dhaka)

Purbachal New Town is Bangladesh's largest planned township, with a total area of 2520 hectares divided into 30 sectors (Hasnat and Hoque, 2016; Hossain, 2014). The project aimed to minimize population pressure on Dhaka City by ensuring the possibility of residential accommodation for the city dwellers near the City (Hossain, 2014). Fatemi and Islam (2014) intimate that Rajdhani Unnayan Kartripakkha of Dhaka (RAJUK- the Capital Development Authority) anticipates planning and developing this area as a self-sufficient new township with all modern amenities and opportunities. The project, however, is far from completion as it was originally planned for 1995-2015 (Hasnat and Hoque, 2016) but major infrastructure development works are still in progress.

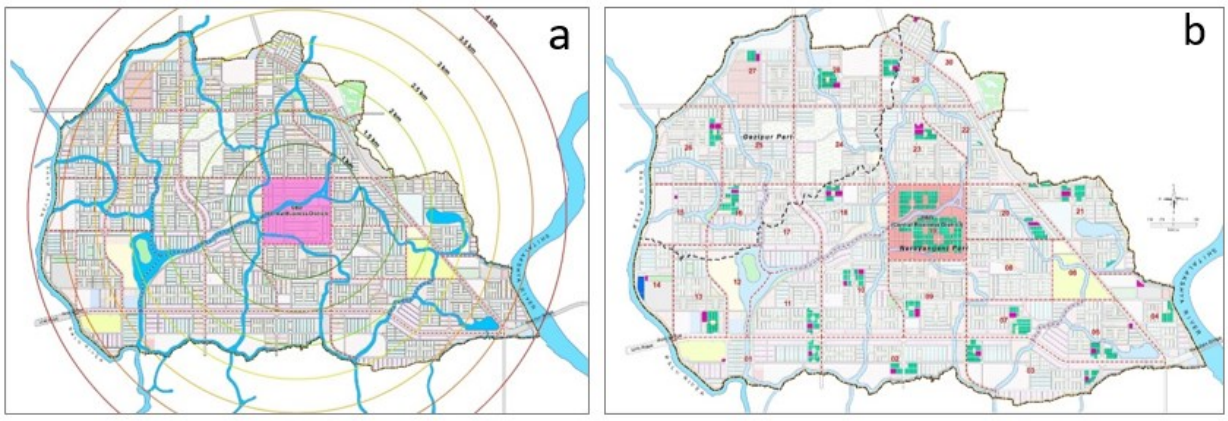

Figure 4. Planning Strategies with a) Central CBD and b) Secondary Commercial Centres of Purbachal New Town (Purbachal New Town Project Office, Dhaka).

Planning decisions were heavily influenced by the undulating topographical condition of the site. (Fatemi and Islam, 2014) (Figure 4a). The existing large depressions of the site have

been converted to form an interconnected lake and canal system to facilitate the natural drainage and also create a recreational belt and pedestrian connectivity in the whole township (Hossain, 2014). However, the master plan for this township has been supplemented by a rigid grid-iron pattern road network.

In Purbachal New Town, 38.7% (975 ha) of the total project area has been allocated for residential purposes (Figure 5), facilitated by 13.7% Forest, Eco-park, Green Belt, Urban Green, and Lake or Canal. According to Hasnat and Hoque (2016), the proportion of open space has shrunk from an originally planned 25% to the current 13.7% to modifications for housing plots extension by the project planners. Intriguingly, the master plan seems to derive from the concentric zone theory (Fatemi and Islam, 2014), because of the CBD's dominant central location (Hossain, 2014; Ibrahim et al., 2017). But, it tends to be the Multiple Nuclei Concept of Chauncy D Harris and Edward L Ullman later, because of the equal distribution of secondary commercial centres along with their adjacent residential plot distributions (Figure 4b), which is quite uncommon in the previous planning precedents in the context of Dhaka (Fatemi and Islam, 2014; Ibrahim et al., 2017).

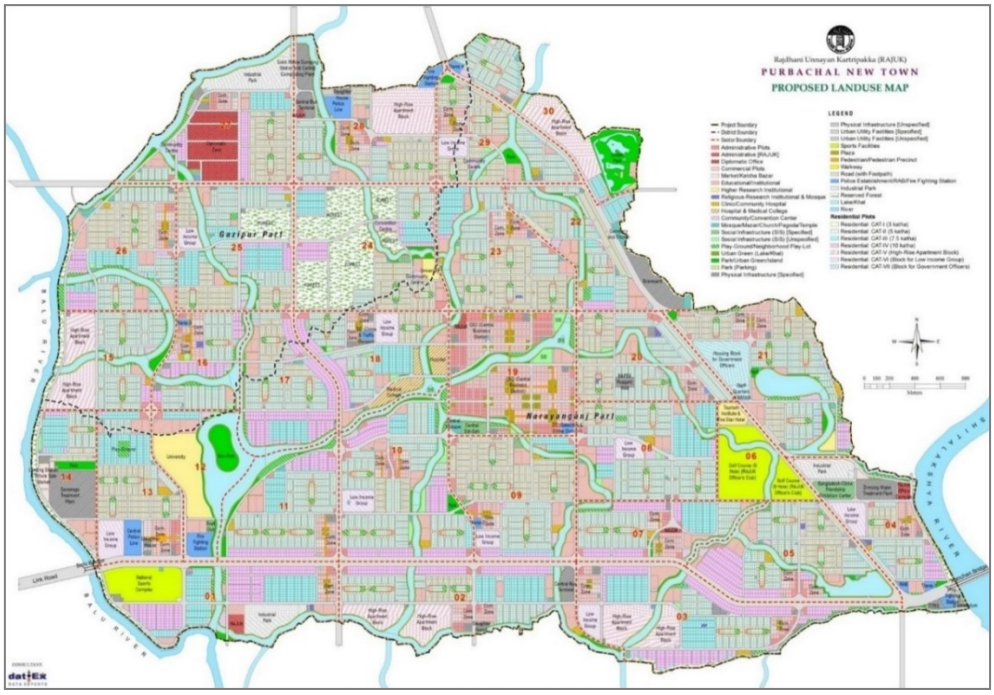

Figure 5. Purbachal New Town Development Plan (Purbachal New Town Project Office, Dhaka).

5.1 Liveability Dimensions of Purbachal New Town

5.1.1 Physical Dimensions

In Purbachal New Town, 25016 residential plots have been allocated covering 976.3ha (38.7% of the total land area). It also includes non-residential functions (Administrative, Commerce, Industrial, Diplomatic Area, and Institutional Area) of 242.9ha (9.6%). Road networks (along with footpath, pedestrian and walkways) cover about 652.7ha (25.9%) while open spaces (Forest, Eco-park, Green Belt, Urban Green, and Lake or Canal) represent 345.2ha (13.7%) (Figure 6). Additionally, sports facilities constitute 121ha (4.8%) and other facilities (Health, Education, Social Infrastructure, Urban Utility Facilities) cover 184ha (7.3%). The entire residential area is planned for a safe and vibrant neighbourhood dominated by a continuous network of pedestrian pathways along with adjacent green areas which further emphasizes the planned intentions for a healthy and liveable community environment (Fatemi and Islam, 2014).

5.1.2 Social Dimensions

Pumain (2006) asserts that continuity of the built environment requires a coherent urban entity where all elements need to interact, as they share a common context, compete for a similar space, negotiate and collaborate for amenities and build a sense of place. Purbachal New Town was designed to

integrate such requirements with a simple framework of varying sizes of social clusters and their corresponding social institutions such as Housing, Neighbourhood, Community, District, and Division level to ensure a sense of place (Fatemi and Islam, 2014).

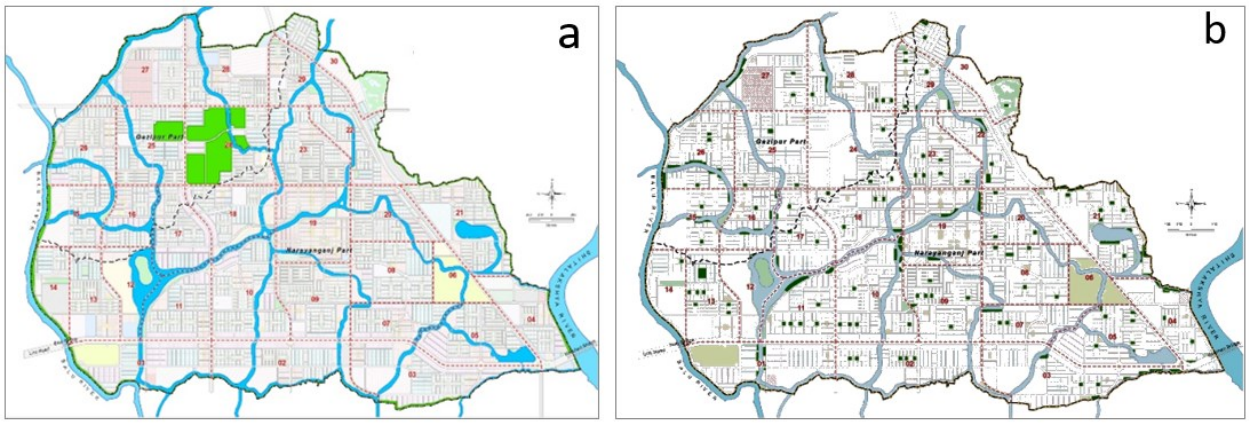

Figure 6. a) Forest and Interconnected Canals B) Community Playgrounds of Purbachal New Town. (Purbachal New Town Project Office, Dhaka)

The community playgrounds, nursery schools, health facilities, urban greens, and recreational facilities of this town are organized in this way to enhance the regular contact between residents and thus improve overall social ties. For this, Purbachal New Town positively followed the international standard to allocate the land for each land use (Hossain, 2014). Correspondingly, Cox and Streeter (2019) stated that Living in amenity-rich communities improves social goods like sociability, neighbourliness, and social trust while lessening social maladies like loneliness.

5.1.3 Functional Dimensions

According to Ibem (2013), improving accessibility for residents to public amenities and social infrastructures has been recognized as one of the key issues for decent living environments and sound healthy communities. The Purbachal New town has essential physical amenities like 165 community playgrounds covering 27.6ha, 87 nursery schools, and utility facilities (e.g. 129 neighbourhood waste disposal stations and 28 health facilities at 500 m walking distance from the residential neighbourhoods.

5.1.4 Safety Dimensions

Cox and Streeter (2019) argue that the proximity of public amenities and social infrastructures is strongly associated with the feelings of neighbourhood safety, and residents living near the neighbourhood amenities tend to feel safe in their communities. Purbachal New town is planned to ensure neighbourhood safety by organizing the public amenities within the walking distance of its residents. Moreover, cul-de-sacs were designed on tertiary roads to separate the residences from main roads, providing citizens with safe and sound open spaces with buildings. Availability of continuous walkways, pedestrian precincts, and public plazas in this town separated the pedestrian from automobile traffic lines.

6. Similarities and Differences between Senri New Town and Purbachal New Town

This section identifies similarities and differences between Senri New Town and Purbachal New. In terms of overall built area, Purbachal New Town is more than twice the size of Senri New Town. However, Purbachal New Town has a much higher estimated population density (410 people/ha) than Senri New Town (130 people/ha). In both cases, the master plan is organized by the neighbourhood unit as their fundamental unit, though the numbers differ (12 units for Senri New Town and 30 units for Purbachal New Town).

There are also differences in the planning approach. Senri New Town's master plan was developed on the notion of 'Neighbourhood Unit Theory'. It just took ten years from 1960-1970 to execute the master plan of Senri New City. On the other hand, Purbachal New Town's Master Plan was developed using the 'Multiple Nuclei Model'. The implementation of this master plan has taken more than 20 years and it is still not ready for potential

residents (Table 2). While both master plans have a comparable proportion of residential land use, Senri New Town has a sufficient amount of mass housing accommodation, while Purbachal New Town has no provision of mass housing. In Purbachal New Town, there seems to be a limited allocation for public amenities (7.3%; 410 persons/ha) in comparison with Senri New Town (14.4%; 130 persons/ha). A similar trend has been identified also for the availability of urban open spaces. Purbachal New Town's provision of open spaces (13.7 per cent) for 410 people/ha seems to be quite low in comparison to Senri New Town's provision of 20.9 per cent for 130 people/ha (Table 2).

Table 2. Comparative Analysis between Senri New Town and Purbachal New Town

Indicators	Senri New Town	Purbachal New Town
1. Developed Area	1,160ha	2,520ha
2. Projected Population Density	130 people/ha	410 people/ha
3. Fundamental Unit	neighbourhood unit (12 units)	neighbourhood unit (30 units)
4. Number of Dwellings	37,330	25,016
5. Planning Strategies	Neighbourhood unit theory	Multiple Nuclei Model
6. Planning Agencies	State Agencies (Public Enterprise Bureau, Osaka Prefectural Government)	State Agencies (Rajdhani Unnayan Kartripakkha (RAJUK Dhaka)
7. Implementation Period	1960-1970	1995-2015
8. Land Use		
i. Residential	41.7%	38.7%
ii. Public Amenities	14.4%	7.3%
iii. Road, Footpath, Pedestrian and Walkway	16.9%	25.9%
iv. Forest, Eco-park, Green Belt and Urban Green	20.9%	13.7%
v. Others	6.1%	14.4%

Source: Compiled by the authors.

