JOURNAL OF RESEARCH IN ARCHITECTURE AND PLANNING

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Introduction

Focusing on research works relevant to the fields of architecture and planning, the Journal of Research in Architecture and Planning (JRAP) explores issues of relevance to both scholars and practitioners in the field of architecture, urban design, urban planning, built form heritage and conservation. JRAP was initiated in 2000 as a peer reviewed journal, initially published annually, however, since 2011 its frequency has increased to biannual. In addition to the papers received through our regular submission process, the two volumes also include papers selected from those presented at the annual International Conference of Urban and Regional Planning and International Conference on Architecture, hosted by the Department of Architecture and Planning at NEDUET. Contributions to the journal on general topics are accepted any time of the year, and incorporated in upcoming issues after going through a peer review process. Post conference reviews are also undertaken for the selection of conference papers, before their publication. JRAP holds the privilege of being the first peer reviewed journal in the discipline of architecture and planning, published from Pakistan. Contributions are received from across the globe and on average half the papers included in JRAP are from international scholars.

As of 2018, the category entitled 'Young Scholar's Contribution' has been included in the Journal. In this category, papers from young faculty and early career scholars are accepted and editorial assistance and peer review feedback is provided to improve the research papers. One such paper is published under the head 'Young Scholar's Contribution' within issues of JRAP.

Aims and Scope

The primary objective of JRAP is to provide an international forum for the dissemination of research knowledge, new developments and critique in architecture, urban design, urban planning and related disciplines for the enrichment and growth of the profession within the context. The journal focuses on papers with a broad range of topics within the related discipline, as well as other overlapping disciplines. JRAP publishes a wide range of research papers which deal with indepth theoretical reviews, design, research and development studies; investigations of experimental and theoretical nature. Articles are contributed by faculty members, research scholars, professionals and other experts. The Editors welcome papers from interested academics and practicing architects. Papers published so far have been on topics as varied as Housing, Urban Design, Urban Planning, Built Environment, Educational Buildings, Domestic Architecture, Conservation and Preservation of Built Form. All back issues are openly accessible and available online on the Journal's official webpage:

http://jrap.neduet.edu.pk/online_journal.html.

CONTENTS

Note: All the photographs included in this issue have been taken by the authors unless otherwise mentioned.

EDITORS' NOTE

The editorial board is pleased to introduce the 35th volume and first issue of the year 2025, which features six papers two international and four local covering a diverse range of topics including the urban built environment, public spaces, technology and architecture, design pedagogy and heritage. These topics are well suited to the scope of the Journal, representing a wide array of perspectives on the built environment.

The first paper is an international contribution from Bangladesh that explores the housing challenges in Dhaka, specifically for single-person households. These residents primarily migrant workers and students, face a housing crisis upon relocating to the capital for work or education. The paper provides a thorough analysis of the spaces they inhabit and their associated needs and aspirations. It contributes to the broader discourse on single person living in urban areas and aims to enhance the quality of life for these stakeholders.

The second paper focuses on design pedagogy, emphasizing the critical role of creativity in design education. It advocates for the integration of technology in the creative process, challenging the misconception that technology hinders creativity. The study dismantles several myths, including the belief that practical guidelines suppress creative outcomes, and demonstrates through survey data that they can, in fact, support innovation. The paper evaluates different pedagogical models and concludes that structured strategies are conducive to fostering creativity.

The third paper examines urban development in Hyderabad, Sindh, particularly the phenomenon of hinged ribbon developments. These patterns of growth often disregard habitability and contribute to the fragmentation of the city. The research identifies key indicators for sustainable neighborhoods-such as a sense of community, accessibility, safety and security, green spaces, and aesthetic value-arguing that these factors are essential for social sustainability.

The fourth paper presents an experimental project involving the "Sonar Screen," a prototype developed at an architectural school in Lahore and exhibited at a local expo under the "Architects' Corner." Utilizing the Arduino microcontroller platform, the prototype explores parametric solutions as a climate-responsive strategy. This international paper addresses the underuse of technological solutions in architectural design in Pakistan, advocating for the integration of technology into both pedagogy and professional practice. It discusses the challenges faced during development, the project's impact on public engagement, and the potential of affordable computing platforms to support future undergraduate design research.

Shifting from high-tech innovation to heritage conservation, the fifth paper offers a detailed study of the Lahore Fort's iconic Picture Wall. Using micro-avian architecture as a conceptual framework, the paper posits that the wall's niches historically functioned as pigeon houses. This claim is supported by a critical analysis of historical data, on-site observations, and surveys. The research aims to support the conservation of the local avian population and envisions the Picture Wall as a living sanctuary.

The sixth and final paper is a post-occupancy evaluation of the gated community of Naya Nazimabad in Karachi. Gated communities are proliferating across the Global South, offering security and self-contained amenities that appeal to the upwardly mobile middle class. Despite this trend, limited research on post-occupancy evaluation (POE) has been conducted in Karachi. This study addresses that gap by surveying 300 residents on POE indicators, offering insights into the benefits and drawbacks of gated living and providing recommendations for future improvements.

The volume also includes a book review of *The Suburban Frontier: Middle-Class Construction in Dar Es Salaam* by Claire Mercer. The book investigates themes of urban transformation, social mobility, and middle-class identity within the broader context of African urbanization.

Editorial Board

LIVING ALONE IN THE CITY: EXPLORING THE COMPLEXITIES OF SINGLE YOUNG ADULTS HOUSING IN THE URBAN CONTEXT OF DHAKA

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ABSTRACT

Worldwide renting and sharing is very common among cities, especially for single-person households. But the living environment is not always welcoming in most developing countries due to the lack of policy-level intervention. Dhaka, a rapidly urbanizing city, attracts people from various regions, but it also presents a range of challenges, particularly for those who live alone. These people, often students or migrant workers, come to the city with aspirations for higher education and better employment opportunities. However, their dreams often clash with the harsh realities of urban life. The study focuses on the difficulties the single-young households, highlighting the living environment and their specific needs due to their independent lifestyles. Most of these individuals are excluded from state welfare and housing support and depend on both formal and informal private rental housing sectors where the main housing typology includes the shared flats and private hostels. Often these housing options provide poor living conditions and are further complicated by social and political challenges. By analyzing multiple case studies in Dhaka, the research uses qualitative methods to gather in-depth insights into the lives of these young adults. Through photographs, drawings, and open-ended interviews, the study captures the nuanced experiences of this population, shedding light on their struggles with isolation, the difficulties of urban living, and their pursuit of meaningful social connections. It also examines how they adapt the shared living arrangements including spaces, utilities, furniture, and food. Ultimately, this research aims to contribute to a growing body of knowledge on single living in urban environments, particularly in the context of developing cities like Dhaka. The insights gained from the study may help in creating more supportive and responsive housing policies and social structures thereby improving the quality of life in the city.

Keywords: Adult Household, Living Environment, Shared Life, Single-Young, Dhaka.

INTRODUCTION

In recent years, challenges to the global housing market have been associated with fast urban growth, migration patterns, reduced housing stock, quality and affordability, and government policies. In Dhaka, the public sector still needs to meet the demand, and housing supply mainly depends on the private rental sector. The development of the rental sector is a neglected topic, as is the case in other developing countries. In Dhaka, around 80 % of people live in rental houses since most of the people migrated more than 60 %. (Statistical Yearbook Bangladesh 2022, 2022). There exist lots of informal settlements, and around 10.2 million people live in informal settlements (Statistical Yearbook Bangladesh 2022, 2022). Renters in informal settlements have to pay more rent per sqm than in the formal sector due to high demand and scarcity of space for the poor. Here, around 70% of the land is occupied by higher

and higher middle-income groups, with only around 30% of the total population in the city. So, lower- and lower-middle-income people always need help to gain access to the housing market (Dhaka Sturcture Plan 2016-2035, 2020). Like other megacities, due to the space crisis and lower affordability, renting and sharing are very common in Dhaka. However, there is very limited research in this context on the field of the rental market in the housing sector, especially on 'shared typology.''This research deals with a sub-market of the private rental sector focusing on single people 18-34 years old who come to the city with the hope of self-establishment by higher education or an excellent job. Due to the lack of accommodation facilities like student hostels or workers dorms in different government and private colleges, universities, and other institutions, rental house is the only option for these students and migrated workers. Since these groups of people are mainly single people, they often share their rental house with another single adult household to reduce the house rent. Locally, these people are known as 'bachelor' people, and their shared house is called a 'mess house.' Often, these single people are neglected as tenants. Besides, they have to face other social and political difficulties. The most common phenomenon is that house owners do not want to rent out their flats to bachelors; sometimes, family households are very reluctant to accept them as neighbours due to having different lifestyles and independent attitudes. Sometimes, extra pressure is created upon them by imposing different rules and regulations regarding the timing of back home, rent payment date, extra bills for using different electronic devices, etc. Often, security forces raid mess houses for political reasons as a kind of fascist attitude. Sometimes, mess houses turned into places of political activity or terrorists' place.

The research will highlight the emerging typology of shared rental houses (known as Mess houses in Dhaka) as a distinct urban form, drawing from middle-income households in Dhaka, Bangladesh. From the reconnaissance survey, research identifies they can be found in all parts of Dhaka and are deeply interlinked with the city's urbanity. Mostly, they are situated near the educational hub, work centers, and any university or college. Its spatial location gave cues about the entwined dependency of the single students and employees. These can further be categorized into two central units – private hostels for men/women and shared houses for men/women. Each of these categories has a distinct process of functioning and living experiences of people. Though initially, to gain economic benefits, people adopt a shared premise, the physical environment of these shared houses has an impact on their mental well-being. The negotiation of privacy and personal space is a major concern in shared houses, and it is associated with behavioral and psychological issues.

At first, research fixed some selection criteria from the findings of the initial reconnaissance survey. To investigate and collect data regarding the selection criteria, three zones were selected in Dhaka: Tejgaon, Moghbazar, and Motijheel (figure 2). In the next step, the research follows convenient random sampling to select fifteen cases from those three specified zones for qualitative analysis. All the houses accommodated single-young households, including students, job holders, or job finders aged between. The questionnaire survey included only the single young adult households aged between 18 to 34 years. The analysis excludes public housing provided by the government to public servants and low-income private accommodations in the form of slums and squats.

Based on the preceding background, the research question is to know how the specific group of people, single adult households, experience shared living away from the parental home in a highly populated city like Dhaka. To answer this question, the research addressed the following research objectives:

First, to narrate the housing circumstances of the shared house.

Second, to explain the nature and extent of the multifaceted problems with which they live.

Background Study

Prevalence of single person household has been increasing worldwide due to different reason which is also associated with urbanized development and shared living arrangement. This section highlights the current trend of single living worldwide.

Prevalence of Single-Person Households Worldwide

The prevalence of single-person households has been amplified in several developed countries (Mackie, 2016). The statistics of prevalence of single person household among European countries shows it varies markedly due to housing support policies, social and political norm regarding independence (Billari & Lifbrore, 2010). In England and Australia the number is increasing day by day (De Vaus & Richardson, 2009; Qu & Vaus 2011). The frequency is relatively high in Japan where 29% households are one

person (Fukuda, 2009). In India, there also emerged the trend of single living which enhances the trend of young people moving to urban areas followed by reforming living arrangements (Dommaraju, 2015).

Housing Challenges of Single Living Worldwide

Studies on Europe and East Asia identify two key housing policy issues for young people. First, policymakers must ensure equal opportunities for young people to leave home and live independently, recognizing the political, economic, and cultural barriers (Mackie, 2016). Second, housing needs to be more accessible and appropriate for young people, especially with the rise of the private rental sector and house-sharing (Mackie, 2016). In Europe, economic constraints drive shared housing, which brings mixed experiences (Gentile, 2016; 2016). In contrast, cultural norms in China and Hong Kong limit independent living, with policies needing to better support young people's access to housing (Li & Shin, 2013). Addressing these challenges is crucial to avoid broader social and economic impacts (Mackie, 2012). As a consequence of recent years housing challenges, young people have been particularly affected as governments have not always kept pace with contemporary social change. Housing regulations haven't always addressed the barriers that prevent young people from having equitable access to independent living possibilities (Mackie, 2016). Young adults are currently compelled to live in shared housing arrangements with varying experiences due to a lack of housing options (Clark, et. al., 2018), though sharing spaces is not always a happy medium despite the economic benefits (Bricocoli & Sabatinelli, 2016). This scenario is common in developing countries and some developed countries like the UK and the USA (Baek & Kim, 2022).

House Sharing by Single Young Households

In simple terms, home-sharing is an arrangement by which two or more unrelated people share a dwelling within which each retains a private space. However, no two home-sharing situations are alike; each is tailored to the needs and desires of the people involved (Oh & Choi, 2014). The term "shared housing," also known as "collective living," has gained widespread acceptance across the globe and has its roots in boarding houses and urban migrants from the 19th century. In areas throughout the U.K. and Europe, inner-city and shared housing developed in response to workers' and students' demand for fexible and affordable accommodation (Uyttebrouck, van Bueren, & Teller, 2020). The idea of 'Shared living' is associated locally in Bengali with the term –'*Messbari*', or 'boarding houses.' '*Messbari*' is an urban Bengali coinage (Bhattacharya, 2024). Boarding houses sprang up in and around the major educational institutions and business areas to accommodate fortune seekers' never-ending paths (Frear, 2012).

Scenario of Dhaka

Every year a considerable number of students come to Dhaka to study at different educational institutions. Not only for education, another group come to the city to search for a better career. Besides every year, many students come to the city for admission coaching. With the rapid increase of the educational institutions in the city, the students' rush towards the over-crowded capital is also increasing. A very few institutions have hostel facilities for students. The students who can live in those hostels find a convenient and havoc-free shelter with some facilities. However, most of the city's colleges and universities do not have sufficient seats or no hostel for their students. As a result, most students have to go for the private rental sector. These migrated single-young people come to the city, leaving their family for a better future, and most of them are students who are economically dependent on their family or young professionals. Considering mainly economic reasons, shared rental houses or hostel/board in rented flats are the only options. In this situation, private hostels in rented flats are

Figure-1: From Left; Mumbai 'Chawls'Kolkata's Diverse Boarding Houses.

springing up randomly through the city but offer a poor living environment. Messes or board in rented flats in different areas of the city face many complexities and harassments due to social and political difficulties.

Dhaka's phenomenal growth makes Dhaka an economic hub and educational hub with a resultant 63% total growth due to migrated population in 2015 when the housing delivery system mainly depends on the private sector (Ahmed & Johson, 2014). Local builders in Dhaka have been feverishly constructing temporary accommodations to meet the high demand for affordable, centrally located, and stigma-free housing. They created a stock of small rental apartments in mid-rise buildings that met migrant students' demands and workers away from their families. These structures are modeled on student housing and derive their name as 'shared/mess housing.' This specific typology is part of an old lineage of urban housing, such as the Mumbai 'chawls'— workers barracks. A research on Dhaka's student hostel highlights that when students share their rooms with others, shared spaces produces problems in terms of territory and private space (Siddika & Ferdous, 2018) which is also supported by another research in newzeland by Khajehzadeh and Vale (Khajehzadeh and Vale, 2014).

Methodology for investigation

The present research has been designed in two parts: a theoretical part based on a literature review and an empirical investigative part based on field surveys and interviews. The research will start with a literature survey conducted on published data (e.g., newpaper report, research papers, books, standards, codes, and websites) to know the present situation of the single young household worldwide. This research follows a qualitative methodological framework through interviews and observation as a means to acquire data on individual life experiences. In this study, the unit of analysis is individual persons and shared house where they live. The study employs open-ended methods to allow all types of experience and observation to be connected.

The field survey involves collecting photos and drawings, and the questionnaire survey investigates the household's socioeconomic and demographic structure to understand better the lifestyle domain. It has also investigated the patterns of sharing (spaces, utilities, furniture and food). The response to the questionnaire was collected from the individuals who were present during the field survey. Field survey conducted after working hour to ensure the presence of maximum households.

Sample Selection

Following convenient random sampling, fifteen houses were selected from three different parts of the Dhaka city corporation area. An initial reconnaissance survey of the present housing situation of study groups helped set up their selection criteria; later, the shared houses were identified in terms of particular criteria in discrete locations in Dhaka. These criteria led to the formulation of two types of shared accommodations to determine as cases (Table 1). Representative cases from each type will be selected for detailed case history analysis for qualitative investigation. The selected case histories will be analyzed in detail for the identification of the overall experiences of single young people with physical and social problems faced in their shared accommodation. Including males and females, a total of 62 participants' responses were considered, with 25

Figure-2: Selected Zone for Field Survey.

students and 17 professionals. Field survey conducted both on holiday and working to get different viewpoints. Cases within the selected criteria were selected to get maximum variations with building type and male-female domain.

Limitations

This research explores the housing circumstances of single young individuals within shared rental houses, focusing on behavioral, functional, physical, and social aspects. However, certain limitations exist. Firstly, it was conducted within a limited area of Dhaka city due to time and resource constraints. Secondly, surveyed shared houses were selected based on the availability of known individuals, limiting the scope for extended observations and comprehensive data collection. Thirdly, while the study addresses architectural aspects, gaps exist regarding the psychological impacts of living away from family. Despite these constraints, the research offers valuable insights into the dynamics of single young adult households in shared rental housing.

Ethical consideration: During the field surveying time, researchers took photographs of personal spaces while obtaining their proper consent. Research has maintained proper consideration to hide their real identity.

Analysis

This section analyze the profile of the study group single young adults and their living arrangements in a shared premise out of family.

Leaving Home and Living Alone

The cultural trend in Bangladesh for young is staying with their parents until marriage or even for several years afterward. This trend attributes by the factors such as economic insecurity, high youth unemployment, extended education periods, unaffordable housing etc. It seems to discourage youth adults, especially daughters, from living independently. In survey, three main reasons of leaving the parental home are found:

- Parental house is out of the city, so moving and living alone for education or a job.

- The long-distance between the parental house and working place or educational institution.

- To enjoy proper educational environment and independent life.

The majority of the people, living in shared houses around 81 percent come from out of the city. The long-distance working or educational place with huge traffic congestion of the city leads to leaving the parental house and their proportion is 16 percent while the rest 3 percent of young people shared house seeking better educational environment than their home. This result indicates that young people in Dhaka city choose this single living lifestyle only when they face a situation of crisis or urgency rather than for enjoying an independent lifestyle or a better environment as seen in many developed countries.

Table-1: Sample Case Selection Criteria.

Reconnaissance survey		Field Survey	
Types of shared accommodation		**Criteria for site selection**	**Selected zone**
A		• The area should be within the urban boundary and have characteristics of Dhaka city's general urban fabric.	Based on the criteria following three zones are selected in Dhaka. They are:
Private Shared House / Mess House		• The site should be located near numerous educational or other institutions.	1. Tejgaon
A1 Self-catering premises	**A2** Premises providing common meals	• The house should be a rental house where more than one non-famil y household lives together as a shared household.	2. Moghbazar 3. Motijheel
B **Private Hostel / Dormitory**		• The house may be hostel-type where the number of students or professionals live together, sharing some common facilities as a payment basis.	From each zone, 5-samples of shared accommodations with 15 numbers of accommodations are selected for the study. Individual participants are selected randomly from each accommodation.
Premises providing common meals			

Table-2: Types of Cases (Shared House) Concerning Male and Female Domain.

Case Type (Type of Sharing)		Female Domain (Number of Case)	Male Domain (Number of Case)
A (Private shared / Mess house)	**A1** (Self-catering)	2	0
	A2 (Common meals)	2	2
B (Private hostel)		4	5

Table-3: Types of Cases Concerning Building Types in Different Zone.

Rental House Type (Building Type)							
Flat as the old-type building (total 9 houses)				Multi-storied Apartment (total 6 houses)			
Case type		Selected zone		Case type		Selected zone	
Type	Number of cases	Zone	Number of cases	Type	Number of cases	Zone	Number of cases
A1	1	Tejgaon	2	**A1**	1	Tejgaon	3
A2	2	Moghbazar	2	**A2**	2	Moghbazar	3
B	7	Motijheel	5	**B**	2	Motijheel	0

Socio-economic Profile

Single young adults in a Shared houses have represented a product of economic constraint rather than choice, their growth attributed to rising housing costs, low incomes, and the relative scarcity of social housing. Figure 3 shows most of the students are economically dependent on their family and self- income when only a few students are fully economically self-dependent. Students who are dependent on both these mainly earn money from private tuition, tuition in a coaching center or online business, etc. Most of the professionals are economically fully self-dependent and more than 50% the professional supports their family. Last of all it can be said that students are mainly dependent on their family and cost of living is important toward them rather than professionals.

Rental Profile

The survey found a wide range of varieties in the rental system when per capita living costs are associated with multiple factors such as house quality, the number of sharers, allotted space per person, sharing type, etc. There are also variations in reasoning to become a sharer rather than to live alone. In this issue, economic constraints and unavailability of the single-person apartment are the major causes followed by other reasons i.e. safety, to avoid social difficulties as living alone, etc. Detail analysis shows that the number of occupants who don't share their bedroom though live in a shared premise is not so little, about 37.10

percent of the total participant. In that case, their rental cost is two to three times of those who share their bedroom with two-three other occupants. For these single rooms occupying person the unavailability of single-person apartments or safety issues or other options rather than economic constraints lead to choosing a shared premise. Table 4 shows that most of the participants share their bedroom with two other occupants within 3-5 sqm. Bedroom space when per capita rental space is 8-12 sqm. for most of them. So for most of the cases, bedrooms are too much-congested. The 'sharing status' is the amount of 'sharing' taking place within the households, and in the survey, four situations found that are; shared bed, toilet, and kitchen; shared bedroom, toilet, and kitchen; shared toilet and kitchen; only shared kitchen whereas maximum participant share the toilet, kitchen and bedroom and only few share their bed with other.