7. Discussion

According to proponents, new town development offer benefits for a better urban life via the provision of affordable residential accommodation and basic public facilities, high-efficient transport infrastructure, and a better living environment (Kafkoula, 2009). Findings from the case reviews show that the master plans of Senri New Town and Purbachal New Town attempt to integrate liveability elements to ensure a better urban life for residents. However, several unique features have been identified in the master plans (Table 2).

The findings reveal that in Purbachal New town, the planners did not sufficiently plan for mass transportation, as only 20%, suggesting heavy private vehicle dependence. However, L. Wang et al. (2010) lamented that due to the slow development of mass transit and the distance to the MRT stations, the Shanghai new towns have not developed into complete residential communities. This essentially contradicts the current global agenda and recommended practices and policies for sustainable mobility. For Senri New Town, strong connection and easy access have been offered to the city centre (Hauk, 2015)— approximately 20 min by railway or subway (Tsutsumi, 2021).

In Addition, Randall (2017) reported several abandoned satellite towns which had never been built due to their ambitious plans that often create ghost towns such as Fordlandia in Brazil, Harlow in England, or New Cairo in Egypt. The critics of satellite towns point to the lengthy development timetable and the exorbitant costs of infrastructure development (Abubakar and Doan, 2017; Randall, 2017). A typical case in point is Purbachal New town. Based on Table 2, the development phase for Purbachal New Town is quite protracted and hence, frequently criticised at time-demanding.

Furthermore, the estimated population density is very low (130 people/ha) for the Senri New Town, less than the minimum density level (150 people/ha) recommended by UN-Habitat (2014a) to make a city sustainable. On the contrary, Purbachal New Town is comparatively high with 410 people/ha. Recently, there has been increasing concern that high-density urban form has resulted in overpopulation, extreme compactness, and relative loss of public facilities (Chen et al., 2008; Y. Wang and Shaw, 2018). From this perspective, the provision of public facilities in

Senri New Town (14.4%) seems to be adequate for its population density compared with the public facilities provided by Purbachal New Town (7.3%). Additionally, Fatemi (2014) indicated the urban green spaces as an essential component of liveability dimensions for a highly dense area and emphasized preserving an adequate amount of these quality green spaces. Correspondingly, the UN-Habitat recommended 15% provision for open and green spaces in high-density settlements (150 people or more per hectare) (UN-Habitat, 2013) is met in Senri New Town (20.9 per cent), but not Purbachal New Town (13.7 per cent). This is quite surprising given that the preservation of existing greens and formulation of an interconnected lake and canal system are major concerns in developing its planning decisions.

New townships are expected to tackle housing shortages through sufficient plot reservations for mixed-use and affordable residential accommodations (Cutts, 2016). UN-Habitat (2014a) advocates a 'social mix of citizens from various economic classes' to promote stable social networks and reduce social inequality. The original plan for Senri New Town consisted of single-family dwellings, apartment complexes (public and private), and condominiums comprising diverse social groups (Tsutsumi, 2021). However, there is no evidence of public mass housing in the case of Purbachal New Town as private development and low-income housing represent 88% and 12% of residential allocations respectively (Fatemi and Islam, 2014). This suggests that the increasing attention to integrating social mix through the adequate combination of lower, middle and higher-income housing into new town developments in Asian cities are yet to take hold in Bangladesh.

8. Conclusion

The promotion of inclusive and sustainable living environments remains an important policy and planning agenda at the global and national levels. Several countries have experimented with new town developments as part of planning initiatives to decongest the central cities and offer a healthier living environment for residents. In this paper, the authors have offered a brief review of master plans via the lens of the dimensions of liveability within New Town Developments based on the examples of Senri New Town (Osaka, Japan) and Purbachal New Town (Dhaka, Bangladesh). The comparative review found that physical, social, functional and security dimensions of liveability could be referenced. However, although Senri New Town was developed almost half a century ago, it appears to have better conform to liveability dimensions compared to Purbachal New Town (Dhaka, Bangladesh). Seemingly, the latter has missed opportunities for integrating some of the key principles in the liveability discourse that gained relevant attention in recent years. While this paper does not report on liveability evaluation of the two new town developments, by drawing on the project components to infer liveability dimensions, the authors suggest the following planning implications:

First, planners and city authorities must recognize the importance of social mix and adequately plan for developments that provide sufficient allocations for lower-income and middle-income housing. This is necessary for inclusive development that provides opportunities for the poor to access better living environments necessary for their wellbeing.

Secondly, the integration of diverse socio-economic profiles invites public-private-people partnerships (P4) to emphasize citizen-centeredness in the planning, design, implementation and evaluation of new town developments.

Thirdly, integrating a diversified density for different zones and pairing with community centres, public facilities, in addition, to properly designed and well connected public open and green and blue spaces. Last of all, promoting a transport hierarchy that restricts vehicular traffic and promotes pedestrianization is relevant for making these new townships truly liveable and sustainable.

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Conflict of interests
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Investigating Built Environment Indicators to Develop a Local Walkability Index

[*1] B.Sc. **Menna Tarek**, [2] Prof. Dr. **Ghada Farouk Hassan**
[3] Prof. Dr. **Abeer Elshater**, [4] Dr. **Mohamed Elfayoumi**
[1, 2, 3 and 4] Ain Shams University, Faculty of Engineering, Cairo, Egypt.
E-mail [1]: menna.tarek@eng.asu.edu.eg , E-mail [2]: Ghadafhassan@eng.asu.edu.eg
E-mail [3]: abeer.elshater@eng.asu.edu.eg , E-mail [4]: m_fayoumi@eng.asu.edu.eg

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ABSTRACT

Many studies have been conducted over the last 20 years to determine and measure factors that affect the walkability of city streets. Walkability is an essential factor in deciding whether a city is green or sustainable. This paper creates a comprehensive walkability index by analysing built environmental indicators that affect walkability. This research was conducted on mixed land use streets in Cairo, Egypt, combining the results from an online survey and a walkability assessment model developed by multi-criteria decision analysis techniques. The results were based on a three-pillar approach starting with the theoretical background to frame the walkability indicator, numerical assessment over the Egyptian cases using a multi-criteria decision-making (MCDM) technique and a qualitative user perception survey. Our results confirm that determining to what extent Cairo's streets are walkable is crucial to enhancing pedestrians' perceptions of the walking environment. Furthermore, the results illustrated the essential factors within the built environment indicators that influence pedestrian walking behaviour.

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1. Introduction

Research describes the essential need for the start and endpoint of any walking experience (Capitanio, 2019; Caymaz, 2019). Walking is also the only way several people can approach everyday activities (Chapman & Olson, 2017; Hussein, 2018; Ferrer, Ruiz, & Mars, 2015). However, the streets and public spaces once meant for pedestrians are being degraded and invaded by private cars, pulling an active social life from residents that formerly walked on the streets (Balsas, 2021; Krambeck

***Corresponding Author:**
Ain Shams University, Faculty of Engineering, Cairo, Egypt.
Email address: menna.tarek@eng.asu.edu.eg

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& Shah, 2006). Forsyth and Southworth (2008) argue that walkability is the foundation of a sustainable city, and it comes with substantial social, environmental and economic benefits.

Recently, walkable environments have been carefully considered in urban design and public health (Ewing & Handy, 2009; El Helou, 2019). One of the most critical aspects of city planning is walking. Research has linked walking to reduced obesity and the gain of other health benefits (Abedo, Salheen, & Elshater, 2020). For example, walking reduces cardiovascular disease, diabetes and hypertension; it also decreases traffic congestion, reduces carbon emissions, noise and pollution (Alfonzo, 2005; Banister, 2007; Capitanio, 2019; López & Wong, 2019; Pucher & Buehler, 2010). In addition to creating 'liveable communities,' walkability is an essential parameter to enhance the quality of life, safety and comfort (Elshater, Abusaada, & Afifi, 2019).

Over the past 20 years, definitions of terms such as 'walkability' and 'walk-friendly communities' have become prominent in the literature (Alawadi, Striedinger, Maghelal, & Khanal, 2021). The connection between these terms with the built environment has been investigated using different tools (Shaaban, 2019; Southworth, 2005). In the current research, walkability is the extent to which the built environment promotes safety and direct access to destinations while reducing travel time and effort and providing a comfortable and appealing visual environment (Dill, 2004).

Several pieces of research classify the indicators that support walkable, friendly environments (Lo, 2009; Forsyth & Southworth, 2008; Balsas, 2021; Reisi, Nadoushan, & Aye, 2019). Since 2009, most of the walkability studies focus on macroscale indices constructed from objective, measurable variables. However, these studies neglect the microscale indicators that could be subjective (Arellana, Alvarez, Oviedo, & Guzman, 2021). Furthermore, few studies combine several indicators to generate a single walkability index (WI). The available data is limited, and no previous research has focused on the methods used to determine the built environment's walking potential in Egyptian cases. More research is needed to address this issue (Abedo, Salheen, & Elshater, 2020; Abussada & Elshater, 2021b).

Regarding walkability in the Egyptian context, definitions and contributing elements require further investigation (Abedo, Salheen, & Elshater, 2020). The rapid deterioration of Egypt's street life is apparent in overcrowded cities like Cairo, with mixed-use/commercial streets becoming more common (Abussada & Elshater, 2021b). Building on the gap in the literature, studies must assess how to integrate the macro- and micro-scale indicators into walkability indices.

A definitive link between walkability and built environment has been challenging to prove. Here, we see a challenge identical to the traditional problem of the standard governmental solution: to increase street capacity to minimise road congestion by widening streets and narrowing sidewalks (Wahba, Kamel, Kandil, & Fadda, 2021). However, according to the best countries statistics in 2021 released by US News, Egypt is ranked 51 in overall quality of life, which is considered a poor ranking (US News, 2021). Therefore, the absence of public spaces, especially the sidewalks, expanding car lanes at the costs of sidewalks, the lack of walkways, or being congested (UN Habitat, 2013) are central issues that negatively affect local walkability and, therefore, reduce the day-to-day quality of life.

There are unanswered questions about the reliability of the built environment in Egypt and its effect on walkability. Therefore, this study addresses the specific research question, "What are the methods that can be applied to formulate a revised version that fit the Egyptian cases?"

This research focuses on the urban streets of Cairo City from the pedestrian-use perspective. The purpose of the present study is to generate a local walkability index (LWI) for urban highways in Cairo, Egypt, considering the restrictions on constructing LWI from actual measurements of built environment indicators. In addition, the study aims to explore the built environment factors that would make the streets of Cairo better places for walking and more adaptable to being used by pedestrians. With this aim in mind, it would be easy to determine the challenges that would stand in the way of achieving 'walkable streets' in Cairo and how to overcome those challenges.

The measurement of the walkability in the Egyptian built environment is the focus of this research. The method used three mixed-use

streets in Cairo. First, a literature review was the basis for developing a comprehensive walkability index using built environment indicators that influence walkability. Second, the authors conducted intense site observation and online questionnaires to analyse the built environment indicators and the users' satisfaction and walking perception in Cairo's three cases. Third, the selected built environment factors were weighted, normalised, and then aggregated to a single WI for each case with the aid of a multi-criteria decision-making (MCDM) technique using the analytical hierarchy process (AHP).

This paper adds to the present literature by developing a new composite indicator for a comprehensive framework that could enhance walkability, using macro and micro-scale built environment parameters to assess walkability and create LWI in Cairo.

The paper is structured into five parts after this introduction (Figure 1). The second part illustrates the selected methods conducted in the current work to answer the research questions. The third part shows the results of scanning relevant literature on Scopus, the Web of Science, and reports, ending with the index investigated in case studies. The fourth part presents the results of the mathematical development of the index and data analyses. Finally, the fifth and sixth sections provide deductive arguments about the LWI ranking results in the Egyptian cases and provide thoughts on directions for future work.

2. Material and Methods

This section introduces a conceptual framework for comparing walking conditions in different city zones using a pedestrian accessibility evaluation. Second, it explains the research field and context used for testing the proposed conceptual framework.

2.1 Theoretical Background: Framing the Indicators of Walkability

In this section, we define the term walkability and the influencing factors. To elucidate a walkable environment, the authors outline the assessment tools and determine the relationship between the built environment and walking behaviour. The literature review depends on two sources. First, articles in Web of Sciences and Scopus; second, published reports on the relevant topic of walkability, liveability and quality of life.

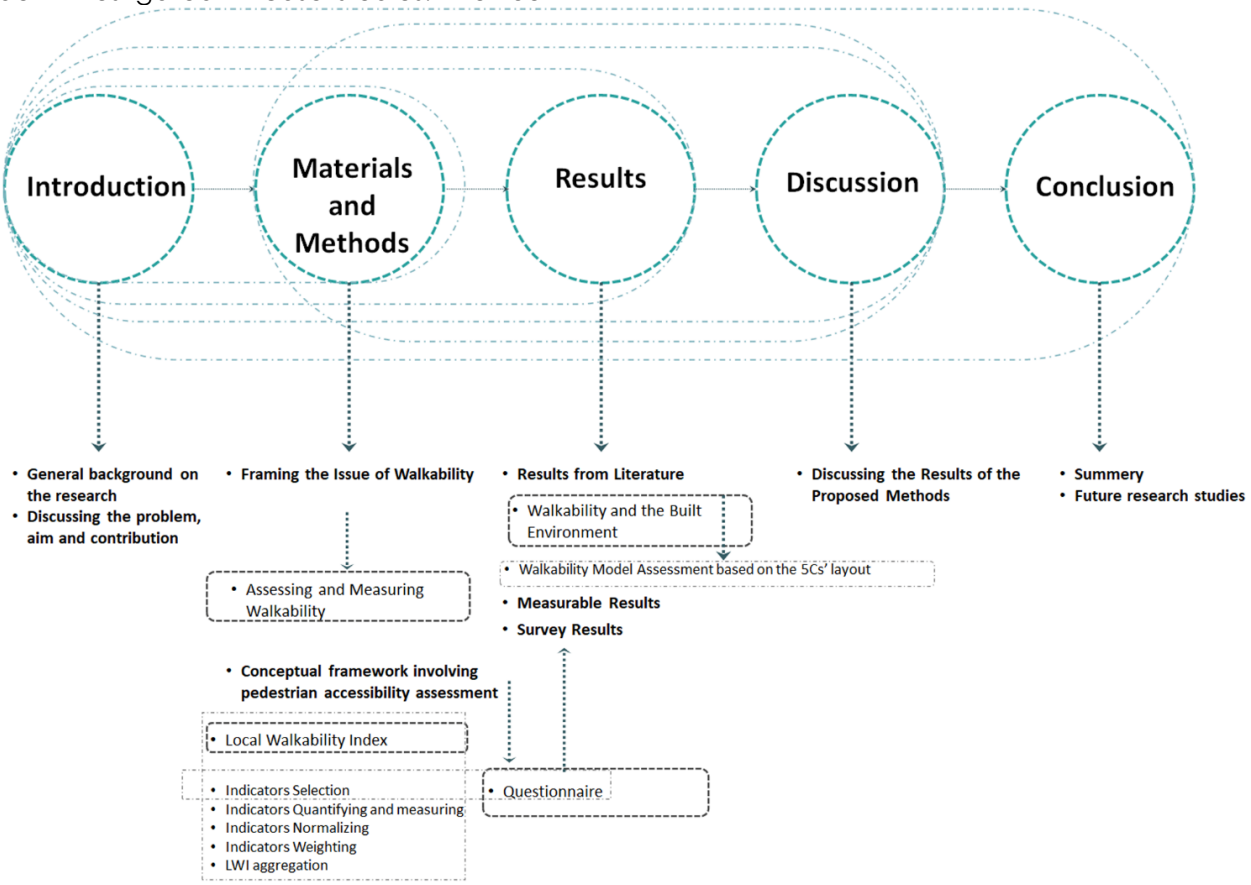


Figure 1. Research structure.

The results show that many tools have emerged to assess the quality of the built environment or the walking environment (Abusaada, Vellguth, & Elshater, 2019; Ewing & Handy, 2009; Leslie, Frank, Owen, Bauman, & Hugo, 2007). These tools gauge whether the built environment attributes are related to different physical activity levels, especially walking (Albers, Wright, & Olwoch, 2010; Alawadi, Striedinger, Maghelal, & Khanal, 2021; Department of Public Health, 2008). Like previous studies, literature was a secondary data source, and it illustrated the importance of various techniques and factors and existing measurement tools (Aghaabbasi, Moeinaddini, Shah, & Asadi-Shekari, 2017).

2.2 Study Area

Cairo is a large city with over 20 million people (CAPMAS, 2019). As documented in the literature, walkability is greatly affected by socioeconomic level and the built environment, including land use, urban form, street network, and landscape design (Alawadi, Striedinger, Maghelal, & Khanal, 2021). Therefore, three case studies were selected based on diversity in their socioeconomic status, built form, street systems and demographic composition. Figure 2 shows the three neighbourhoods on a google earth map.

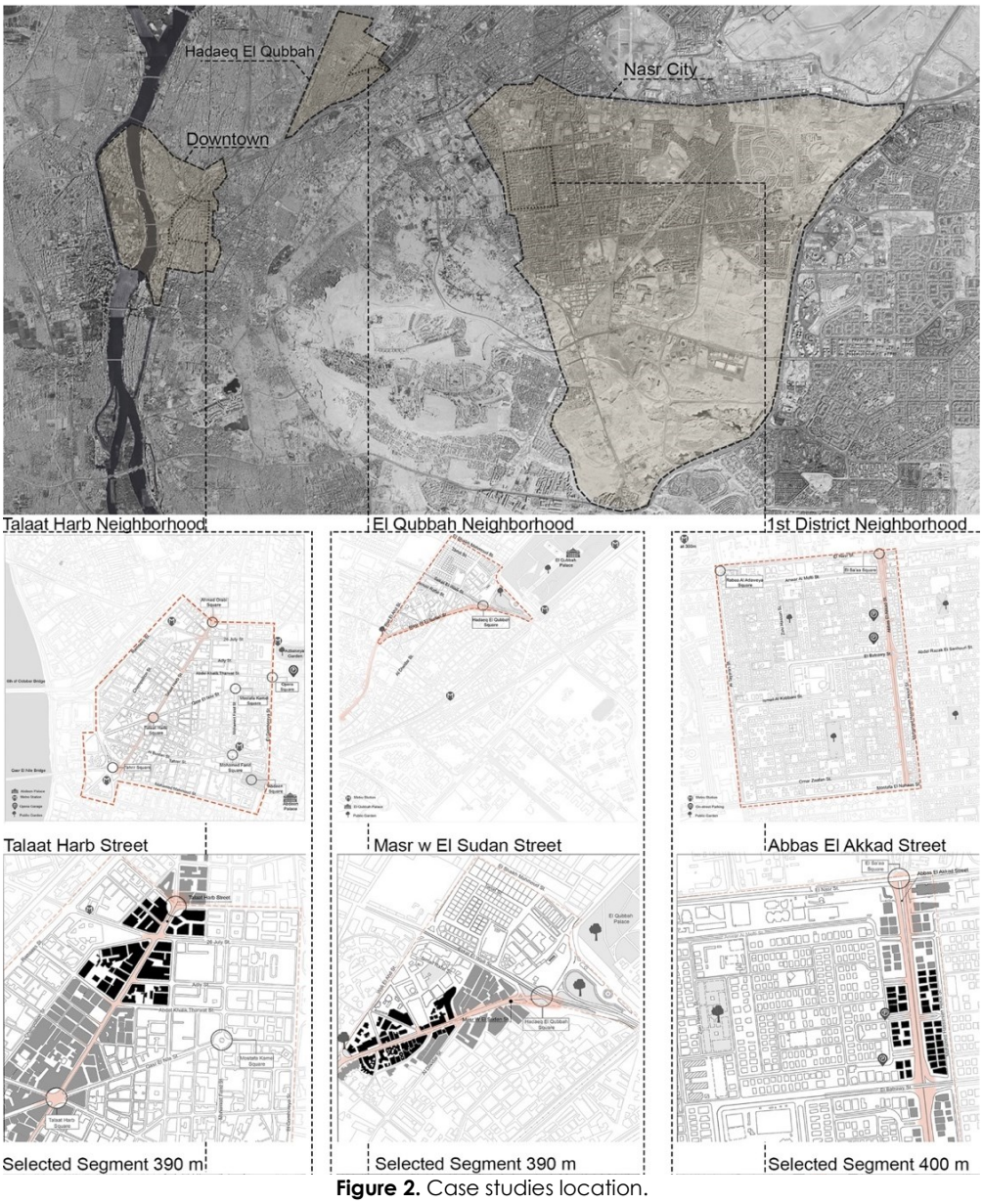


Figure 2. Case studies location.

The first case is Downtown (1798–1952), the second is Hadaeq El Qubbah (882-1908), and the third is Nasr City (1952–1987). Downtown is considered a medium socioeconomic area and the Cairo CBD. Hadaeq El Qubbah is an old urban community with historical background from 882 till 1908 when it became known as Hadaeq El Qubbah. It is now considered as a below medium-class area. While Nasr City is an intermediate urban community, it is considered an above medium-class area based on the apartment prices.

2.3 Mathematical Development of the Walkability Index

After selecting the different neighbourhoods to perform the measurement, it was necessary to choose the streets for data collection (Soba, Ersoy, Altınay, Erkan, & Şik, 2020), using criteria such as highly mixed land use (López, Toan, & Wong, 2020; Ewing, et al., 2011) and car parking along the streets. The criteria also include distances between 200m and 400m long (Pallas, 2010).

Converting the indicators first before summing the dimensionless values is critical when working with a variety of indicators. Previous research describes this process as normalisation (Nardo, Saisana, & Saltelli, 2005). Our selected indicators cover both positive and negative effects on the ability to walk in the case studies. Similar to previous research addressing positive and negative indicators, the normalisation equation differed (Reisi, Nadoushan, & Aye, 2019). Equations (1) and Equation (2) show the normalisation equations for positive and negative indicators (Krajnc & Glavič, 2005).

$$I^{+}{}_{N} = \frac{I^{+} - I^{+}{}_{min}}{I^{+}{}_{max} - I^{+}{}_{min}} \qquad (1)$$

$$I^{-}{}_{N} = \frac{I^{-}{}_{max} - I^{-}}{I^{-}{}_{max} - I^{-}{}_{min}} \qquad (2)$$

Where I^{+}_{N} is for the normalised positive indicator, and I^{-}_{N} represents the normalised negative indicator. I_{min} was the minimum value of indicator considering the three streets, I_{max} was the maximum value of indicator over the three streets.

Previous research has attempted to establish weighted walkability indices using various techniques to prevent equal weighting in their development (Albers, Wright, & Olwoch, 2010). Specific mathematical relations are used to assign weights (Organisation for Economic Cooperation and Development, 2008). In this study, we used the analytical hierarchy process (AHP) (Saaty, 1980). The AHP approach decomposes complicated situations into a hierarchical structure of the research aims and related criteria and sub-criteria.

AHP conducts paired comparisons for the indicators in each level of the hierarchy for obtaining weights for indicators. Pairwise comparisons are performed between pairs of indicators, demonstrating the relative relevance of one indication to the other, and quantified based on experts' judgments. Indicator weights and priorities were gained from experts and researchers from the reviewed secondary data and estimated from previous studies or other indicators measurements.

This research suggested an indicator aggregation and index composition after assigning a weight to each of the indicators. The aggregation occurred through the weighted linear combination (WLC) method shown in Equation (3). This method is an overlaying technique that considers the normalised values and relative weights of indicators in an aggregation (Al-shabeeb, 2015):

$$\boldsymbol{LWI} = \sum \boldsymbol{W_{ij}} \,.\boldsymbol{X_{ij}} \qquad (3)$$

Where LWI is the Local Walkability index. W_i stands for the weight of indicator $\boldsymbol{i}$ in parameter $\boldsymbol{j}$. X_{ij} is the normalised value of indicator $\boldsymbol{i}$ in parameter $\boldsymbol{j}$.

The normalised value of each indicator for each parameter was multiplied by the relative weights of the indicators extracted in the previous stage using AHP. Next, the relative weights of the indicators collected using AHP in the previous stage multiplied each parameter's normalised value. Finally, a sub-index was created by combining the weighted values of indicators in each parameter. The weight of each type was then multiplied by the sub-index value and combined into a single LWI (Aghaabbasi, Moeinaddini, Shah, & Asadi-Shekari, 2017; Gallin, 2001). Table 1 shows the interpretation of the LWI scores, ranges and the level of required improvements (LRI) at each grade (Aghaabbasi, Moeinaddini, Shah, & Asadi-Shekari, 2017).

Table 1. LWI interpretation Source: (Aghaabbasi, Moeinaddini, Shah, & Asadi-Shekari, 2017)

LRI	LWI	Grade	Condition	Description
1	80 ≤ LWI ≤100	A	Very Good	Streets deliver great services for its users
2	60 ≤ LWI < 80	B	Good	Streets adequately serve the users
3	40 ≤ LWI < 60	C	Regular	Streets serve the users adequately
4	20 ≤ LWI < 40	D	Poor	Streets do not support the users
5	0 ≤ LWI < 20	E	Awful	Streets are not provided by appropriate service to satisfy the users

This research used internal consistency to examine the applicability of the proposed tool's measurements. Cronbach's alpha was used to evaluate the consistency of this tool as it calculates how accurately a group of items measures a single unidimensional factor (Arellana, Saltarín, Larrañaga, Alvarez, & Henao, 2020). An alpha value of 0.7 or higher shows reliability (Cortina, 1993).