Forms of Sharing

In surveying shared houses there are mainly two types of sharing occurs that is a private mess/shared house (A-type) or private hostel (B-type) when mess house is further subdivided into the self-catering system (A1-type) and providing common meal system (A2-type). The survey result shows that only female households are using the self-catering system (A1-type); maybe there subsist any psychological issue so that females are sometimes comfortable with self-catering rather than sharing common meals. The survey result also shows that most of the private hostels are in a
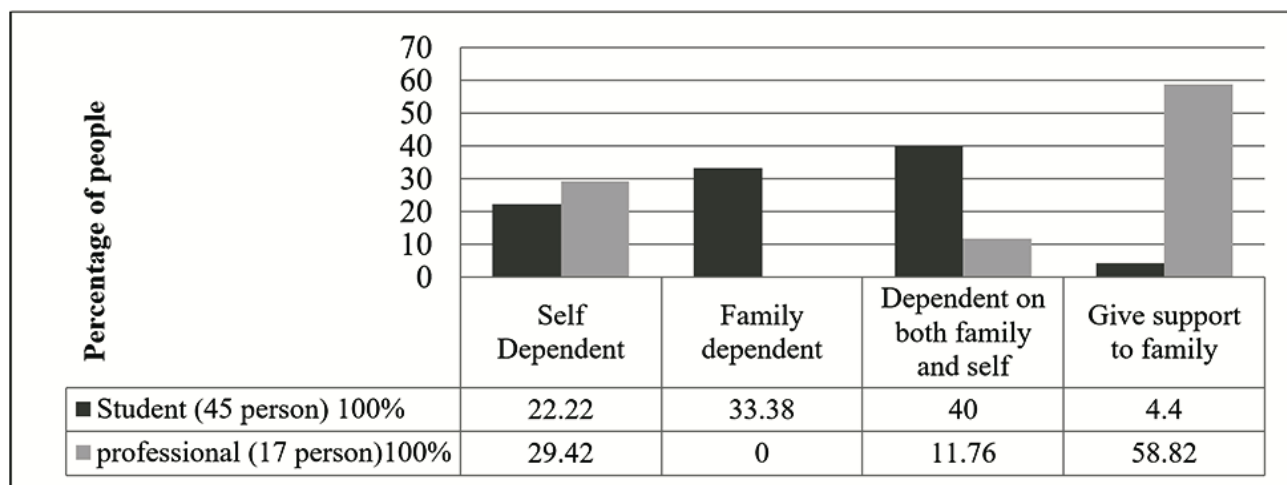
Figure-3: Economic Status of Single Young Person Household in Surveying Population.
Source: Field Survey

renting flat of old buildings maybe because of low house rent and to get benefit the scope of internal modification toward multiple single households. The living cost sometimes may be higher in A-type sharing rather than B-type (Table 5).

Shared Rental House (Mess house)

In this house sharing type, a private house/flat is rented with its rooms as they were designed without any changes to the floor plan by some unrelated adult households. As the apartments are mainly designed for family-type households, here, the dining space, bathroom, and kitchen are usually shared spaces for all residents, and bedrooms are allotted to the individual resident or multiple residents. The research found the following four states to lead a shared house.

- Shared houses made up of friends who have come together to live with one another.

- Shared houses of 'random' who all found each other through means such as websites and are sharing a property;

- Friend/random hybrid households where some people are friends but have since had to enter random to fill gaps to maintain the tenancy of the property;

- Owner-occupied shared households where the owner is a resident and shared with one or more tenants, usually to afford to own the property.

- This type of arrangement rents out a flat for a long time or a short time and includes diversified living arrangements.

Private Hostel

In this type of sharing, landlord or head tenant rent a house from a landlord and then further rent out the house toward many sub-tenants with overall control. This type is a profit-making business, and sometimes the landlord runs the business own-self. Usually, this type of hostel is built for a long time for many tenants living together with low rent, and often floor plan is modified with temporary partition walls. In this situation, the large room is divided into several separate rooms or dining spaces, and living spaces are moderate, with partitioning to a bedroom.

Comparative Analysis of Shared Rental Flat (Mess House) and Hostel

The internal layout (figure 3 and figure 4) shows no significant difference in the layout plan of shared house and hostel because both are a rental flat, but considering the overall living pattern, there is a considerable difference.

Mess house and hostels offer a sharing lifestyle, but the considerable difference started with profit-making. Private hostels were happening with planning of profit gain and shared houses forms to benefit economically/socially through sharing. At some instant, hostels are a formal set-up wherein most of the cases, and this is a long-time establishment. Hostel fees are also a fixed payment, including all services. On the other hand, mess houses are very informal in terms of the distribution of spaces, foods, responsibilities, etc. often this informal arrangement seems like a family within a limited number of occupants rather than hostels with a

Table-4: Rental Profile of Single Young Households.
Source: Field Survey

Attributes		Frequency (n= 62)	Percentage
Sharing type	- Private rental house (mess house)	34	54.8
	- Private hostel	28	45.2
Sharing status	- Shared kitchen	6	9.72
	- Shared kitchen and toilet	16	25.81
	- Shared kitchen, toilet, and bedroom	38	61.29
	- Shared kitchen, toilet, bedroom, and bed	2	3.22
No. of occupants in one bedroom	- Single	23	37.10
	- 2 people	10	16.13
	- 3 people	27	43.55
	- 4 people	2	3.23
Per capita rental space	- Less than 8 sqm	12	19.35
	- 8 sqm-12 sqm	30	48.39
	- 12 sqm- 16 sqm	12	19.35
	- More than 16 sqm	8	29.03
Per capita bedroom space	- Less than 3 sqm	8	12.9
	- 3 sqm-5 sqm	34	54.8
	- 5 sqm- 10 sqm	14	22.58
	- More than 10 sqm	6	9.72
Per capita rental cost including meal charge and other services	- Less than 3000 tk/month	2	3.23
	- 3000-5000 tk/month	16	25.81
	- 5000-8000 tk/month	36	58.06
	- More than 8000 tk/month	8	12.90
The motivation for sharing toward the rental house	- For lowering rent	25	40.32
	- For safety	7	11.29
	- For not being alone to avoid social difficulties	10	16.13
	- For the unavailability of single-person apartments or other options	20	32.26

Table-5: Rental Cost for Different Types of Sharing at Selected Zones (Per Capita Rental Cost).
Source: Field Survey (2018)

House type	Rent type	Tejgaon (Tk/month)	Moghbazar (Tk/month)	Motijheel (Tk/month)
A1 (Self-catering)	House rent excluding meal charge	4000-6000	-	-
A2 (Common meal)	House rent+Meal charge+service charge	(4000 to 6000 + (2000 to 3000 + (300 to 500)	(2000 to 5000 + (2000 to 3000) + (300 to 500)	-
B (Private hostel)	House rent including meal charge and other	3000 to 6500	6000 to 6500	3000 to 6500

large number of occupants with unknown flat-mates. The most advantages of hostels are offering all things in a package where one newcomer to the city finds a place to live with necessary furniture (bed and table), including meals and other services with minimum responsibilities to manage everything. However, sometimes because of profit-making attitude, hostels offer a poor environment with crowding rather than mess house where informal arrangement always tries to achieve a better environment economically.

The Process of Finding Shared Accommodation

Finding a room/seat in shared accommodation may seem straightforward, involving browsing ads, making calls, and viewing rooms. However, the reality can be more complex, with considerations such as proximity to work, environment, and compatibility with housemates. Shared living involves a laborious process for both seekers and advertisers, as it involves establishing routines and practices for harmonious coexistence. Advertisements vary based on the type of accommodation, with hostels using commercial approaches and private shared houses often preferring familiarity among residents. Specific requirements, such as non-smoking or employment status, are often mentioned in advertisements.

House Rent

Different houses adopt different approaches to managing house rent. In shared, rented house rent is distributed to all shared members. The process of distribution can be configured in multiple ways.

- House rent is uniformly distributed to all shared household. There are no considerations of space allocation. For example, there may be a small or large room in one flat, and each household may not be uniformly benefited, but house rent will be equally distributed to all members (Figure 3 & Figure 4).

- House rent is distributed according to the seat. At first, the house is divided into several seats, for example, three seats in the large room and two seats in a small room. If one sharer wants to occupy two seats, he/she has to pay rent of two seats. Sometimes share of house rent is fixed according to some values like the small or large room, room with attached veranda, room with attached toilet, etc.

Legend
1. Bedroom
2. Converted bedroom from living space.
3. Dinning or multipurpose space
4. Kitchen
5. Toilet
6. Veranda

Figure-4: Private Mess House (From left, Type A1 & A2, Flat 3B, R#6 @Niketon, Flat A3, Green Nahar Villa, Mogbbazar, Dhaka).

It is common in the case of shared house that if one seat is vacant for one month, then rent of that seat will be distributed to all those residing within it. In private hostel house rent including 2-3 meals is fixed by the authority

Food

Food arrangement includes food purchase, storage, distribution, shopping, shelving, cooking, and eating. In the hostel case, all the process of food is done by hostel authority, and individual households have no other responsibility without collecting food from shared dining or kitchen. In a shared house, most of the cases food is prepared commonly, but the self-catering system also found. In the survey, it seems that the self-catering approach was only adopted by female domain, maybe because of the females' attitude. Different approaches are also found in shared food systems which are shown below:

• Food arrangement responsibility is given to one or two enants (called mess manager) by rotation.

• Food responsibility is given upon specific one household, and he benefitted with meal charges,

• All households are responsible for food arrangements.

At the point of food arrangement, the housemaid is an unavoidable issue, and often it seems to housemaid has a significant contribution. High dependency on housemaid arises problems when housemaid makes absent for the reason of illness or other. In that case, usually, they prefer the nearest cheap hotels or self cooking.

Discussion on Opportunities and Complexities in Shared Premise

Shared living and opportunities: Connection and support

According to respondents, although they chose to live in shared accommodation with no other suitable options, the residents shared a vision of sustainability (social and

Legend
1. Bedroom
2. Converted bedroom from living space
3. Dinning or multipurpose space
4. Kitchen
5. Toilet
6. Veranda

Figure-5: Private Hostel; Type B (From Left, Roja VIP Chattri Hoste, Ramna Chattri Hostel-2nd Floor).

Figure-5a: Tejgaon Area.

TEJGAON AREA

Case 1. Roja VIP Chattri Hostel, Monipuripara, Farmgate, Tejgaon, Dhaka.
Case 2. 23/A/6, Hazi Arab Ali Villa, Happy Homes Kunipara, Tejgaon, Dhaka
Case 3. Nibedika Chattri Hostel, Monipuripara, Farmgate, Tejgaon, Dhaka
Case 4. Flat 3A, Road no. 6, Niketon, Tejgaon, Dhaka
Case 5. Flat 3B, Road no. 6, Niketon, Tejgaon, Dhaka

Figure-5b: Moghbazar Area.

MOGHBAZAR AREA

Case 6. Flat A2, Green Nahar Villa, Baro Moghbazar, Dhaka 1237
Case 7. 3rd floor, House, Wireless, Moghbazar, Dhaka
Case 8. Ad-Din Women's Medical College Hostel, Wireless, Moghbazar, Dhaka
Case 9. Ramna Chattri Hostel, Baro Moghbazar, Dhaka 1237
Case 10. Flat A3, Green Nahar Villa, Baro Moghbazar, Dhaka 1237

Figure-5c: Motijheel Area.

economic), which instantly created a commonality between them. This vision connected various people from diverse backgrounds and developed strong social network and social bonding toward social sustainability. Aside from the instant connection formed through sharing, residents had sudden or regular events to meet, greet, and get to know one another.

At this point, frequent interaction between residents is essential. Although conflict sometimes arises, informal space demarcation responsibility distribution increases the level of interaction.

As stated by the residents, they enjoy lots of practical and moral support in shared living. In the premise of a shared house, though everyone lives out of their own family, there is evidence of a family environment within the home. The issue of support is also related to how the residents are connected.

Shared living and complexities: Social and physical problems

The research found the diversity and complexity of 'sharing' arrangements within two basic different types of shared houses: private shared/mess houses and private hostels. First of all as a group of single young households, it is difficult to find potential houses due to social misperceptions and politically unstable situations. In this regard, the choice goes to private hostel.

In a mess house, different informal systems for 'sharing arrangements' exist that arise spontaneously to address multiple issues or sharing problems. Basically, what system will be followed to manage a shared house depends on the interpersonal relationship between the households; that is how a group is formed to live in a shared house. In mess house, all problems mainly occurred because of informal ways of management and using a single-family house for multiple shared households. First, difficulties to find potential housemates, and this problem is heightened when existing housemates have to share extra house-rent to fill the gap of one sharer. Second, there are challenges to getting equal space distribution within the households when the house is not designed for multiple households. Third, complexities due to fixation of house rent, when all the residents do not get equal facilities such as an attached toilet or attached

veranda, same room space, etc. Fourth, to run a mess house, the head tenant or mess manager must take multiple responsibilities regarding the management of food, funds etc. A problem arises within the selection of mess managers with the reluctance of households to take responsibility as an extra burden, and sometimes mismanagement and misunderstanding occur. Fifth, complexities due to adjustment with variance in daily routine, lifestyle, food habits, etc., and the amount of this problem depends mainly on the 'sharing status' and interpersonal relationship between households.

In the case of a private hostel, the situation is not too different, but the fundamental difference is here; a shared accommodation is run by following a management team's rules and regulations. So households get all facilities in a package system within seat fare and are bound to accept the hostel rules without any negotiation. The first problem of mess house regarding sharing extra house rent does not exist here because each is responsible for only his or her occupied seat. The second and third problems of equal distribution of space and facilities are also present here since private hostels are also situated in single-family residences with or without small conversion. However, here residents have no right to say anything about this problem, so there is no scope of the chaos and no negotiation between residents. The fifth problem regarding different lifestyles and issues of sacrifice is constant for shared living depending on their sharing status. However, the private hostel's main problem is the poor quality of food, services and space crowding because of the landlord's profit-seeking attitude. As a result, it has seen that most of the hostel raise their seat fare, considering increased demand.

With some exceptions, most participants narrated a more individualistic approach to sharing space and goods that gave primacy to individual taste and routine over time. How sharing was managed was not an easy task for those involved, often problematized by the length of stay (how long someone has been in the house). The problem between one household versus many households under one roof is a constant feature of 'sharing' practices. 'Sharing is inherently rational and interpersonal, so the form and quality of the interpersonal relationships within which sharing occurs fundamentally affect the nature and success of sharing within shared households. Besides, these psychological things are essential within sharing, such as self-perception, behavior, privacy needs, etc.

Overall problems occurred mainly on two sides, i.e., supply-side and demand side. There are an overall housing shortage and unwillingness of suppliers (landlords) due to social misperceptions on the supply side. On the demand side, multiple problems occurred due to shared living with different lifestyles and choices, converted family houses for sharing, and different space requirements. Their living arrangement often short term and they consider economic accommodation with   In the solution, there required planning strategies regarding specific urban schemes and housing typologies.

CONCLUSION

Though the number of young single-person households is increasing day by day, they are still a minority group of people. So, our society and government are not wholly concerned about the issue. Since accurate statistics are also missing so the private sector is not also interested in, providing for this group of people. Unlike many Western developed countries where the younger generation is living away from the parental family to seek greater independence and freedom, the situation is quite different in Dhaka, Bangladesh, in terms of culture and the housing market. Here single individuals live independently to build their career started from student life to job career where city centric development acts as a fuel.

Shared living appears to be particularly suited to young adults who are strongly committed to their future careers and the labor market. It is a flexible household form, that can provide 'professional standard' accommodations and ready access to a social life for time-constrained and geographically mobile people. The study has used the empirical case study of shared accommodation as a context and means to know about the perception and problems of living away from the parental home by focusing on 'sharing'. While domestic 'sharing' has been examined thoroughly in different researches, little research has explored such sharing

practices amongst peer-shared accommodation. A diverse picture is seen in the evaluation of different shared households. Mainly, the problems arise with the quality and quantity of space. These issues are also related to other social issues such as the relationship with society, dealing with conflict and 'moving on', and personal issues like feelings of crowding and privacy. It is argued that "sharing" consume less and make an attitude toward sustainability. However, this research found the presence of critical situation at different level of sharing, the conclusion wants to highlight the scope and opportunities of sharing. Beside the space crisis, shared houses provide a compact and well-networked living environment that is significant for sustainability. The research findings contribute to knowledge regarding the experiences and barriers to successful sharing which have

been largely unexplored. The essential factors of 'sharing' that should be considered while designing are the following:

- Who is sharing, what is the quality and the form of sharing, and what is the relation between the sharers?

- Why is the sharing taking place (is it elective or necessary)?

- What is being shared (space, goods, and responsibility)?

- How is sharing taking place?

At this point, this research does not try to generalize the findings however scope and opportunities of shared living provides valuable indication toward sustainable living worldwide.

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CULTIVATING CREATIVITY IN ARCHITECTURE EDUCATION: STUDENT PERCEPTIONS AND PEDAGOGICAL APPROACHES IN DESIGN STUDIOS OF LAHORE

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ABSTRACT

This research investigation examines the pivotal importance of creativity defined in this study as ability to produce original but practical and relevant solutions, whether innovative or not (Weisberg, 2006; Amabile & Khaire, 2008) in architectural pedagogy, with a particular emphasis on student perceptions in the design studio environment. Architectural education must balance the creative process with regard to technology and theory, with the design studio remaining the central place for these fields to converge, enabling students to develop distinguishing and efficient design solutions. There is no compromise with creativity in this equilibrium but it is a concordance, where technology is used to assist the creative process and not restrict it (Gelernter, 1988). To encourage creativity in the studio environment, various teaching strategies are used, such as reflective practices and strategies that promote creative thinking. In addition, models of learning such as Kolb's experiential learning cycle and Leary's interpersonal theory are explored for their influence on student behavior and impact on the learning process in architectural education.

The Pedagogy Survey in the Design Studio identifies significant student experiences and perceptions, providing evidence of a complex educational environment. Although students believe in the importance of creativity, structure, and real-world projects, there are areas for development in relation to pedagogy. Many students express a need for more structured and clearer frameworks to help them formulate their ideas, as well as a more balanced approach to integrating creativity and practicality. Rather than juxtaposing creativity with practicality as opposing forces, this view actually posits their interdependency: practical constraints function as conditions activating creative solutions (Kowaltowski et al., 2012). Additionally, open-ended qualitative feedback reveals students seek a combination of pedagogical support that emphasizes individualized instruction and real-life applications for tangible learning outcomes.

Keywords: Design Studio Pedagogy, Architecture Education, Creativity, Lahore.

INTRODUCTION

Architectural education exists at the intersection of creativity, technology, and theory, providing a space where new ideas are revered. Students are thus required to develop both an artistic point of view and technical skills in the dynamic, multidimensional environment of the design studio. This research investigated the role of creativity in the architectural education of students, looking at their perceptions and pedagogical approaches to find out how it gets inculcated within the design studios of Lahore, Pakistan. Creativity is often acknowledged as a cornerstone of architectural education and beyond. It incorporates not only the production of original and sensible solutions in design but also the capacity for problem solving, flexibility, and innovation across disciplines (Weisberg, 2006; Amabile & Khaire, 2008). For example, creativity plays a crucial role in mathematics, where it drives breakthroughs in solving

complex problems (Hadamard, 1945), and in politics, where innovative strategies can lead to impactful policymaking (Gibson, 2003). This universality underscores creativity's role in both envisioning the future and addressing present challenges. Creativity not only shapes the future but also provides actionable frameworks to tackle contemporary issues (Jeanes, 2006).

The architecture school design studio fulfills all the functions in an education system, at which theoretical classroom knowledge and practical experience are combined under a model of synchronous and asynchronous blended learning (Garrison & Vaughan, 2008). A wide variety of teaching approaches have been developed to promote creative thinking and enhance students' design work. For instance, Goldschmidt and Tatsa (2005) and Casakin and Kreitler (2008) explored how studio arrangements and teaching methods impact creativity. Asefi and Imani (2011) advocate for structured educational experiences, defined as organized activities that foster both divergent and convergent thinking, which enhance creativity throughout the design process. Kowaltowski et al. (2012) support this by highlighting the benefits of structured creativity models, which lead to improved student outcomes through active engagement.

Fostering creativity in studio culture requires introducing reflective practices and encouraging creative thinking strategies. Alterio and McDrury (2003) identify reflection as a key component of meaningful learning, while Hargrove and Nietfeld (2015) highlight the role of associative thinking in addressing diverse challenges. Bhattacharya et al. (2014) further argue that exposure to unconventional scenarios enhances students' capacity for divergent thinking, promoting originality in design solutions.

Integrating theory and practice is vital in architectural education. Gelernter (1988) asserts that this integration directly enhances project quality, a view supported by Turkan et al. (2010), who note that Bilkent University students see value in connecting technical courses with design projects. However, a gap remains in applying historical and theoretical knowledge. Fahmi et al. (2012) suggest that engaging multimedia and physical models enhances the integration of theory and practice by providing students with interactive tools to explore abstract concepts in tangible ways.

By examining learning models like Kolb's experiential learning cycle and Leary's interpersonal theory, this study provides insights into architectural pedagogy. Kolb's cycle emphasizes active experimentation and concrete experience, aligning with the hands-on preferences of architecture students (Powell, 2007). Leary's theory complements this

by describing how interpersonal behaviors influence design development processes (Leary, 1957). The theory runs the risk of fitting in the instructional focus on collaborative activities which would aid students in collaborative task commitments performing way better in projects. Such involvement links Powell's emphasis on active learning to Leary's relationships of active experience versus passive experience.

Literature for this study was then filtered through relevance to architectural education, creativity, and frameworks of pedagogy. Selection criteria included credibility, recency, and applicability to the Lahore context, thus ensuring an exhaustive canopy for this research. This systematic approach also highlights a certain linking between the review and the objectives of the research identifying effective pedagogy and areas for improvement with regard to creativity.

This study aims to evaluate how creativity is developed and assessed within architectural education, focusing on faculty instruction, the interconnectedness of knowledge, and learning models. By examining the perspectives of architecture students in Lahore, this research identifies opportunities to refine design studio pedagogy, enhancing student learning and creative outcomes.

REVIEW OF LITERATURE

The Role of Creativity in Architectural Education

Authors like Weisberg (2006) have described creativity as the ability to generate a good number of original ideas. However, creativity today is understood as a multifaceted concept encompassing originality, practicality, adaptability, and the ability to apply insights across diverse fields (CIDA, 2022). It is critical not only in learning and knowledge construction (Kahvecioglu, 2007) but also in solving complex, real-world problems that extend beyond architecture, including fields like mathematics, politics, and healthcare (Hadamard, 1945; Gibson, 2003). Architectural education sits at the intersection of art, science, and technology, requiring a full understanding of creative processes alongside analytical ones.

Creativity remains the most critical component within architectural design because it enables students to navigate this intersection effectively. Amabile and Khaire (2008) argue that creativity is central not only to design but also to problem-solving in other disciplines, further emphasizing its universal relevance. Furthermore, creativity informs both the present and future, serving as a tool for immediate problem-solving and a mechanism to envision sustainable, innovative practices (Jeanes, 2006).

Instructional Approaches in the Design Studio

Design Studio Configuration

The configuration of the design studio significantly impacts the creativity and learning outcomes of students. Goldschmidt and Tatsa's analysis of student ideas during the design process underscores the importance of structuring ideas both qualitatively and quantitatively, offering deep insights into the creative process (Goldschmidt & Tatsa, 2005). Similarly, Casakin and Kreitler's comparison of student and teacher perspectives on creativity reveals the need for design studio interventions that align student operational focus with teacher emphasis on innovation (Casakin & Kreitler, 2008). This approach could bridge the gap between student and instructor perceptions, fostering a more comprehensive understanding of creativity in design.