2.4 Qualitative Data Collection

After selecting the indicators, the authors visited the streets multiple times to gauge the 26 selected indicators in the three streets. Table 2 shows the proposed model of walkability assessment based on the 5Cs' layout and each indicator's measurement and quantification.

The survey was a pragmatic approach based on qualitative data to assess user's perception of their neighbourhood streets (Silva, Saraiva, Loupa-Ramos, & Bernardo, 2013). The aim was to evaluate the pedestrians' overall view of their walking environment. The purpose was to provide a holistic perspective of how they perceive the built environment of their neighbourhood streets and the level of satisfaction of the current situation. Due to the COVID-19 pandemic and lockdown, we distributed an online questionnaire to users of the three streets. A range of indicators was presented to determine if each met their needs and whether they were successfully designed. The survey results were then compared to the spatial observation of the built environment, and the walkability indices were developed for each street.

Table 2. The proposed model of walkability assessment is based on the 5Cs' layout and their way of measurement.

Key Attribute	Parameter	Indicator	Ways of measurement
Conspicuous	Safety	Surveillance	Number of surveillance cameras and first-floor windows
		Bollards	Number
		Signals and Signage	Number
	Security	Lighting	Number of lighting posts
	Security from Traffic	Traffic Volume	Number of vehicles per hour
		Traffic Speed	Average speed of vehicles
		Speed Reducers	Number
Connectivity Continuity Accessibility Permeability	Sidewalks	Obstructions	Number of obstacles along sidewalks
		Crossing and Intersections	Number of services available to aid in crossing and Number of Intersections
Convenient Efficiency Function	Sidewalks	Sidewalk width	Distance from building elevation to the edge of the curb in m.
		Street Width	Distance from the edge of curb on one side to the other edge in m.
		Buffer Width	Average width of on-street parking in m.
	Land Use Mix	Active Environment	Number of Public Transport

		Relational Environment	Area of Food destinations, Facilities and Commercial and social destinations in m2.
Comfortable Facilities Aesthetics Attractiveness	Thermal Comfort	Shade and rain cover	Number of shading elements as sheds and trees canopy span in meters
		Average skyline height	Height of buildings in meter, to measure average shade of them in meters
	Streetscape and Landscape	Paving Material	Area in m2
		Seating Areas	Number
		Trash Receptacles	Number
		Trees	Number
		Landscape strip	Area in m2
	Facilities	Vehicle Parking Facilities	Area in m2
		Facilities For Disabled People	Number of ramps along the street and sidewalks
Convivial User-friendly Livable	Sociability	Pedestrian Flow	Flow of user number of users per Hour.
		Enclosure	Average building width in meter.
		Spaces for interaction	Average area of open or green spaces

3. Results and Discussion

3.1 Findings from the Literature

The authors attempt to present a new measurement method that combines the built environment's macro and micro-scale design factors and the common vital concerns on the neighbourhood and street levels. This model for walkability assessment addresses the 5Cs. These fundamental concerns are categorised according to the definition of the 5Cs and then combined with other attributes; each had a set of parameters with different indicators. These parameters include: Be

1. The **connection** between pedestrian networks facilitating pedestrian movement and support their trips. Like other research, we assessed this factor using criteria including street permeability and connectivity (Elshater, 2019).
2. **Convivial** is the quality that can create lively, pleasant, and friendly activity and interaction places. In considering this quality, we include the parameters of liveability and sociability (Elshater, 2020; Shaftoe, 2008).
3. In line with a study conducted on the case of London, the **conspicuous** quality was recommended to create walkable streets (Transport for London - TFL, 2004). This quality of safety and the welcoming nature of the space is affected by the sidewalks, pedestrian paths and public spaces. This design quality relates to spatial legibility, complexity and coherence. Where walking routes are safe, visible, well-lit, and well furnished, in our work, this factor is assessed by criteria regarding route safety and security (Abedo, Salheen, & Elshater, 2020).
4. In creating **comfortable** places, this is related to the quality of the walking environment and how the design of these places support the local facilities. Furthermore, having these facilities in place alongside the walkable paths is affected by aesthetics and attractiveness (Abusaada & Elshater, 2021a).
5. Finally, **convivence in the walking experiences** is the quality that is affected by the land use through efficiency and functionality (El Helou, 2019; Elshater, 2020).

Based on the above factors and how this research adapted them to the new model, the combined indicator can be defined as a

compilation of factors from the literature and adapted to the 5Cs layout to formulate a new set of parameters and indicators for the assessment of built environment attributes to evaluate the walkability of urban streets. We used 26 indicators based on the review of the literature. Table 2 presents a new model of the selected built environment indicators and parameters and their role in the various critical walkability factors. Our results confirmed that the walkability measurement tools are scattered between various forms, such as audits, indices and inventories (Boarnet, Day, Alfonzo, Forsyth, & Oakes, 2006; Clifton, Smith, & Rodriguez, 2007; Evenson, et al., 2009; Krambeck & Shah, 2006).

Walkability has usually been based on the features of the built environment (Forsyth, 2015). Generally, walkability is affected by factors like density (Newman & Kenworthy, 2006), while mixed land use and connectivity encourage people to walk (Iroz-Elardo, Adkins, & Ingram, 2021). In addition, the purpose of a walk might be for leisure or to access destinations without using their cars (Lu, Xiao, & Ye, 2017; Sivam, 2012). Hussein (2018) explained that the built environment and physical features on sidewalks are the primary factors influencing people's walk decisions. His study followed the concept used by Cervero and Kockelman (1997), where they defined the built environment as the physical features of the landscape architecture that mutually set a definition for the public realm of participation in everyday life experience.

According to The Transport for London -TFL (2004) report, a 5C's layout is necessary for a walkable environment. The classification and prioritisation of pedestrians' quality needs are often based on the approach (Refaat & Kafafy, 2014). Research has suggested design qualities that can support the walkability of the street environment, where the area should be convenient, conspicuous, convivial, comfortable and consistent (5Cs) (Abedo, Salheen, & Elshater, 2020; Iroz-Elardo, Adkins, & Ingram, 2021; Transport for London -TFL, 2004). The Public Transport Authority of Australia endorsed the 5C's layout (Australian Public Transport Authority, 2012).

In summary, Table 3 shows the mentioned Key Attributes and walkability concerns in the literature combined with the 5C's approach to develop the model to assess walkability. Consequently, Zayed (2016) deduced that 'walkability' is the extent that an urban context promotes walking. Furthermore, in reviewing relevant literature, there is consensus that the built environment's main physical attributes enhance walkability.

Table 3. Adoption of the walkability requirements and crucial keys driven from literature.

Concerns and Characteristics / Key Attributes	Connectivity Continuity Accessibility Permeability	Convivial User-friendly Liveable/ Sociability	Comfortable Aesthetics Attractiveness Facilities	Convenient Efficiency Functionality	Conspicuous Safety Security	Consistent Sustainable	Legibility Ease of use	Diversity/Coexistence Design /Density	Economic Feasibility Socio-Economic	Coherence	Human Scale
Mid-America Regional Council (MARC) (1998)	•	•	•	•	•			•			
Transport For London, UK (2004)	•	•	•	•	•	•					
Portland City, US	•	•	•	•	•	•		•	•		
Public Transport Authority of Australia	•	•	•	•	•	•					
New Zealand Transport Agency (2009)	•	•	•	•	•		•				
European Unio Financed Report	•	•	•	•	•	•	•				•

Sheila Ferrer, Tomás Ruiz, Lidón Mars, (2015)			•	•	•				
Handy, Cao& Mokhtarian (2006)	•	•	•	•	•				•
Pikora et al (2003)			•	•	•				
Stevens (2005)	•	•	•	•	•				
Boarnet et al. (2007)	•	•	•	•	•	•	•	•	
Krambeck and Shah (2006) Darmoyono and Tanan (2015)			•	•	•				
Forsyth and Southworth (2008) Giles-Corti et al. (2009)	•		•	•	•		•		•
Ewing et al. (2011) Rebecchi et al. (2019)			•		•		•		
Cevrero and Kockelman (1997)							•		

3.2 Measurable Results

The LWI was derived for each of the three streets. Therefore, it is critical to determine the street level and the sidewalk amenities to calculate the LWI for each BI indicator and the total LWI for the selected segments. Table 4 shows the LWI for the streets and the level of required improvements (LRI) for the sidewalk BI factors and the entire street environment. For example, the LWI for Talaat Harb Street is 30.99, with a 'C' grade indicating that BI adequately serves the residents (Table 4). In this neighbourhood, the sidewalk condition is acceptable, but it could be better. In contrast, the LWI ratings of Masr w El Sudan and Abbas El Akkad streets are 20.94 and 28.45, respectively.

As a result, the grade for these streets is a 'D,' as the built environment indicators suggest that these streets are in poor condition and require significant improvement. Across the three selected streets, most BI indicators received 'poor' or 'awful' LWI ratings, indicating the need for substantial improvements in traffic speed, shade and rain cover, trees, landscape strips, crossing availability, and vehicle facilities. Over the selected streets, few sidewalk factors achieved 'good' or 'very good' LWI ratings, such as the availability of bollards, seating, and enclosures requiring minor improvements.

Table 4. LWI for the selected streets and the LRI.

Built Environment Indicator	Talaat Harb St.	Masr W El Sudan St.	Abbas El-Akkad St.	Indicator Weighting	Local Walkability Index (LWI) & LRI					
					Talaat Harb St.		Masr W El Sudan St.		Abbas El-Akkad St.	
	Normalised Value	Normalised Value	Normalised Value		LWI	LRI	LWI	LRI	LWI	
Surveillance	6.06	7.71	6.24	5.2	31.49	4	40.07	3	32.44	
Bollards	16.84	1.05	2.11	5.5	92.63	1	5.79	5	11.58	
Signals and Signage	10.00	2.86	7.14	5.6	56.00	3	16.00	5	40.00	
Lighting	8.68	6.32	5.00	4.8	41.68	3	30.32	4	24.00	
Traffic Volume	5.70	6.23	8.08	4.3	24.50	4	26.77	4	34.73	
Traffic Speed	6.15	4.62	9.23	3.5	21.54	4	16.15	5	32.31	

Speed Reducers	3.33	3.33	13.33	2.2	7.33	5	7.33	5	29.33	4
Obstructions	6.49	8.65	4.86	3.3	21.41	4	28.54	4	16.05	3
Crossing Availability	7.50	6.25	6.25	4.1	30.75	4	25.63	4	25.63	4
Sidewalk width	8.21	1.54	10.26	5.7	46.77	3	8.77	5	58.46	3
Street Width	6.10	2.93	10.98	2.5	15.24	5	7.32	5	27.44	4
Buffer Width	5.00	5.00	10.00	5	25.00	4	25.00	4	50.00	3
Active Environment	10.00	6.67	3.33	2	20.00	4	13.33	5	6.67	2
Relational Environment	5.98	4.11	9.91	4	23.92	4	16.44	5	39.64	4
Shade and rain cover	9.21	7.30	3.49	2.1	19.33	5	15.33	5	7.33	2
Average skyline height	6.85	4.93	8.22	5.5	37.67	4	27.12	4	45.21	3
Paving Material	7.22	4.98	7.79	5.6	40.44	3	27.91	4	43.65	3
Seating Areas	6.67	0.00	13.33	5.7	38.00	4	0.00	5	76.00	1
Trash Receptacles	9.23	7.08	3.69	5.5	50.77	3	38.92	4	20.31	4
Trees	8.67	7.67	3.67	2.01	17.42	5	15.41	5	7.37	2
Landscape strip	0.00	14.22	5.78	1.6	0.00	5	22.75	4	9.25	2
Vehicle Parking Facilities	1.11	6.82	12.07	1.1	1.22	5	7.50	5	13.28	2
Facilities for Disabled People	6.09	8.70	5.22	5.6	34.09	4	48.70	3	29.22	4
Pedestrian Flow	8.74	4.60	6.67	2.5	21.84	4	11.49	5	16.67	2
Enclosure	9.23	6.15	4.62	8.1	74.77	2	49.85	3	37.38	4
Spaces for interaction	8	8	4	1.5	12.00	5	12.00	5	6.00	2
Overall LWI					30.99		20.94		28.45	
Overall level of required improvements					3		4		4	
			Grade		Regular		Poor Condition		Poor Condition	

3.3 Internal Consistency

Table 5 displays the Cronbach's alpha for each indicator's LWI in each street. As previously stated, to demonstrate a reliable scale, the Cronbach's alpha value should be at least 0.7. During this investigation, the Cronbach's alpha of the three studied streets have coefficients of 0.77 or more. The high, moderate, and increased alpha values in all three neighbourhoods indicate that the questionnaire produces consistent results over time and throughout the neighbourhoods with varying characteristics.