Asefi and Imani (2011) advocate for a strategic educational model that accommodates different types of thinking at various stages of the design process. By assigning specific tools and methods, they promote a more active engagement in the design studio, enhancing student creativity through structured interventions. Kowaltowski et al. (2012) further support this by suggesting that a more structured approach to creativity in design studios, informed by instructor interviews, can lead to more effective outcomes.

Cultivating Creativity

Incorporating creativity in architecture pedagogy means having reflective practice or thinking strategies built into the design studio. Alterio and McDrury (2003) point out the role of reflection on experience in promoting creativity, especially by using reflective practice as a way to have a meaningful learning experience when participating in a design development project. Hargrove and Nietheld (2015) evaluated the effectiveness of proposing creativity education through associative thinking strategies, which the authors argued provided a higher level of advanced cognitive development experience in creatively solving problems.

Bhattacharya et al. (2014), however, proposed that exposing students to unconventional experiences and virtual experiences resulted in more divergent thinking, while using that experience to encourage students to create new original responses to unusual and unexpected design problems would develop students' overall creative capacity.

Integrating Theoretical and Practical Knowledge in Design Studios

The incorporation of theoretical knowledge alongside practical applications in the design studio is paramount in developing a holistic practice-based architectural education. Gelernter (1988) claims that the effectiveness of architectural practice is directly related to this merging of theoretical and technical knowledge. Bilkent University students, for example, valued the identification of links between technical courses and design projects, especially in construction, lighting design, and building services disciplines (Turkan et al., 2010). However, knowledge from history and theory courses remains less integrated and valued, according to student surveys and questionnaires, contradicting the rhetoric of the course descriptions in that study.

Fahmi et al. (2012) suggest that foundational courses may become less time-consuming and more engaging through the arrangement of lessons as more organized activities with the incorporation of multimedia, physical models, and software. This has dual advantages of a more fulfilling educational experience and, as importantly—as it is this knowledge that relates theory to practice in the design studio.

Learning Models in Architectural Education

Kolb's learning cycle is highly applicable to architectural education, as students often prefer 'active experimentation' and 'concrete experience' when learning (Kolb & Kolb, 2017). According to Powell (2007), architectural students, characterized as 'Accommodators,' thrive on hands-on experience and direct engagement with their practice.

Leary's (1957) interpersonal theory of personality provides additional insights into students' behaviors within the design studio. This theory identifies stable interpersonal behaviors that influence students' responses to design tasks. For instance, a student with a 'friendly/dominant' personality may confidently engage with tasks, while a 'critical/dominant' personality might approach tasks analytically yet hesitantly.

The interplay between Kolb's experiential learning and Leary's personality calls for the tremendously flexible instruction prescribed for students with different learning styles.

ANALYSIS

This section analyze the profile of the study group single young adults and their living arrangements in a shared premise out of family.

Key Interview Questions Emerging from the Models:

How does reflective practice impact your design decisions?

In what ways do you balance hands-on experimentation with analytical thinking?

Table-1: Linking Learning Models and Behavioral Patterns

Learning Model	Key Traits	Behavioral Patterns in Students	Pedagogical Implications
Kolb's Learning Cycle	Hands-on, Experiential Learning	Active engagement, preference for experimentation	Design activities that involve tactile exploration
Leary's Personality Theory	Interpersonal Behavior Dynamics	Confidence in friendly/dominant students; hesitation in critical/dominant students	Adapt tasks to support analytical and confident learners

How do your interpersonal tendencies influence your approach to collaborative design tasks?

MATERIAL AND METHODS

Survey Design and Distribution:

This study was conducted among students enrolled in Bachelor of Architecture (B.Arch) programs at various universities in Lahore, Pakistan. To be eligible, students needed to have completed at least four semesters, and therefore the questionnaire was directed toward third-, fourth-, and fifth-year students. The targeted group was chosen because these students had significant exposure to the design studio environment and could provide meaningful insights into pedagogical practices. The third-year students shared experiences and views from their first studio exposure. Fourth-year students reflected on stages in between. Fifth-year students provided an understanding of what happens during advanced design studio work-experiences, allowing an all-encompassing understanding across levels (Kowaltowski et al., 2012).

The purpose of this study was to gather data on students' experiences and perceptions of design studio pedagogy, specifically focusing on instructional approaches, integration of theoretical and practical knowledge, and learning models in architectural education. A systematic questionnaire was created using Google Forms, incorporating both multiple-choice questions and open-ended prompts for suggestions and comments.

Rationale for Survey Structure

- The multiple choice questions provided empirical data, within which patterns and trends could be analyzed among students' perceptions.

- On the other hand, the open-ended questions allow qualitative insight, thus broadening understanding of individual experiences and subtle feedback (Creswell & Plano Clark, 2017).

The formulation of each question related to the research aspect, keeping to the objectives of the literature review:

- **Organization of Idea in Design Studio:** Based on Goldschmidt and Tatsa's (2005) emphasis on structuring ideas, this question assessed students' experiences organizing their creative processes.

- **Balancing Creativity and Feasibility:** Inspired by Casakin and Kreitler (2008), this explored learning of how students Navigate innovative and essentially practical design aspects.

- **Metacognitive Processing:** Aligned with Hargrove and Nietfeld's (2015) findings, this question investigated students' self-awareness of their thinking processes when performing design projects.

- **Connections with Design Thinking and Self-Directed Learning:** Rooted in Kolb's (2017) and Leary's (1957) theories, this study examined how students perceive the relationship their learning strategies have with the design outcome.

The majority of the people, living in shared houses around 81 percent come from out of the city. The long-distance working or educational place with huge traffic congestion of the city leads to leaving the parental house and their proportion is 16 percent while the rest 3 percent of young people shared house seeking better educational environment than their home. This result indicates that young people in Dhaka city choose this single living lifestyle only when they face a situation of crisis or urgency rather than for enjoying an independent lifestyle or a better environment as seen in many developed countries.

By linking the survey structure to the literature, the questionnaire was designed not as an isolated tool but as a method to validate and expand upon existing research frameworks.

Survey Distribution

The survey was distributed through a combination of social media platforms and direct outreach to Heads of Departments (HODs) and faculty members in architectural schools across Lahore. This multifaceted approach ensured broad participation from students across diverse institutions.

Rationale for Distribution Strategy

- **Social Media**: Such platforms like WhatsApp and Facebook would have made rapid spreading and easy access very simple for the students, particularly since they are digital natives and devote a lot of their time to such platforms (Kaplan & Haenlein, 2010). This was a method for reaching as much of the Lahore area as possible, ensuring broad-based inclusivity.

- **Direct Outreach**: This strategy made certain the survey could reach up to the dead centre target by providing institution credibility and participation through networks. Very efficient encouragement of responses for students too poor in interest to speak up in a social media discussion was possible using this method.

Impacts on Survey Results

- The role of social media in boosting turnout rates, as well as in diversifying response types, which demonstrated a variety of established institutional practices.

Figure-1: Gender Distribution

- Direct approach ensures the appropriateness and reliability of data by bringing such accounts into the study; typically, young people with no relevant experience would be less likely to respond to the survey.

It might be the fact that that dual approach might have biased the actual research, because this very particular student group consists of only those who are more active on social media as young and digitally engaged individuals while those who have responded via institutional channels are much less likely to reveal their answer using a more formal and thus academic perspective (Creswell, 2013).

Participants

A total of 110 responses were collected. The gender distribution of participants was 43% male and 57% female. In terms of academic standing, 39.6% of the respondents

Table-2: Institution Participation

Institution	Participation Percentage
University of Engineering and Technology (UET)	21.80%
University of South Asia (USA)	19%
COMSATS Institute of Information Technology	12%
Punjab Tianjin University of Technology (PTUT)	9.90%
Lahore College for Women University (LCWU)	8.10%
Institute for Art and Culture (IAC)	7.20%
National College of Arts (NCA)	3.60%
University of Management and Technology (UMT)	1.80%
Beaconhouse National University (BNU)	1.80%
University of Lahore (UOL)	0.90%
Superior University	0.90%
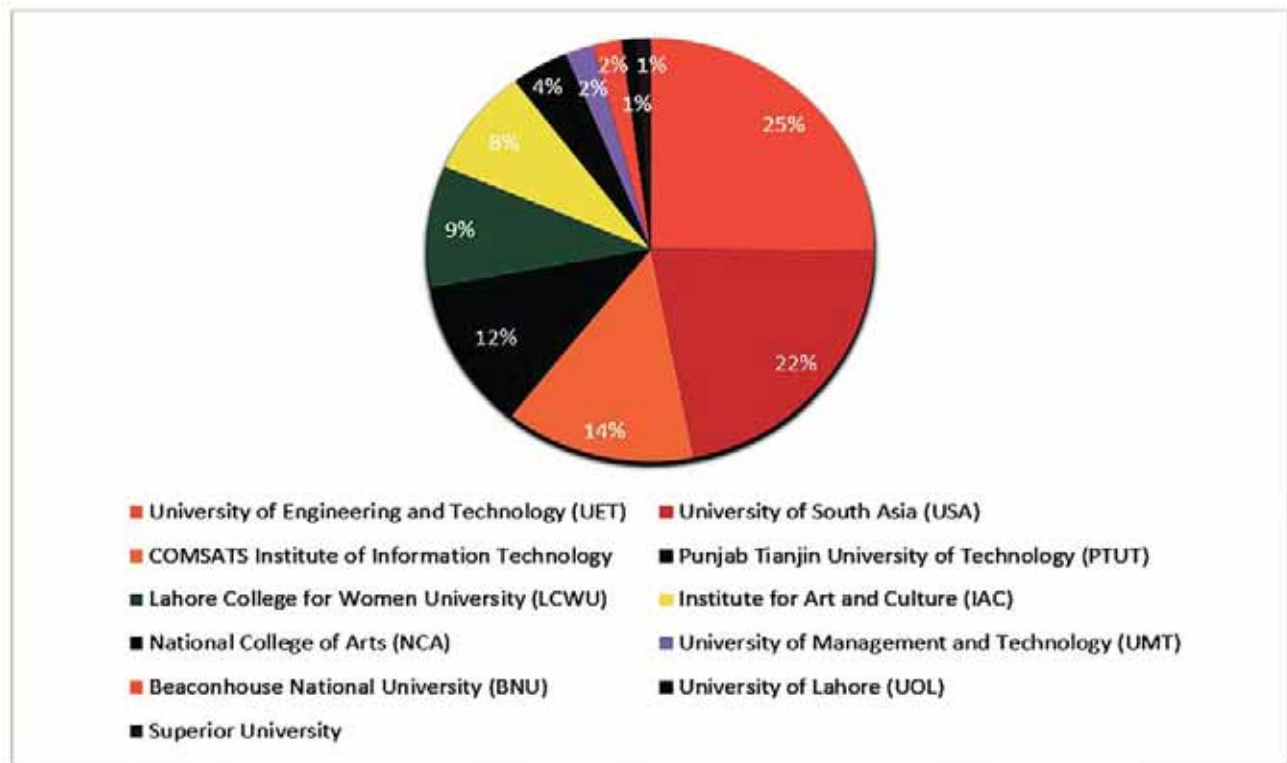
Figure-2: Institution Participation

were in their third year of study, while 29.7% were in their fourth year, and 30.6% were in their fifth year.

Institutional Participation

Students from a diverse range of institutions participated in the survey, providing a comprehensive overview of design studio pedagogy across Lahore. The institutions and their respective participation rates are as follows:

Data Analysis

The data obtained from the surveys were analyzed using descriptive statistics to summarize responses and identify patterns. Popularized by the findings, it also extended to the computation of frequencies, percentages, and distributions involved for multiple-choice questions concerning what would now be known as the trends in student perception and experiences (Field, 2018).

The qualitative responses were analyzed using thematic analysis, a widely recognized method for identifying, analyzing, and interpreting patterns of meaning within qualitative data (Braun & Clarke, 2006). This approach was employed to explore students' experiences and perceptions of design studio pedagogy, focusing on recurring themes such as challenges in balancing creativity and feasibility,

the role of reflective practices, and the perceived impact of instructional strategies. Thematic analysis has been chosen for obvious reason: it captures both explicit and implicit patterns in data, which is really useful for open-ended survey responses.

The mixed-method approach provided a comprehensive understanding of pedagogy in the design studio. Quantitative analysis helped establish clear patterns and trends, while qualitative analysis offered deeper insights into student experiences and feedback. This allowed researchers to coordinate findings with each other, making sure that a complete interpretation would understand the data (Creswell & Plano Clark, 2017).

RESULTS AND ANALYSIS

Perspectives on Instructional Approaches in the Design Studio

Design Studio Configuration

Organization of Ideas in Design Studio Projects

Survey Question1
"How do you feel about the organization of ideas during your design studio projects?"

Table-3: Result of Survey Question 1

Table-4: Result of Survey Question 1

Table-5: Result of Survey Question 1
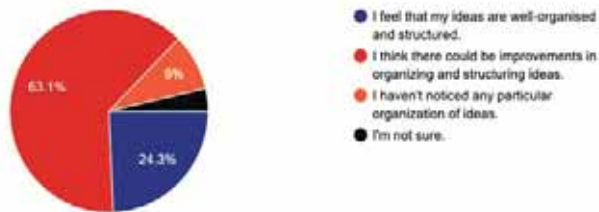
Table-6: Result of Survey Question 2

Clarification

This question refers to the organization of ideas both by the students and as facilitated by teachers in the design studio environment. The importance of structured idea generation is highlighted in the works of Goldschmidt and Tatsa (2005), who underscore the value of qualitative and quantitative structuring in the creative process.

Response Distribution

- 24.3% of students reported that their ideas are well-organized and structured.

- 63.1% felt that there could be improvements in organizing and structuring ideas.

- 9.0% did not notice any particular organization of ideas.

- 3.6% were unsure.

Analysis

Gender distribution and year of study distribution do not significantly affect the overall proportions of the responses, as the perspectives of students remain consistent across different demographics. The majority of students (63.1%) believe that there is room for improvement in the organization and structuring of ideas during design studio projects.
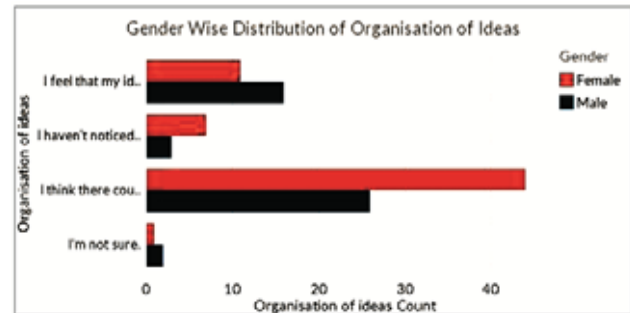
This feedback aligns with the literature, which emphasizes that structured interventions in idea organization can enhance creativity and learning outcomes (Asefi & Imani, 2011).

Teachers play a pivotal role in guiding students through structured thinking processes, providing frameworks that enable better organization and development of ideas. Addressing this gap in pedagogy could significantly improve students' ability to tackle design challenges effectively.

Survey Question 2

"What aspects of design creativity do you focus on the most during your projects?"

Response Distribution

- 21.8% focus on operational aspects and practical considerations.

- 31.8% prioritize innovative and creative aspects.

- 41.8% give equal importance to both operational and innovative aspects.

Analysis

A plurality of students (41.8%) reported balancing both

Table-7: Result of Survey Question 2

Gender Wise Distribution of Focus of Design Thinking

Table-8: Year of Study Distribution chart for Question 2

Year of Study Wise Distribution of Focus of Design Creativity
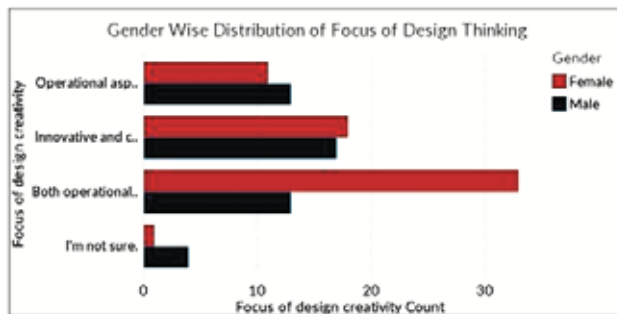
Table-9: Result of Survey Question 3

- Yes, I actively switch between different thinking modes.
- Sometimes, but it's not a deliberate process.
- No, I tend to stick to one type of thinking throughout.
- I'm not sure.

Table-10: Gender Distribution chart for Question 3

Gender Wise Distribution of Trasition of Thinking Types

operational and innovative aspects of design equally. This reflects a growing awareness of the importance of merging creativity with practicality. A significant portion (31.8%) prioritizes innovative aspects, suggesting that students place high value on originality in design.

Gender distribution reveals notable differences. A majority of female students give equal importance to operational and innovative aspects, while a significant number of male students prioritize innovative and creative aspects. In terms of year-wise distribution, third-year students tend to balance both aspects equally, while fifth-year students focus more on innovation, often at the expense of operational aspects.

This finding is consistent with the literature, which argues that striking a balance between creativity and feasibility is crucial for comprehensive design solutions (Kowaltowski et al., 2012). Educators can address these tendencies by encouraging female students to explore more innovative approaches while guiding male students to integrate practical considerations into their designs. Such balanced instruction could foster a more holistic design education.

Transition Between Different Types of Thinking

Survey Question 3

"Do you find yourself transitioning between different types of thinking during the various stages of your design projects?"

Response Distribution

- 54.5% actively switch between different thinking modes.

- 38.2% sometimes switch, but it is not a deliberate process.

- 5.5% tend to stick to one type of thinking throughout.

- 1.8% were unsure.

Analysis

More than half of the students (54.5%) actively transition between different thinking modes during design projects, demonstrating flexibility in their cognitive approaches. However, 38.2% do not consciously make these transitions, indicating a potential gap in their metacognitive awareness.

Gender analysis shows differences in intentionality. Female students are more likely to transition modes without deliberate intent, whereas male students tend to approach these shifts intentionally. Additionally, a small number of male students reported sticking to one mode throughout, an observation absents among female respondents.

This aligns with Hargrove and Nietfeld's (2015) findings, which emphasize the importance of deliberate associative thinking in developing creativity. Educators can address this by incorporating reflective practices, such as journaling or guided discussions, to help students become more conscious

Table-11: Year of Study Distribution chart for Question 3

Table-12: Result of Survey Question 4
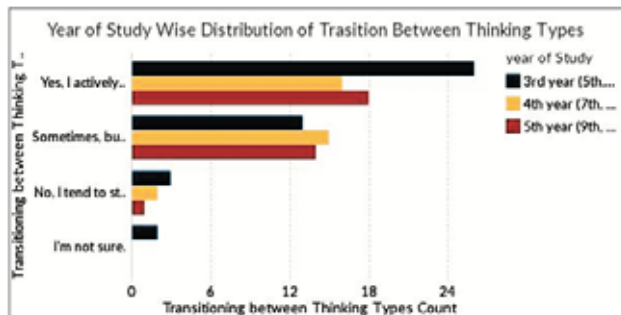
Table-13: Gender Distribution chart for Question 4
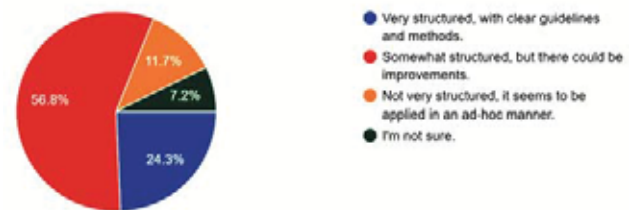
Table-14: Year of Study Distribution chart for Question 4

of their cognitive transitions. These strategies could enable all students to harness the benefits of flexible thinking more effectively.

Structure of Creativity Methods

Survey Question 4

"How structured do you find the application of creativity methods in your design studio projects?"

Response Distribution

- 24.5% found the methods very structured with clear guidelines.

- 57.3% found them somewhat structured but felt there could be improvements.

- 10.9% felt the methods were applied in an ad-hoc manner.

- 7.3% were unsure.

Analysis

A majority of students (57.3%) perceive the application of creativity methods as somewhat structured but believe there is room for improvement. This aligns with Kowaltowski et al. (2012), who emphasize that structured creativity methods can significantly enhance student outcomes by providing consistent frameworks for design exploration.

The ad-hoc application of these methods by some students (10.9%) further underscores the need for standardized and clearly articulated creativity techniques in the design studio. Although the year-wise distribution matches overall trends, there is a notable spike in the perception of creativity methods as somewhat structured but needing improvement among female students.

Male students, in contrast, are more divided, with a substantial portion perceiving the methods as very structured with clear guidelines, while others share the female students' view of needing improvement. These gender-based differences highlight the importance of tailoring creativity techniques to meet diverse student needs, a recommendation also supported by Casakin and Kreitler (2008).

Cultivating Creativity

Role of Reflection on Experience in Enhancing CreativitySurvey

Question 5

"How do you perceive the role of reflection (understanding

Table-15: Result of Survey Question 5

Table-16: Gender Distribution chart for Question 5
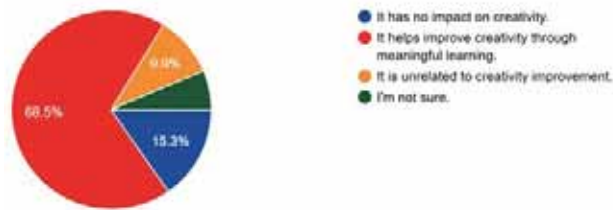
Table-17: Year of Study Distribution chart for Question 5
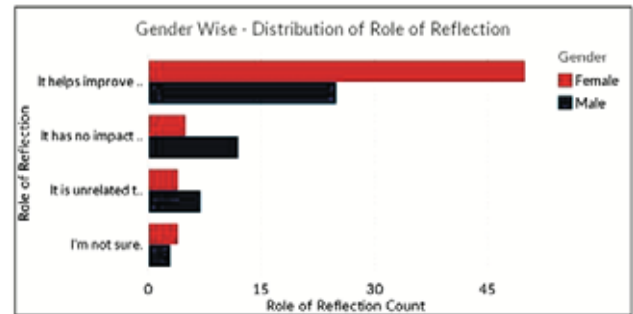
Table-18: Result of Survey Question 6

the bigger picture and its consequences) on experience in enhancing creativity during studio projects?".

Response Distribution

- 15.5% believe it has no impact on creativity.

- 68.2% believe it helps improve creativity through meaningful learning.

- 10% believe it is unrelated to creativity improvement.

- 6.4% were unsure.

Analysis

A large majority (68.2%) of students believe that reflection enhances creativity by promoting meaningful learning. This finding reinforces the work of Alterio and McDrury (2003), who emphasize reflection as a critical component of significant learning in design projects.