Table 5. Cronbach alpha results

	Talaat Harb St.	Masr W El Sudan St	Abbas El-Akkad St.
Surveillance	0.77	0.98	0.99
Bollards	0.81	0.96	0.95
Signals and Signage	0.83	0.94	0.97
Lighting	0.84	0.94	0.96
Traffic Volume	0.85	0.96	0.96
Traffic Speed	0.86	0.98	0.97
Speed Reducers	0.85	0.94	0.98
Obstructions	0.84	0.94	0.97
Crossing Availability	0.82	0.97	0.93
Sidewalk width	0.85	0.98	0.97
Street Width	0.84	0.94	0.94
Buffer Width	0.85	0.96	0.99
Active Environment	0.85	0.96	0.95
Relational Environment	0.85	0.96	0.98
Shade and rain cover	0.83	0.94	0.95
Average skyline height	0.83	0.94	0.95
Paving Material	0.83	0.99	0.91
Seating Areas	0.82	0.92	0.98
Trash Receptacles	0.85	0.96	0.96
Trees	0.87	0.95	0.99
Landscape strip	0.87	0.98	0.99
Vehicle Parking Facilities	0.83	0.90	0.97
Facilities for Disabled People	0.85	0.97	0.98
Pedestrian Flow	0.79	0.90	0.96
Enclosure	0.86	0.97	0.97
Spaces for interaction	0.97	0.95	0.97

3.4 Survey Results

The online questionnaire results were obtained after three days, the total number of respondents was 387. Table 6 shows the respondents' socio-demographic characteristics.

Table 6. Socio-demographic characteristics of the respondents.

Characteristic	**Talaat Harb St. (n= 112)**		**Masr W El Sudan St (n=107)**		**Abbas El-Akkad St. (n=168)**	
	N	**Percentage %**	**N**	**Percentage %**	**N**	**Percentage %**
Gender						
Male	46	41.1	39	36.4	65	38.7
Female	66	58.9	68	63.6	103	61.3
Age						
18 - 26	34	30	33	30.8	41	24.4
27 - 31	27	24.1	29	27.1	82	48.8
32 - 46	25	22.3	19	17.8	23	13.7
47 - 60	19	16.9	21	19.6	19	11.3
60+	7	6.7	5	4.7	3	1.8
Duration of the walk	.					
Less than 10 minutes	26	23.21	26	24.3	25	14.9

10-19 minutes	25	22.32	28	26.2	73	43.5
20-29 minutes	34	30.36	19	17.8	43	25.6
30 minutes or more	27	24.11	34	31.8	27	16.1
Type of Users						
Resident	22	19.30	24	21.30	21	18.40
Going to school/ Work	20	18.20	23	20.80	20	17.60
Exercise /sports	4	3.50	9	7.60	4	3.30
Going to bus stop/public transportation.	8	6.70	6	5.60	7	6.60
Going to a daily service	13	11.70	14	12.50	12	11.00
Shopping	51	45.70	45	40.30	52	46.30
Visit neighbours or relatives	23	20.10	25	22.30	22	19.50
Enjoy the outdoors	14	12.30	13	11.60	12	10.40

4. Discussion

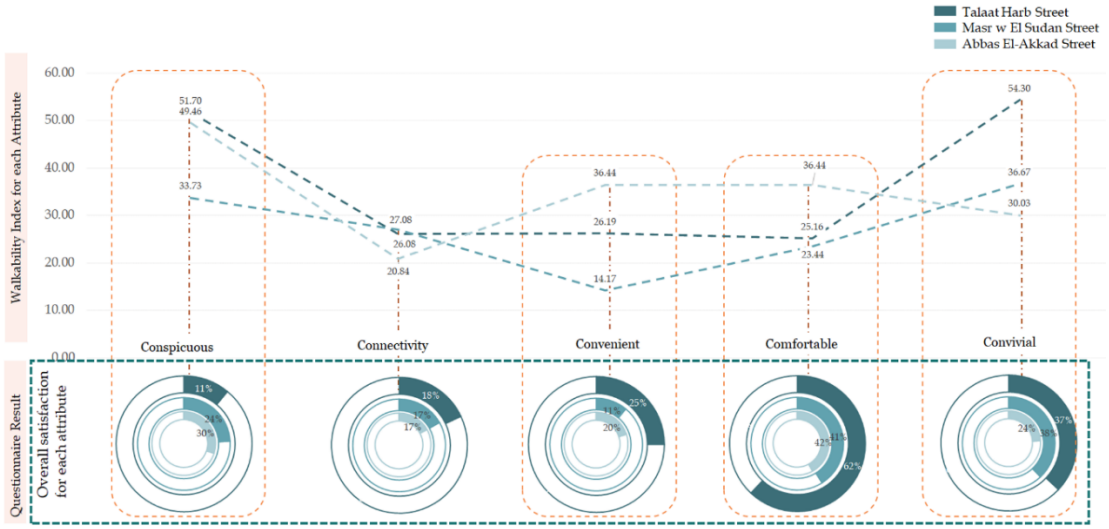
Our findings identified relationships between the survey results and LWI values of three streets for the 5Cs' attributes, parameters, and indicators. User satisfaction for the three streets regarding the attribute of 'conspicuous' was less than the calculated indices for the attributes. There was a difference between the results for 'comfortable' compared to convivial and convenience attributes. The level of user satisfaction was higher than the calculated indices (Figure 3a).

The results confirm the importance of including users' perceptions and their satisfaction in perceiving the built environments to achieve the highest walkability indices. The result of the survey and the LWI for the 5Cs' attributes proved that people's perception of the three streets regarding conspicuousness is less than the measured index. Regarding convenience and conviviality, there was a slight difference between the two measures. However, for comfort, users showed high levels of more than the measured indices. The relationship between survey results and the measured indices differs from the parameters. The results here show that people's satisfaction level with safety from traffic is less than their index indicates for the three streets. While the quantitative assessment of the safety parameter was measured to be high, users did not feel safe from traffic, so the measure does not appear to meet the objective. Vice-versa, for the mixture of land uses, the satisfaction level is higher than the measured index that indicates applying all types of uses does not fulfil people's needs. Both indices and satisfaction are nearly equal in the three streets (Figure 3). Our results about walkability parameters in Egyptian cases align with other research that confirmed effective land use could promote walkability (Abedo, Salheen, & Elshater, 2020; Abussada & Elshater, 2021b; Balsas, 2021; Lu, Xiao, & Ye, 2017). Furthermore, these results demonstrated in this paper match state-of-the-art methods. Finally, the results from Egyptian cases confirm previous studies, where a convenient environment facilitates residents to go on food in their daily lives and walk for their commute (Elshater, 2020; Hussein, 2018).

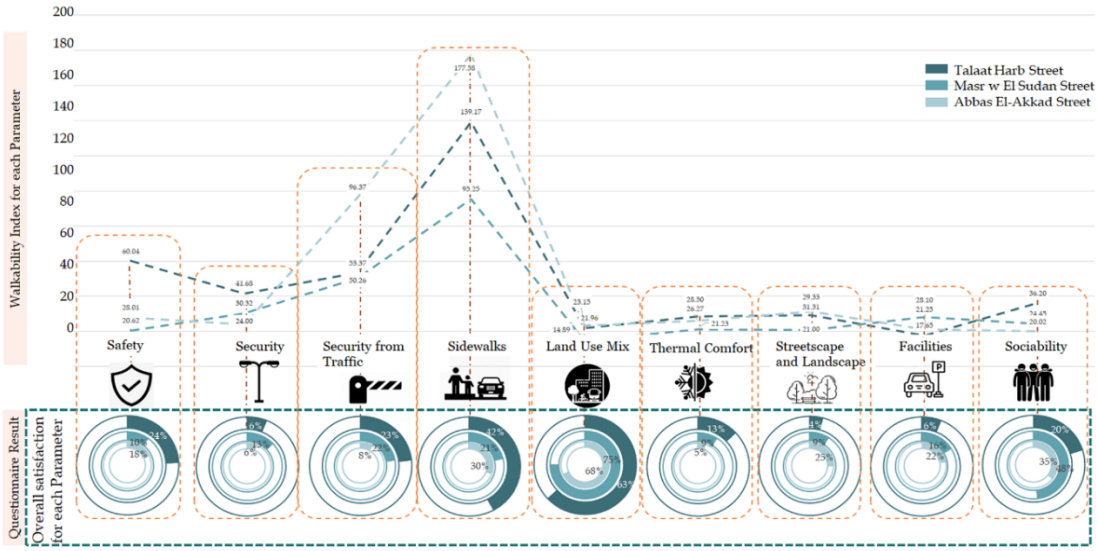
Because of the inability to face-to-face interview residents, we decided not to investigate users' satisfaction using an online survey. One concern about the survey findings was that we used a limited sample size. Another limitation in the walkability investigation involves using various methods like space syntax or Walk Score to verify the numerical results of normalisation for positive and negative indicators.

The present findings confirm that 12 out of the 26 indicators were the most effective based on their opinions. However, their level of satisfaction was nearly equal to the calculated indices on the three streets (Figure 3c). In sum,

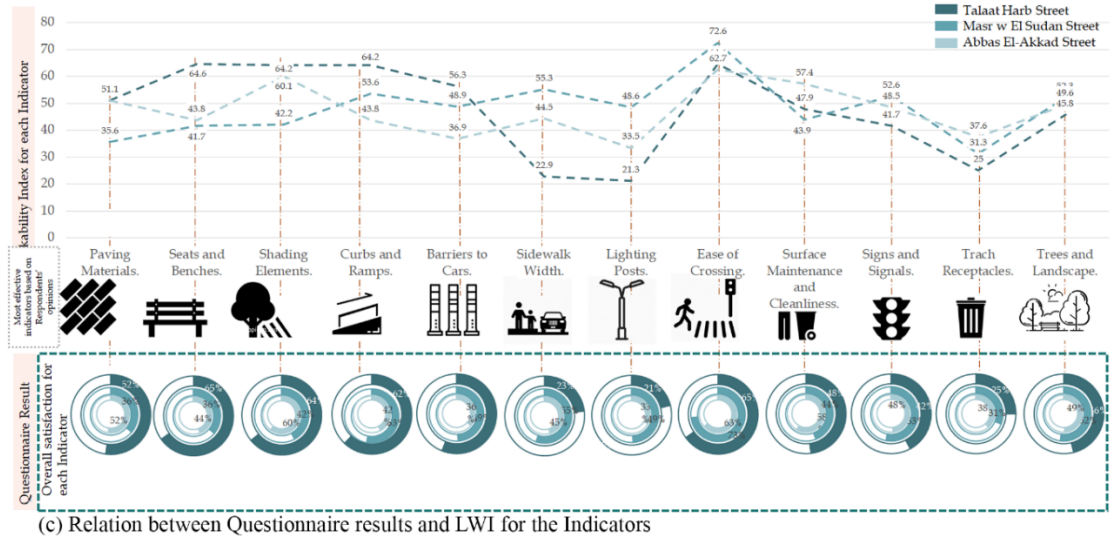
these results show a gap between the level of satisfaction and how they perceive the walking environment and the theoretical framework for achieving a walkable street.



(a) Relation between Questionnaire results and LWI for the 5 Cs' Attributes



(b) Relation between Questionnaire results and LWI for the Parameters



(c) Relation between Questionnaire results and LWI for the Indicators

Figure 3. Relation between survey results and LWI for the indicators.

The further novel finding on the parameters is that the relationship between questionnaire results and LWIs had a colossal difference. For 'safety from traffic', the index obtained was higher than the level of satisfaction, and visa-versa with 'land use mix', and for 'sidewalks.' It had the most significant difference as the walkability indices were higher than the level of satisfaction (Figure 3b).

The added value of this research is in comparing the measured walkability indices for the built environment, which the authors have developed with users' level of satisfaction using a survey. This research breaks new ground in highlighting the importance of perceptions of the built environment on their walking behaviour. In this respect, investigating people's perceptions and the most effective indicators should be considered in developing local walkability.

5. Conclusion

This study looked at 26 environmental indicators that affect walkability on Cairo's streets, divided into nine parameters and five categories. A new compliance measuring method that combines the built environment's macro-and micro-scale design indicators and the common vital concerns mentioned in literature at the neighbourhood and street-level addressed to the 5Cs, was presented. Using this method to calculate the walkability indices for the selected streets in Cairo and comparing the resulting index to the respondents' answers and their level of satisfaction from the developed questionnaire could help decision-makers determine the features of the built environment that needs development to achieve more walkability levels. This spectrum of indicators can make this tool universally applicable. A single walkability index was developed by providing indicator weights based on their relevance and importance, then combining them. Finally, the reliability of the built environment indicators used in the LWI was tested using an internal consistency test. All indicators showed moderate to high reliability across the studied neighbourhoods.

Due to the limitations resulting from the COVID-19 pandemic and lockdown, future research should consider measuring perceptions and satisfaction with a range of on-site questionnaires, field studies, semi-structured interviews and analysis of the indicators. Multi-disciplinary approaches are also helpful, and the research should include input from urban planners, designers, sociologists and health care professionals. Based on the research limitations, future work includes an extensive study of streets in neighbourhoods of varying character, considering the design of new cities and how urban planners and governmental authorities plan them. Other quantitative measuring tools could be adopted alongside the established WI and the questionnaire.

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Conflict of interests

The authors declare no conflict of interest.