However, 15.5% of students believe that reflection has no impact on creativity. These students may benefit from structured opportunities for reflection, such as guided journaling or peer discussions, to better understand its role in the creative process.

Gender distribution shows that a higher proportion of female students recognize the value of reflection compared to male students, some of whom feel it has no impact. Year-wise distribution indicates a divergence, with third- and fifth-year students more likely to believe that reflection is unrelated to creativity improvement, while fourth-year students align with the majority trend. This suggests that targeted interventions, such as reflective workshops tailored by academic level, could help bridge these gaps in perception (Hargrove & Nietfeld, 2015).

Impact of Unusual Experiences on Creativity

Survey Question 6

"How do you think exposure to unusual experiences and situations affects creativity in design studios?"

Response Distribution

- 14.5% believe it limits creativity.

- 69.1% believe it enhances creativity by encouraging divergent thinking.

- 8.2% believe it has no impact on creativity.

- 8.2% were unsure.

Table-19: Gender Distribution chart for Question 6

Table-20: Year of Study Distribution chart for Question 6
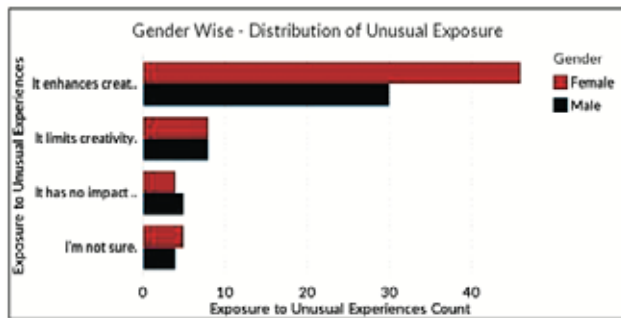
Table-21: Result of Survey Question 7
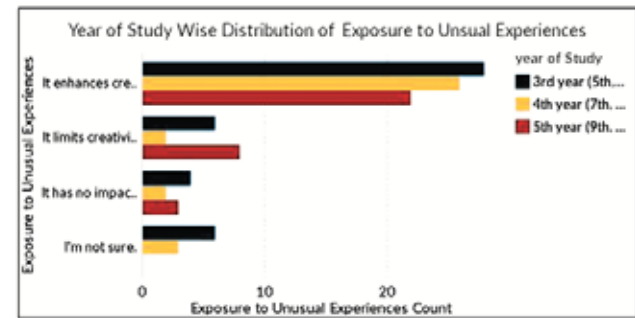
Table-22: Gender Distribution chart for Question 7

Analysis

The majority of students (69.1%) believe that exposure to unusual experiences enhances creativity by encouraging divergent thinking. Bhattacharya et al. (2014) support this view, highlighting how unconventional experiences stimulate original responses to design challenges.

The small percentage (14.5%) who believe it limits creativity suggests that some students may feel overwhelmed or constrained by novelty. This aligns with the idea that not all students are equally equipped to handle the ambiguity associated with unconventional scenarios (Hargrove & Nietfeld, 2015). Targeted strategies, such as preparatory exercises that gradually introduce novelty, could help these students adapt and thrive in such situations.

Gender and year-wise distributions show consistency with the general trend, reinforcing the broad recognition of divergent thinking's value in the design process.

Integrating Theoretical and Practical Knowledge in Design Studios

Encounter with Historical Theories and Frameworks
Survey Question 7

"Have you encountered the use of historical theories or frameworks like typology in guiding your design process?

Response Distribution

- 49.1% have encountered and utilized such frameworks.

- 35.5% have heard of them but haven't used them in their projects.

- 10.9% have not encountered them in their design projects.

- 4.5% were unsure.

Analysis

Approximately half (49.1%) of the students have applied historical theories or frameworks, indicating some integration of traditional knowledge into contemporary design practice. However, the 35.5% who have only heard of these frameworks without applying them highlights a gap in connecting theoretical knowledge to practical design tasks.

Turkan et al. (2010) emphasize the importance of explicitly linking theoretical content to design studio projects to bridge this gap. Gender distribution matches the general trend, but year-wise distribution reveals a significant challenge at the fourth-year level, where students report having heard of frameworks but not using them in their projects. This suggests a need to strengthen curricula at this stage, emphasizing applied historical analysis in design tasks.

Table-23: Year of Study Distribution chart for Question 7
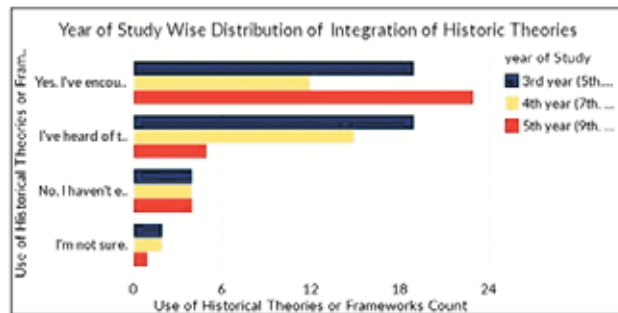
Table-24: Result of Survey Question 8
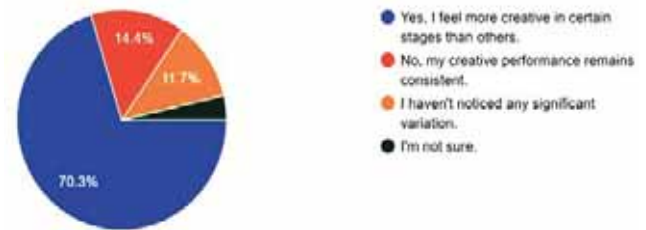
Table-25: Result of Survey Question 8
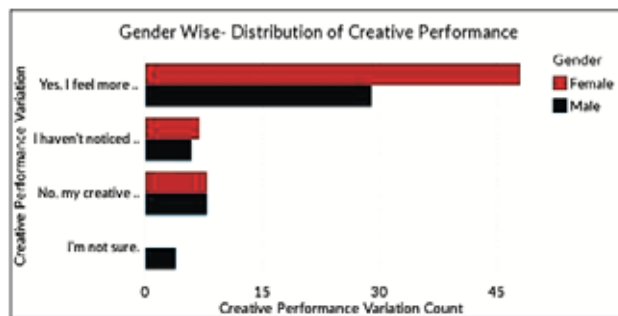
Table-26: Year of Study Distribution chart for Question 8
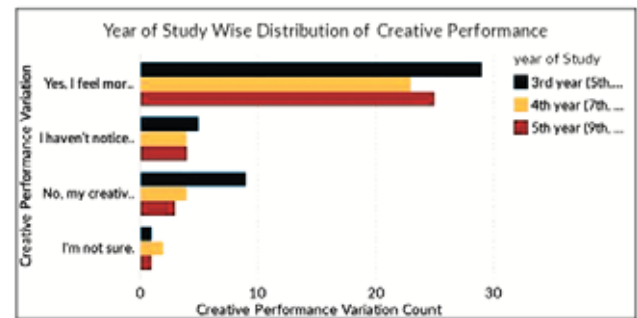
Learning Models in Architectural Education

Variation in Creative Performance

Survey Question 8

"Do you feel that your creative performance varies throughout the different stages of the design process?"

Response Distribution

- 70% feel more creative in certain stages than others.

- 14.5% feel their creative performance remains consistent.

- 11.8% haven't noticed any significant variation.

- 3.6% were unsure.

Analysis

A significant majority (70%) of students reported that their creative performance varies throughout the design process, suggesting that certain stages may inherently foster more creativity than others. This variability in creative performance highlights the importance of identifying and enhancing the stages of the design process where creativity tends to flourish, while also exploring ways to maintain or boost creativity in other stages.

Gender distribution and year-wise distribution show the same trend, indicating that this variability in creative performance is consistent across different demographics. This consistency suggests that educators should focus on developing strategies that support creativity throughout all stages of the design process, benefiting a broad range of students.

Impact of Metacognitive Processing

Survey Question 9

"How do you think metacognitive processing (thinking about one's own thinking and learning) affects your design thinking and making?"

Response Distribution

- 40.9% believe it significantly enhances their design process and outcomes.

- 40.9% believe it has some impact, but they are not sure how significant it is.

- 10% do not think it impacts their design.

- 8.2% were unsure.

Table-27: Result of Survey Question 9

- It significantly enhances my design process and outcomes.
- It has some impact, but I'm not sure how significant it is.
- I don't think metacognitive processing impacts my design.
- I'm not sure.

Table-28: Gender Distribution chart for Question 9
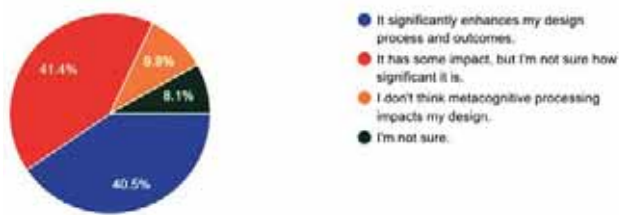
Table-29: Gender Distribution chart for Question 9
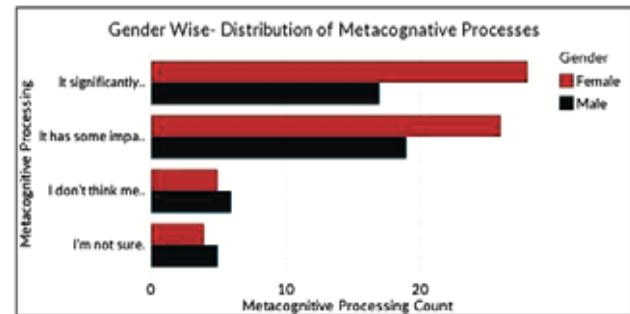
Table-30: Result of Survey Question 10

- Yes, I see a strong relationship between design thinking and self-directed learning.
- I'm not sure about the relationship between the two.
- No, I don't think there's a significant relationship.
- I'm not sure.

Analysis

Students are evenly split between those who believe that metacognitive processing significantly enhances their design process (40.9%) and those who recognize some impact but are unsure of its significance (40.9%). This reflects an awareness of the importance of self-reflection in design thinking, though there may be a need for further emphasis on metacognitive strategies to help students fully appreciate and leverage their benefits. The pattern is the same in gender distribution and year-wise distribution, indicating that this split in perception is consistent across different groups of students. This suggests a universal opportunity to reinforce the value of metacognitive strategies in the design studio.

Relationship Between Design Thinking and Self-Directed Learning

Survey Question 10

"Do you believe that design thinking is closely related to self-directed learning?"

Response Distribution

- 63.6% see a strong relationship between design thinking and self-directed learning.

- 20.9% are unsure about the relationship.

- 10.9% do not think there is a significant relationship.

- 4.5% were unsure.

Analysis

A strong majority (63.6%) of students perceive a close relationship between design thinking and self-directed learning, suggesting that students who engage in self-directed learning may be better equipped to apply design thinking principles. This indicates that fostering self-directed learning skills could enhance students' overall design capabilities, making them more effective and independent thinkers.

Gender distribution and year-wise distribution show the same trend, reinforcing the idea that this perception is consistent across different groups of students. This consistency further highlights the importance of integrating self-directed learning strategies into the design education curriculum.