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Heritage Preservation as Strategy for Recomposing Conflict Territories

Prof. Dr. **José Manuel Pagés Madrigal**
Architecture & Urban Design, German University in Cairo, Egypt
E-mail: jose.madrigal@guc.edu.eg

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ABSTRACT

Heritage admits diverse readings depending on different territorial spaces, contexts, and knowledge fields. The relation between Heritage and the social contexts is one of these knowledge areas. But Heritage accepts a dual perception as a cultural reflection. It may be considered either as the origins of the conflicts or the engine for recomposing disrupted territories. The paper proposes a reflection on the topics related to conflict territories and the roles currently played by Cultural Heritage. The recomposition of conflict territories is based on a continuous intercultural approach with important contributions from human rights, genders equality, intercultural dialogue perspectives and the fact of taking heritage as a territorial stabilization factor. The paper presents specific practical cases in the Eastern Mediterranean region where actions on Heritage religious elements collide with the national sovereign of the respective current countries. A comparative study among these different actions proves that the initial clashes can be progressively transformed into strategies able to become the future guideline for the resolution of heritage regional conflicts. These conflicts reflect two discourses: political (with strong links between national identity and religion) and scientific (with a clash between static concept and dynamic vision) where objects interact with the visitors.

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1. Introduction

Heritage victimization became one of the main problems of cultural preservation linked to national conflicts in the 20th century. The assigned role to Heritage as the brand identity of the opposed parties in these armed conflicts provoked the lust for annihilation due to a double convergence: the disappearance of the enemy's national symbols as well as the fact of assigning to this demolition the symbol of a victory over the enemy.

Enemy's heritage reconstruction over opposite territories was in this case in a difficult position, since the fact of accepting it would imply the recognition of the enemy's values. This option is, in fact, more difficult to defend when religious and political values are mixed in the conflicts, as it was in the cases presented in this paper (Kosovo and Cyprus conflicts). Heritage assumes different roles in conflict territories within the dilemma of the preservation/destruction process where other external factors must be considered. The position of complexity is initially defended by

***Corresponding Author:**
Faculty of Architecture & Urban Design, German University in Cairo, Egypt
Email address: jose.madrigal@guc.edu.eg

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Constantinou and Mete (2010), where heritage suffers the double role of the ethnical conflicts as responsible for heritage destruction as well as for the preservation due to the "frozen" development during the conflict times. The first apparent role is obvious, if we pay attention to the statistics of destroyed heritage pieces, as symbols of the territorial branding actions authored by the enemy on the opposite side (Pavlović, 2017). The second role can be considered as the consequence of the post-war period, as per the economic decay of both territories.

Historically, the heritage sites reconstruction was a task of the new "owners' of the respective territories, as the best way to re-brand them. It would be a clear intention of re-writing the history, adding layers to the cultural palimpsest wherein some regions of the world are involved. This conventional attitude is recently reinterpreted, especially in the previous century. The intentions of balancing territorial effects of post-war conflicts consequences are obvious in the reconstruction mechanisms with different meanings and actions spread on different fields and perspectives: social, economic, political, and Heritage reconstructions act on the same complex territorial space (Legnér, 2018). This shared space is not the best scenario for having successful results and so many variables are playing and conditioning these results (Giblin, 2014). The best example for understanding this problem can be Kosovo, where so many actions have been applied but definitive results were not evaluated yet. One of the variables to be considered in these reconstruction processes is the relation between Heritage and social contexts. Heritage, as a cultural reflection, has a dual perception. It may be considered as the origin of the conflicts, suffering their negative consequences. At the same time, it may be conceived as the engine for recomposing disrupted territories. This paper tries to be a reflection on the roles of Heritage in conflict territories and is divided into two main blocks. The first one develops the theoretical approach through reviewing the performed Heritage's roles as well as the different parallel steps identified within the war or conflicts avatars. The second block presents some cases of management in conflict territories in Eastern Mediterranean countries with different results. The conclusion tries to summarize the most important topics to be taken into consideration in cases where Heritage can contribute to a social and territorial recomposition.

2. Heritage as a part of historical identity

No one can forget the capacity and the strong contribution of Heritage for defining a certain territorial identity. Heritage can be conceived as a system where the idea of being the repository of many memories over a certain territory. It reveals a solid relationship between the social group and the territory where the human effect on it through different cultural manifestations became as identity signals. In a wider perspective, identities' creation preservation is strongly based on culture and cultural heritage.

Di Pietro et al. (2018) reminded in their work the important role of the culture in the identities' creation and human development, understood in the individual level, as well as the communities' ones. Both concepts, Heritage and Culture, play a double role since they influence and at the same time, they are affected by the daily life of each social group. Heritage can induce different meanings and experiences to different social groups and communities, disseminating cultural values and generating new resources (González, 2008). Cultural heritage contributes to the development of social groups. Cultural heritage and its associated sense of identity are generally used as elements with high potential influences over social groups and individuals. This practice is even stronger in conflict times and conflict territories. One common practice is branding territories with heritage. Territorial branding becomes an obsession and an extended practice. Religious buildings' locations contribute for that and Mediterranean conflict cities show so many examples. The spatial dispute between the Maronite Cathedral of St Georges and Mohammed Al Amin mosque in Beirut is a clear example, where successive enlargements of the bell tower of the Cathedral try to remark its visibility, especially after the mosque was built.

Cultural heritage generates resources able to form cultural identities of social communities. Either Culture or cultural heritage can be perceived as individual and groups phenomena, influencing our knowledge, beliefs, and emotions. The cultural heritage generation process partly involves a selection that is based on the prevalence of some elements from settings. In this case, multiple cultures from different groups make up our Mediterranean societies contribute to this

amalgam. We can accept or reject traditions, though often only with difficulty, and we can move to new environments. All social cultures practised territorial branding as a way to perpetuate their existences. There was a wide fan of possibilities to brand these territories. Concerning the cultural Heritage manifestations, we can identify these groups. Table 1. summarizes these different manifestations. This table includes the different Heritage's uses expressed through time and different scales. These attitudes are not necessarily diachronic and can be sorted into four groups of attitudes where the territorial and landscapes effects are visible, as well as the identities' processes are hardly linked to the previous effects.

Table 1. Heritage presences over territories.

		Big scale (territories)	Medium-scale (social groups)	Small scale (domestic)	Characteristics	Samples
Topographical and geographical aspects	**Starting steps of societies (initiating process)**	Mega-scale monuments	First funerary manifestations and establishing relations with planets and stars	The refuge as the first cultural habitational manifestation	Strong relation between the Man and the Environment	Göbeklitepe, Turkey Stonehenge, UK
	Consolidating actions over territories	Terraces as territorial sculptures	Urban patterns for the first settlements	The domestic architecture as a compendium	Inventing signals or adapting foreign ones	Cinqueterre (Liguria)
Branding territories	**Preserving identities against acculturations**	Defining the idea of nationalism	Blocking public manifestations of the foreign cultures	Preserving and improving the own cultural manifestations	Religions as a specific tool for that	Reuse of the churches to be used as mosques
	Expanding cultures and invading territories	Imperial scale	Religion and architectures join efforts to insert strong local signals	Colonization of cities through the importation of typologies	Extrapolating cultures and backgrounds	Roman Empire, South America, British colonies
Identities' prevalence	**Reinventing identities**	Destruction of external signals as obsessions	Cleaning/filtering other cultures/ Substitution of the landmarks	Local confusions	The strong intention of being different from the neighbourhoods (Skopje)	Skopje, Albania, North Korea
	Reinforcing nationalities	Improving and supporting nationalisms	Reinventing and forcing national architectural styles	Blocking the family status to other cultures (endogamy)	Modifying the urban landscapes	Serbian orthodox churches today out of Serbia
Territorial palimpsests	**Sharing territories, sharing heritages**	The multiplicity of territorial landmarks	Proposing the common use under restriction or rigid management instructions	Mutual forced or voluntary acceptance	Recovering multilayer structures	Prizren Nicosia

3. Heritage as a genetic cause of clashes

In general terms, all worldwide societies, especially the European ones, are progressively more attracted by their respective cities' historical dimensions. Their physical and cultural traces contribute to the territorial branding and reinforcement of their identities. This process matches entirely with the European discourse symbolized by the Florence convention of the Council of Europe-2000. The German presidency of the EU in 2007 brought up the capacities of the European cities to combine cultural and architectural qualities with their social inclusion's potentials to improve together strong possibilities for economic development. (Leipzig Charter on Sustainable European Cities, Informal Meeting of ministers responsible for Urban Development, 2007). This entire scenario is real in peacetime. Cultural landscapes can change in wartimes, especially when conflicts are generated in a small territory and they achieve other ranks.

Some research fields pay specific attention to the ways how cultural heritage leads to conflict. It happens in conflict territories where identity recomposition becomes a priority task, using heritage as a resource for that. This kind of process, being susceptible to be discussed from a scientific perspective, assume in such times a negative effect when the achievement of these objectives is understood through the destruction of heritages symbolizing opposite political, social, or religious thoughts. Heritage is so often rendered as a war target. Cultural contestation is a fact in these cases, as a reflex of different cultural streams and social statements over conflict territories. The dispute is not only spatial but ideological.

Governments play an important role through the definition of policies supporting or not this cultural contestation. Accordingly, there is a temptation of considering heritage, through its redesign, as an instrument of political division in conflict territories. This fact affects not only tangible but intangible expressions of Heritage. We can note these facts in several divided territories: names of the streets in Sarajevo (Sarajevo and East Sarajevo) define certain territories through the commemoration of different facts. Famous parades, considered as urban expressions of diverse and opposite realities, fulfil the city of Belfast. Heritage objects, like religious buildings, are used as a way to express a territorial domain. This explains the referred spatial dispute between churches and mosques in Beirut. Reusing religious buildings to be containers of the rituals of the opposite religion linked to the other party is another cultural branding. The simple abandonment of the landmarks of the opposite party will lead the urban landscapes to a slow change till their disappearances. These facts are reflected in Cyprus Island. The "wrong location" of the heritage of such community after the post-conflict territorial re-distribution propitiates this kind of actions: The Cathedral of St Sophia in Lefkosa, and Santa Maria Abbey in Omerye-Nicosia or St George Church in Famagusta, and Agia Sophia old Church in Moutallos – Paphos, were transformed into mosques. In a parallel way, the Armenian church in Arabahmet-Nicosia [1] lost its common function to be infra-used nowadays (Figure 1).

Figure 1. Bedesten as an exhibition hall in Lefkosa (left), Omeriye mosque in Nicosia (centre and Agya Sophia in Lefkosa (right).

3.1 States' roles over the respective heritages: post-trauma scenarios.

The role of the states over Heritage has been progressively intense from a managerial perspective. The pre-modern scenarios were based on a private initiative and two basic ideas. The stakeholders of the heritage production and maintenance were so far from the own state since the Heritage concept was even unknown, and the inconsistency of States as protectors and main stakeholders of Cultural Heritage protection was so far of being effective.

A historical overview of Cultural Heritage protections has diverse precedents. The first collection's concept during the Late Medieval and Early Modern Periods came from the idea of reducing the whole world History into a single closed space to its "antiquarian interest". The acquisition as a social value, the rarity of different objects, their aesthetic quality as well as the fact of objects being taken from the enemy as a part of wars' spoils were in the origin of so many collections. This phenomenon is visible in the collections of Pedro Henriquez de Acevedo, the founder of Casa de Pilatos palace in Sevilla, where the pieces are shown to come from the different campaigns of this general caught during his different wars in Italy (16th century). Time, place, and social prestige were factors able to assign certain values and they were criteria for the selection of the materials to be collected.

A second factor played an important in this process, due to the enlargement of the known World after discoveries in America and India. In this case, the social prestige would be substituted for national prestige, as the country can assume a colonialist role. This role was taken by Institutions, most of them religious and the State would symbolize this kind of action through the fact of extrapolation of some elements (usually architectural objects) to other new buildings, as symbols of victory over the enemy. Monuments, as new entities during the 19th century, as well as the new concept of national heritage led societies to consider these new entities as a symbol of power linking

[1] Recent Europa Nostra award in 2015 for its restoration

in a material way Culture and Power. Colonialism let eradication and pillage of the original Heritage sites, either at local, regional, or international levels. Different reasons were assumed alongside History and these kinds of processes were done in the last regional conflicts.

First World War (1914-1918) was the starting point to use weapons of extreme force with scenarios of heritage destruction, used in this case as a punitive action against the enemy. Second World War (1939-1945) repeated the same schemes enlarging the scale of destruction till the total eradication of settlements. In both cases, it is not possible to talk of collateral effects of war actions but a premeditated strategy with punitive effects to be suffered beyond the end of the war: the disappearance of heritage objects from the collective memory of a country. So many scientific answers to these phenomena were achieved, as a direct positive consequence of that. So many University departments were focused on the destruction processes and their consequences, as well as the development of the restoration theories, linked to the different complex practical cases for recovering the destroyed built heritage.

During the second half of the 20th century, after the II World War, various initiatives converged into a common goal of preserving memories as the way to understand the present and beginning to formalize the future in the planet. UNESCO´s contribution was vital for that. This fact encouraged heritage studies as well as another perspective of the topic: the heritage business. Tourism and Heritage run parallel paths. The use and abuse of these practices are provoking nowadays a double phenomenon: lack of authenticity in such scenarios with an important down in identity terms and exacerbations of heritage assets as objects of sale, either through their temporary enjoyment or through a banalization of the heritage concept.

Cultural Heritage has been, in fact, the conceptual basis of the arousal of nationalist movements. It is normal to see how heritage objects are symbols to reclaim certain old sovereignty status over territories in recent nationalities, as a way to promote social conflicts, either from extremist or chauvinistic perspectives. Trauma interventions and wars do not finish when ceasing fire. Fights continue in a hidden way till achieving social control over territories. There are different manifestations of fight: they go from the simple destruction of monuments of previous cultures on the site as a form of eradication of the history and culture up to distorted interpretations of the same cultural heritage, as a simple manipulation of the facts to translate History into a more convenient version favouring certain religious or political movements linked to the current territorial status.

Post-trauma scenarios led to various options and the Role of International Institutions in conflict territories is considered so important for the recomposition of scenarios where spatial sharing can be possible. A substantial difference between modern and recent contemporary states is related to the attitude facing the Heritage problem. The modern government would play the role of promoting Heritage as a preserver of their memories and in the case of the colonized countries, the role of curator of different local Heritage provoked the abuse of dislocating local memories to the own National Museums. Contemporary governments of countries coming from post-trauma interventions try to control and translate Heritage in a distorted way. Almost all of them try to take advantage of the different scenarios as the best way to command the new heritage landscapes

Two references to post-trauma scenarios are indeed tackling the main issue: Andrieux (2016) summarized the statement in the last 40 years "*… heritage has become unwillingly one of the great symbolic stakes of the ongoing conflicts over the planet*." According to Hutchings and Dent (2017) "*Heritage will be questioned as a symbolic social construction, a catalyst for appropriation and/or identity-making and the object of memory discourses*." Cultural Heritage becomes in this case a sort of instrument for imposing and challenging domination.

In these scenarios, the contribution of the International Institutions is essential for adequate territorial recomposition, where the *Heritagization* plays an important role.[2] This process, when applied to the different realities that were inherited (objects, cultures, even intangible memories), is totally necessary for the construction of historical narratives and

[2] Heritagization is a loanword taken from the direct translation of French term Patrimonialization

propose valid Heritage policies promoted by the new governments.

3.2 The Cypriot case

Cyprus presents a unique case in the Mediterranean Basin, as an immense cultural crossroad is. Historically considered as a conflict territory, Cyprus became a laboratory where all the confrontations between Christian and Muslim communities assumed different scenarios: Venice vs. Ottoman Empire, just after Lepanto battle; Ottoman Empire vs. British Empire; and the recent episodes of the civil conflicts between Turkish and Greek communities in the last century (1963–1974).

These facts eased the arousal of cultural crossroads able to configure the third kind of identities, which share the same reduced space of the island, despite the historical controversies.

In the period 1878-1974 Cyprus suffered a sequence of events that branded its history definitively up today. Since the Ottoman cession to the British Administration of the island in 1878 and its later declaration as a British Crown colony between 1925 and 1959, the final independence arrived in 1969 after the liberation struggle in 1955-1959 against the colonial rule. Coexistence between Turkish and Greek communities was short: in 1964, UN peacekeeping forces arrived in Cyprus, with the main purpose of preventing intercommunal clashes between the Greek Cypriots and Turkish Cypriots. These forces, known as The United Nations Peacekeeping Force in Cyprus (UNFICYP) were settled following the resolution 186/1964 of the United Nations Security Council and nowadays they continue on the island with periodical renewals.

In July 1974, Turkish forces invaded and occupied the northern third of the island, according to the Greek version. The Turkish version refers to the idea of Turkish troops' arrival to the island with the only one objective of protecting the Muslim minority, displaced up to the northern part of the island. Turkish troops are currently settled on the island. UNFICYP troops continue keeping and controlling the buffer zone, that separates both communities during the last 54 years. Both parts were uncommunicated till April 2008, when the Ledra street checkpoint opened. The hard blockage of the intercommunal frontiers ended after 34 years.

This scenario contrasts with the necessary cooperation between both communities for the resolution of territorial common problems: Nicosia Master Plan became vital for that. This urbanistic tool was conceived as a bi-communal initiative to change the image of the city following two urgent actions to resolve the territorial problems caused by an interrupted city. In 1978 an agreement for the preparation of a common sewerage system was achieved. One year later it was agreed to the preparation of a physic master plan, respecting initially the urbanistic decisions of both halves of the city. In 1981 a bi-communal multidisciplinary team was formed to prepare a common planning strategy for Nicosia. The agreement contained two different scales. One first step defined between 1981 and 1984 was the general planning strategy for Greater Nicosia. During 1984 and 1985 an operational master plan for the walled city was developed, being Heritage topics the focus of the project. The positive perspective was using Heritage as a conciliator element between both communities, and the negative aspects referred to the different problems and difficulties to have a reasonable treatment of the archaeological sites.

The assumption of bicommunal projects was the beginning of a sequence of successful collaborations. The restoration of certain Heritage objects became landmarks of a community on the opposite territories. We pay special attention to the works developed by the Bicommunal Technical committee on cultural heritage during the last decade. This group of experts in heritage from both sides has been the key element to develop actions under the UN auspices to promote the cross heritage of the diverse social groups, usually located on the opposite side of the island, divided into two parts after the civil war in 1974, and separated by a buffer zone controlled by UN troops.

The experiences of restoring the heritage objects after the civil war in Cyprus in 1974 were commanded by United Nations through UNDP. The creation of a Technical Committee on Cultural Heritage was possible in 2008 when UNDP contributed to reaching an agreement between both communities of the island about tasks to develop in the Cultural heritage. This bi-communal Technical Committee on Cultural Heritage started to work in 2009 when a Study of Cultural Heritage in Cyprus was requested by the European Commission. This Committee played an important role in the recovering of 70 sites and monuments on both sides of the buffer zone. This important fact is not hiding the

definition and development of a more active role of cultural heritage in the ongoing peace and confidence-building process on the island. Since 2012, this committee had the European Commission as a key partner together with UNDP. The program has been spread all over the island with more concentrated actions on the Karpasia/Karpaz area. The map below reflects the whole number of actions developed till now in different scales (see figure 2):

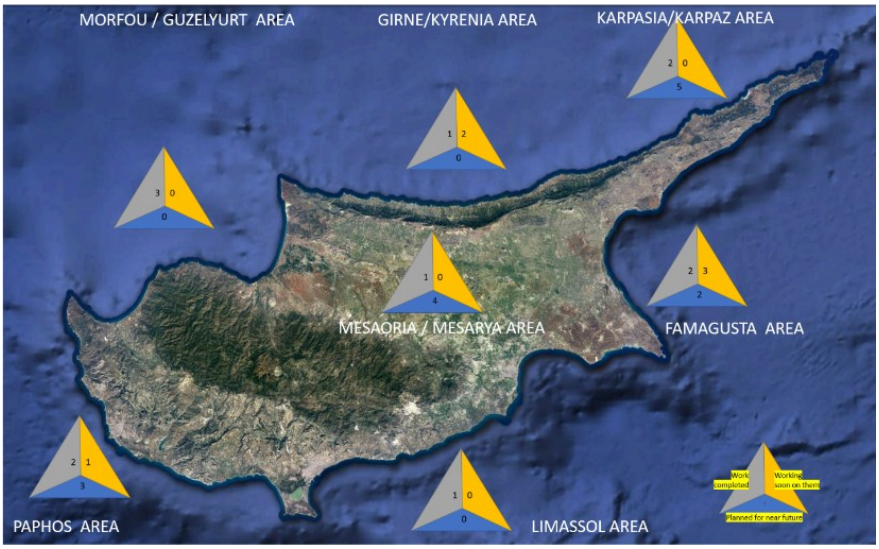

Figure 2. Action Plan developed by the Technical Committee on Cultural Heritage in Cyprus. Own adaptation with data from this committee.

Figure 3. Agios Philon after the restoration, 2021.

Last works in the Karpaz area (Agios Philon and Afendrika complex) were the precedent to the awarded action by Europa Nostra in 2021. (Figure 3)

The reaction of both communities facing the issue of restoration of built elements of the opposite ethnic group has been positive in general terms. The exception was the arson attack on the mosque in Denia, one of the villages located inside the buffer zone. This attack provoked the destruction of the entire roof as well as damages to the structural parts in stone, which obliged a new restoration.

The negative aspects related to the heritage status of the many buildings not yet restored in both parts led leads to dramatic situations in some cases. Abandoned mosques in the South and buildings are victims of vandalism carried by uncontrolled groups. At the same time, a similar statement is happening in the northern part of the island at Monastery of Antiphonitis, close to Esentepe on the northern slope of Pentadaktilos range of the island, close to Girne. Different actions managed by the Department of Antiquities and Museums provoked clashes between both national Administrations. The focus was around the excavations developed in 1983 in Galinoporni /Kaleburnu. Other polemic actions developed by the Eastern Mediterranean University were strongly contested by the southern Administration in places like Akanthou/Tatlısu; Salamis and at Galinoporni/Kaleburnu. The Cypriot Heritage experience, as a sequence of the previous bi-communal projects like the Master Plan for Nicosia, proves the feasibility of finding out common and successful solutions for common problems, basically located on the shared spaces due to the political circumstances. They even prove the possibility of shared responsibility on the projects under the umbrella of International Institutions, in this case through the coordination of UNDP offices.

3.3 The Balkans case

There is a direct relationship between the current political map of the Balkans region and

the continuous overlapping of diverse historical layers with their respective repositories of heritage objects, tangible and intangible ones. Roman traces, as well as Byzantian, Ottoman, and Austro-Hungarian presences in the region, according to a conventional traditional vision of the region, seem to explain and justify the complex vision of the region. The heritage strategies of the new states, coming from the division post-civil wars in the period 1991-1999, are dominated by two goals. The first one is the intention of looking for roots without any link with recent history, to reinforce the authenticity of this local identity. The second way is just the opposite, joining several characters, events and monuments of diverse cultures that collaborated on the construction of a territory, as a way to create a new identity, cause of current national pride.

In the first case, we can highlight the efforts of the Kosovar government as a way of reclaiming an own identity before the roman period and far from the colonial status. This is the case of the Neolithic site of 'Tjerrtorja in Kalabria site, identified almost sixty years ago. It is clear the intention of Memli Krasniqi, Ministry of Culture, Youth and Sports of Kosovo in 2012 when confirms the fact of the archaeological testimonies reflecting the traces, remains, ruins and artefacts of the past civilization, of the autochthonous population (Berisha, 2012, pp. 3–4) (Figure 4).

In the second case, a simple walk along with the new urban landscape of Skopje, as a way of identifying a new monumentality of the city, reveals the efforts of commemorating the several characters in the region: Mother Theresa can share spaces with old medieval Christian kings of the past. (Figure 5).

Figure 4. Hyjnesha Ne Fron, goddess, by Arben Ilaphastica (left) and the aerial view from Ulpiana archaeological site. Sources: https://twitter.com/illyriens and Carto database (right).

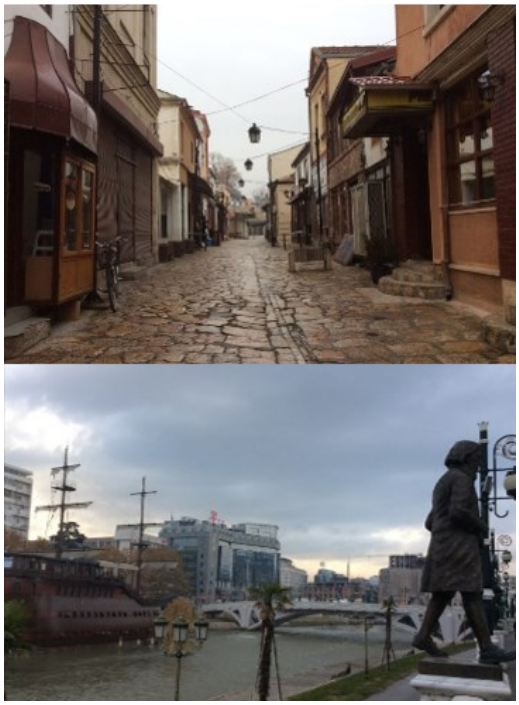

Figure 5. Different scales of the traditional and contemporary Skopje.

Balkans were always a scenario of fights between Christian and Muslim visions of the World. Both visions tried to control this strategic area. Even in the last years of Tito's regime, Culture manipulation was a fact. The culture was used as an important dividing force, just in the opposite way as an agglutinating. This instrumentalization, together with religion, was the engine for different mobilizations in the late 80's.

The Balkans conflict meant the dismantlement of Historical and cultural sites for military or political reasons. Baumel (1993, p. 3) has calculated an eradication of nearly 75% of the common heritage with the consequences of a cultural catastrophe. All the communities involved in the conflict have suffered irreparable damage in many ways.

The priority of some International Institutions was the recomposition of these destroyed Heritage-scapes, as a way of contributing to peacebuilding efforts in the region. Two interventions during these post-conflict years illustrate the feelings and intentions of the several communities: Halbwachs (1992, p. 222) confirms the inexistence of specific signs as symbols in the landscape and the needs to recompose this fact: *'A society, first of all, needs to find landmarks....it is necessary that those sites most charged with religious significance stand out against all others'*.

Dalmatian Bishop His Grace Fotije [3], when interviewed on 4 October 2002, clearly defined the intentions of recomposing the heritage as the way to keep memories of previous existences: '*At this moment, the immense effort is not only the fact that we try to preserve our sanctuaries and a small number of people in Orthodox faith but also the evidence that we exist in this region'*.

After the Balkans conflict, the scission of Kosovo from Serbia was a fact. Kosovo Liberation Army (KLA) played as a warrantor of the rights for the Kosovo Albanian communities through terror and violence. The result was an important break between Serbian and Albanian communities sharing this territory. Serbian groups were transformed into a minority and Kosovo concentrated in two blocks, one at the north, close to the Serbian frontier and the other one around Prizren. The UN Security Council Resolution 1244 established the status of international administration to govern the region (the United Nations Interim Administration Mission in Kosovo, UNMIK), and NATO peace-keeping forces (KFOR) were called to keep peace and stability in Kosovo. Currently, KFOR continues to be present in Kosovo meanwhile a Kosovar government is assessed by diverse European Institutions to warranty the normal administrative process.

In 1999 the Serbian Orthodox Church published "Crucified Kosovo"[4]. It is a booklet that affirmed the number of 76 religious places destroyed during the summer of that year. Similar actions were reported since at least 200 of 600 mosques in Kosovo were previously destroyed. Both facts provoked a debate on the reconstruction of religious heritage monuments. KFOR troops were appointed to protect the religious heritage buildings, but after 1999 the cleansing progress even grows up.

UNESCO Venice office published a report through its webpage considering that the sad process in Kosovo "… *was not only monuments but also memory and cultural identity that were being destroyed'*. An effort from several countries, International Institutions and NGO, led to the reconstruction or restoration of forty-eight Orthodox and fourteen Islamic religious buildings. In the last 15 years, the Turkish International Cooperation and Development Agency (TIKA) supported efforts of reconstruction of Mosques and Hammams in Kosovo, as well as in Bosnia-Herzegovina. Relations between Belgrade and Ankara were affected by these supports. The Council of Europe assessed the Kosovar government to promulgate a Law on Cultural Heritage (2006) and the National Strategy for Cultural Heritage 2017-2027. This strategy faces the general framework for the coming years, with objectives spread in the following main topics:

1. Structuration of the legal and institutional framework.
2. A comprehensive vision of the cultural heritage and its promotion, through sustainable development.
3. Understanding cultural heritage as a basic element for future strategic national development plans.
4. Education, promotion training, and active participation in the protection of cultural heritage.

Regarding topic 3 the Law defines a specific compromise. Basically, the document calls for the need for education, promotion, and continuous citizen awareness about the trauma scenario. The document continues calling for focusing the efforts on the role of cultural heritage to foster the sense of cultural identity and background, promotion, and facilitation of inter-cultural and inter-religious dialogues. The last objective would be for Heritage to become a source of inspiration and innovation for future generations.

Regarding the last topic, four objectives are defined to improve the "access to all" to the cultural heritage: 1- The Promotion of the National Strategy for Cultural Heritage, to strengthen the public debate and awareness relating to the objectives of the National Strategy. 2- Improving intellectual, physical, and virtual access to assets and locations of cultural heritage. 3- Promotion of alternate uses of heritage sites, with a purpose to strengthen the link between cultural heritage and arts. 4- Promotion of traditional knowledge transfer of collective memory and spoken histories from the older generation to the new generation.

Currently, the most important intercommunal Heritage problem is referred to as the crash provoked by the tentative reconstruction of an old church in a Monastery that is considered by the Kosovar Government as an archaeological site.

[3] The link http://www.eparhija-dalmatinska.hr/Episkop-Intervju-E.htm contains the whole content of this interview

[4] See: http://www.kosovo.net/crucified/default.htm , last consult on 2021-09-26

The dilemma they are dealing with at this moment is based on these questions:
Is it adequate to act over archaeological sites, and how?
Is it ethically approved the presence of the Serbian Orthodox Church using spaces considered today with special protections and archaeological sites? Which is the prevalence of historical uses or functions over the current statement of the country?
Which function must prevail over the second one: religious or cultural? Maybe none of them?
Coming back to a wider perspective:
Which is the role played by built remains, practices and discourses of the past play in the demarcation and branding of urban territories?
Which are the consequences of the displacement/ replacement of heritage elements referred by such a social group by the opposite group?
How do the Interpretations and Presentations of Cultural Heritage Sites clash today with the religious functions performed in such spaces?
Which principles should prevail to define the adequation of the technical means and methods when used in cultural and heritage contexts?
As partial conclusions, we can agree that the reconstruction of cultural heritage in post-trauma scenarios becomes a matter with political nuances, either based on domestic or international levels. In both cases, the respective identities had been contested and their symbols had been deliberately destroyed in post-conflict societies (Teijgeler & Stone, 2011).

4. Heritage as a tool for the territorial and social recomposition

Facing the previous problems and specific cases presented, where the heritage is used as a tool for mismatch, Heritage can play an important role for territorial and social recomposition.
Francophone studies assume the term "*patrimonialization*", to refer to the historically situated projects and procedures that transform places, people, practices and artefacts into a heritage to be protected, exhibited and highlighted (Gillot et al., 2013). "*Patrimonialization*" from an ethnological perspective would become an analytical tool used for the processes in which objects and social practices acquire the rank of heritage. From a geographical perspective, the same term is used to research and act on the construction of territories. (Herzog, 2011).
The *heritagization* can be susceptible to being used as a new way of colonialism, sometimes hidden within a globalization process. So the last goal will be always to avoid considering Heritagization as a confrontational arena were different categories of actors compete to impose their rights and/or identities (El-Haj, 2008; Maeir, 2004). The relation between heritage and their respective hinterlands is vital to understanding the composition of Heritage-scapes. They are the scenarios where heritage is strongly preferred to the place and where territories play an important role.
Spirits of conflict territories are reflected in their own Heritage spaces. There is a strong interaction among them. They contribute to emphasizing the breakdown of relations between opposite social groups that share the same territory. This consideration let us develop the idea of using Heritage as an opportunity for these spaces to be a reference for the reconstruction of the interrupted links among several communities. Memories and identities almost fulfil the scenarios where Heritage is flowing in any of the meanings of this term. Hajrullah Ceku (Cited in Avdyli, 2017), a member of NGO EC Ma Ndryshe, resumes these kinds of relations:
"Memory is what we are. It is a part of our identity. Without memory, we have no identity, and if we preserve our cultural heritage, then we preserve our memory," … *"I'm talking more about local identities, neighbourhood identities, and their preservation. Old buildings are not valuable just because they are old. Their value exists because of the connection that they have with the people around them"*.
In the case of conflict territories, Heritage must deal with the dispute of territoriality, sovereignty, and issues referred to as cultural cleavages.
Stefan Surlić (2017), confirmed the existence of scenarios where Cultural Heritage stays between Religion and Myth. The historical coexistence of Serbs, as Orthodox Christians, and the Albanians, who are mostly Muslims. Contributed for different myths related to historical rights on the common Kosovar territory were implemented. The Serbian perspective is based on the territoriality of the historical origins of the Serbian national and

religious identity. The Albanian territorial vision is focused on the promotion of the recent Kosovar state based on the 'Albanianess' (Obućina, 2011). Both myths become integral parts of each coexistent identities. They seem to be the antagonist in the territorial management and clash till the point of trying to get the delegitimization of the rights of the opposite side through denying the right to the cultural heritage to the opponent.

The journalist and philologist Vedran Obućina (2011) remarked on the existence of Serbian and Albanian myths sharing the same territory: The Serbian myth perceives Kosovo as " *the heart and soul of Serbian national and religious identity*". The Albanian myth "*uses the history and culture to promote the 'Albanianess' of the new Kosovo state*". In a parallel way, the UNESCO and other International Institutions strategies seemed to separate the concepts of national sovereignty and cultural Heritage in this case. There are progressively more voices claiming for such agreement in this conflict territory. Professor Surlić (2017) (from the Faculty of Political Science, University of Belgrade) concludes that cultural sites must be understood as a property of all human beings and the international level of its protection prevail over any local sovereign authority if they are threatened. In this case, both communities should find a balanced agreement on this matter through the separation between the cultural heritage from the assigned political dimension. This fact would create the conditions for the cultural diversity in Kosovo to be an additional element of heterogeneity, fragmentation and incoherence in the Balkans."

Territorial cohesion, within an accepted diversity, could be achieved if we see Heritage with the feeling of belonging, of community, with social cohesion, but also with sustainable development, that is, with taking care of existing resources, not destroying and squandering them.

It seems to be a consensus on the idea of Cultural Heritage accepting always other perspectives, where its role is important and cannot be postponed: the capacity to communicate, to present and to be an important social-economic resource.

5. The definition of the action model on heritage in conflict territories

Most of the regional societal conflicts involve ethnic societies. Consequently, the respective identities (supported by the Heritage manifestations) are within these conflicts as an inseparable part of the conflict. Based on previous experiences presented in this paper, a definition of action modes over conflict territories concerning the Heritage field is needed. There are common points revealed as social mood patterns that must be observed:

- All the parties involved in the conflict see Heritage in a partial way. In the initial post-trauma moments, an impartial vision from both parties is not possible.
- Own heritage elements are used as the way to improve nationalism and reinforce the own identity
- At the same time, the heritage elements of the other disputing party are conceived as the way to perpetuate the presence/ dominance of the enemy in the own country.
- The third way, promoting the reconciliation path, is a long process with extreme difficulties during the first conflict generation
- International arbitrations play an important role on site since they try to be warranties for Heritage preservation as well as channelers of the positive actions over it.
- A first step for the use of the heritage elements as tools for the social recomposition always needs strong support for these International impartial Institutions.
- The less allocation of political content the patrimonial elements have, the better and faster territorial and social recomposition will be achieved. It is the moment where Heritage must be considered as a challenge for opposite social groups, as a part of shared memory.
- Urban Heritage must play an important role to mediate socio-spatial discrimination and exclusion. The urban landscape layouts of the cities strongly support this point since landscapes must reflect these sharing spaces.

Arbitrations of the International impartial Institutions play an important role in all these different processes. In the beginning, a learning process of shared responsibilities on a coexistent Heritage is only possible under its coordination. Master plans for recovering diverse heritage elements, preferably in an equal number of them in the macroscale, should be coordinated. In any case, a specific

master action plan for recomposing heritage scenarios from a multilayer perspective should be coordinated, too. This master action plan would assume a philosophy based on these topics:

- Main functions on the place, from both parties, would be always shared without special prevalence.
- The mutual respect of several functions, spaces, ideas, and beliefs must be kept.
- The definition of mechanisms to warranty free mobility and accessibility to the place
- The definition of internal rules distributing direct and shared responsibilities on the place, under the auspices of International Institutions
- Principles of sustainable tourism on heritage spaces must be kept too, as the way to avoid an introspective situation, opening the spaces and the country to external visits.

6. Conclusions

Different conclusions, able to be extrapolated to other similar case studies, can be taken into consideration:

- Heritage has a double role in conflict territories, as an engine for the recomposition of regions and as a victim of the actions related to the social conflict.
- The way how Heritage will be conceived in such conflict territory will strongly depend on the capability of the implied stakeholders to divert the actions positively, through the redirection of the different actions.
- Interactions among components of the social and cultural complexity of civil conflicts can be important troubles for the previous reconciliation actions.
- Heritage can be considered an object for the conciliation under the premise of being the will to reconstruct physical spaces, where both parts can conceive the same space from different perspectives.
- Roles of the International Institutions are essential to achieve the adequate climate for developing the territorial and social recomposition, where Heritage plays an important role. The more implication of the political aspects within other fields, the more difficult and limited results of these actions.
- The roles of the NGOs are important stakeholders of the process because of two reasons: they can arrive where International Institutions cannot or must not get, and they have a bigger capacity for closer interaction in different social groups.
- Independent assessments and coordination of the recovering heritage actions are vital for having successful results. In this case, the profile of these assessors must be carefully selected to avoid rejection by any of the litigants in the conflict.

Future research lines must be based on specific cases where the interaction between International Institutions and NGOs must be clearly defined on specific procedures for each case. Since the last elections in 2020/2021, some changes happened in both conflict territories. New presidents of Kosovo and the Turkish Republic of North Cyprus [5] have drawn new geostrategic scenarios, where eventual changes in the way of conceiving the respective Heritage roles must shortly arise. Hopefully, the routes to be taken will be in the future will support the ideas of reconciliation, using the Heritage as an effective strategy for recomposing territories.

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Conflict of interests

The author declares no conflict of interest.

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[5] The author is not expressing any political option through these names but accepting what is commonly known in the scientific communities.

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