Integration of Creative and Critical Thinking

Survey Question 11

"If creative thinking involves an open approach to new ideas,

Table-31: Gender Distribution chart for Question 10
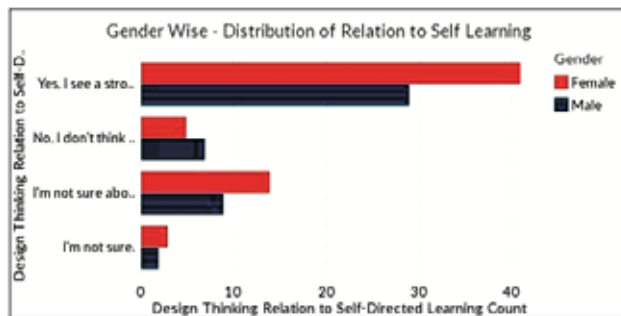
Table-32: Year of Study Distribution chart for Question 10
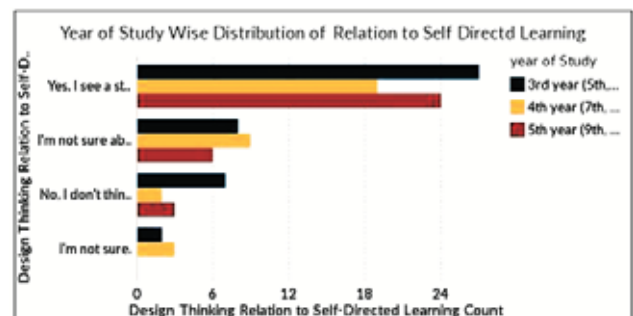
Table-33: Result of Survey Question 11

Table-34: Gender Distribution chart for Question 11
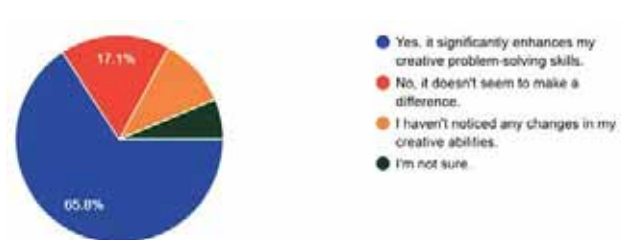
and critical thinking involves an analytical thought process, have you found integrating both types into studio activities helpful in enhancing your superior cognitive development?"

Response Distribution

- 66.4% believe it significantly enhances their creative problem-solving skills.

- 17.3% do not believe it makes a difference.

- 10.9% haven't noticed any changes in their creative abilities.

- 5.5% were unsure.

Analysis

A substantial majority (66.4%) of students reported that integrating both creative and critical thinking significantly enhances their problem-solving skills, suggesting that the combination of these cognitive approaches is essential for superior cognitive development. The students' recognition of the value of this integration highlights the need for studio activities that actively promote both creative exploration and critical analysis. Gender distribution and year-wise distribution do not show any deviation from the general response result, indicating that this perception is consistent across different groups of students. This reinforces the importance of fostering both creative and critical thinking in the design studio.

Approaches to Design Strategies

Survey Question 12

"What approach yields the best results in terms of solution quality and creativity?"

Response Distribution

- 20% believe intuition-based design strategies yield the best results.

- 52.7% favor problem-driven design strategies.

- 16.4% prefer trial-and-error design strategies.

- 10.9% were unsure.

Analysis

A significant majority of students (52.7%) favor problem-driven design strategies, indicating a preference for structured, analytical approaches that focus on solving specific design challenges. Intuition-based strategies, while still valued (20%), are less favored, suggesting that while creativity is essential, students feel more confident in approaches that offer clear pathways to solving design problems. This result underscores the importance of teaching both intuitive and problem-driven methods to allow students to develop a well-rounded design approach. Gender distribution and year-wise distribution align with this general response, reflecting a

Table-35: Year of Study Distribution chart for Question 11

Table-36: Result of Survey Question 12
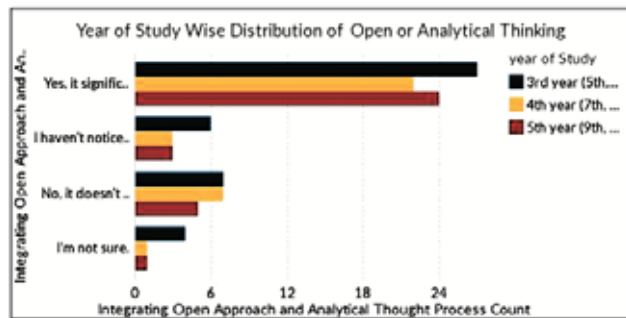

Table-37: Result of Survey Question 12
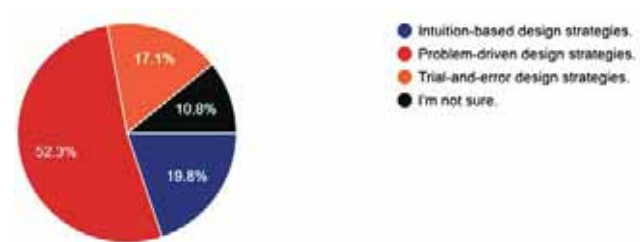
Table-38: Year of Study Distribution chart for Question 12

consistent preference for problem-driven strategies across different student groups.

Qualitative Analysis

Aside from the evaluated, quantifiable nature of the data, encapsulated in the survey portion, a range of open-ended responses given by students serve as added means for exploring their experience and point of view perspective paradigm around learning in the program:

- Architecture Frustration: One provided a considerable dislike of architecture with potential realities of frustration or dissatisfaction with the educational experience.

- Practical vs. Aesthetic Balance: A number of students noted a lack of balance between practical experience and aesthetic on the educational spectrum, noting a desire for more "real-world" applications or hands-on experience.

- Influence of instructors: One response noted how understanding instructor strengths and unique villages absorb students' thought processes and creative paths, limiting creative processes.

- Mix of creativity and function: One 5th student noted the value of mixing creativity and technicality with degree of value afforded for both aesthetics and purpose. Careful attention to pursue holistically the intention of functionality in designs through a balance of creativity and critical

functionality equally valued in design process.

Result Summary

The results of the Pedagogy Survey carried out in the Design Studio provided a contextual lens of student experiences and perceptions. Students acknowledge value in creativity, structure, and applicability for their education, but we have substantial opportunities to refine pedagogical practice around the arrangement of ideas and methods of creative thought, and balancing creativity (e.g., free thought) with pertinence or relevance (e.g., descriptive or prescriptive thought). Using qualitative feedback demonstrated to be advantageous in a survey format, teacher feedback also indicated students desire, "... an individualized and flexible approach to teaching, emphasizing real-life practice and experiential learning" (feedback, Student One). This analysis of findings serves as a framework of consideration for refinement in studio-based design education (for the sake of creativity), in terms of impacting in-studio student learning and experiences.

DISCUSSION

The survey results indicate a complex situation with regards to architectural education in Lahore, specifically in relation to students' views on the balance between creativity and practicality, the organization of ideas, and reflective practice. There are good indicators and areas of potential

developmental concern in design studio pedagogies that emerge from this research.

Firstly, the alignment among the gender and year of study perspectives about the pedagogy implies that students share a belief that their ideas with regard to design project would benefit from better organization and structuring. This agrees with Goldschmidt and Tatsa (2005) about the benefits of ideas being organized and structured qualitatively and quantitatively in the design process. Secondly, however, the differences in male and female student preferences for innovation or operation still seem to warrant design studio to be flexible and multiple perspectives to balance better these two essential aspects of design. The research findings identify a tendency for female studies to allow both aspects equal opportunity while male studies seemed to favor innovation more, and other factors seem at play such as Pakistan culture and traditional beliefs about what is valued with regards to the role of creativity and practicality.

Example of Teacher Intervention: One possible intervention for educators in Lahore might include intentionally instructional exercises that have students employ both practical actions and engaging their creativity. For example, an educator may ask their students to first brainstorm creative design concepts through a series of practice activities and ask the students to then create thorough technical plans for execution. Another approach might ask the students to work in teams with both a male and female, or one innovative or automotive professional, for the purpose of mutual learning and developing a more integrated design methodology.

The survey additionally indicates that many students switch between different thinking orientations while working through their design projects, with a large proportion of them not consciously doing so. This evidence provides support for educators to offer some structured activity that helps develop thinking flexibility, as suggested by Asefi and Imani (2011).

Female students, in particular, would benefit from prompts that support them to become more intentional about these cognitive shifts.

Example of Teacher Intervention: One potential design for teachers would be to integrate reflective tasks such as "design journals" in which students catalogue their thought process while working through the project. Teachers could ask students to examine their diaries and identify shifts between different modes of thought (e.g., creative versus analytical modes of thought), and talk about how these shifting modes operated and affected the outcome. Exposing students in an active manner would likely be a very beneficial way for students to become aware of their modes of thought, and shift to demonstrate abilities to adapt to more instances of design thinking and multiple aspects of design challenges.

Reflective practice is a vital mechanism for building creativity in architectural education. It is well-documented that the near-unanimous student perception that reflection supports creativity is telling of its importance, as Alterio and McDrury (2003) discuss. However, the percentage of students who do not believe that reflection is valuable (both of which were below the proportion of students who did) indicates that structured opportunities need more opportunities for reflective practice to practice reflection.

Example of Teacher Intervention: One simple way instructors could engage their students would be an exercise titled "reflection week," where students revisit their major project in relation to their decisions. Teachers could engage students in some way, such as discuss the decisions that students made at different points in their project, such as initial brainstorms or sketches, through practice replica decisions from the project they were able to adapt or generally overall about their work on it. In these teacher-facilitated discussions or workshops, students simply would consider what they learned from the project, what they would do differently, or how decisions substantiate the use of creativity or practicality in their choices. The "reflection week" organized, from teachers would weave into the fabric of the course, the possibility of peer reviews for students to give and receive feedback. This would also potentially deepen the students understanding both their own work and work of others.

The need for improvement exists in the area of the integration of theoretical to practice in the design studio. The survey results show that students felt exposure to historical theories and frameworks, but that learning theory was remiss when the students went to made design projects. This is consistent with a finding from Turkan et al. (2010) at Bilkent University, which showed that students referenced the connections between technical courses and design projects, but less so with historical or theoretical knowledge.

Example of Teacher Intervention: To "facilitate" this linkage, educators could formulate assignments that would compel students to apply historical and theoretical ideas directly in their designs. For example, the students could design a modern building that incorporates aspects of particular historical architectural movement into their project, explaining how the principles were incorporated into the design. In this area, educators could also organize "theory-to-practice" workshops, wherein students would study case

studies of buildings that incorporate historical theories into contemporary work successfully. This could serve two purposes by (1) reinforcing the importance of theoretical knowledge, while support (2) the predictability of their practice by demonstrating their application to student work.

Finally, the findings show that self-directed learning and metacognitive processing is significant consideration for the design process. Student did appreciate the importance of metacognitive strategies for self-directed learning regarding, yet there is questionable how much they stood behind the idea metacognitive processing positively impacted the design process when using strategies. The students appreciated self-reflection from the designer thinking scope but ideological did not feel they were firmly taking advantage of these versatility of thinking tools.

Example of Teacher Intervention: Educators could facilitate the experience each week to change or minimize negative self-efficacy influences of rationale/purpose with "pause and reflect" reminders placed at different junctures during studio session, for examples these could occur during design critiques if students were directed to take just a moment to consider why they went down any particular design tangential listening to the questions such as "Why was that an approach?" or "Why was that decision made? "How does this decision relate to the project's objectives?" These prompts may help students become aware of their thinking strategies and impact on their design outcomes. Furthermore, using self-assessment rubrics with criteria around which students evaluate their work would also support the development of metacognition.

The observed strong connection that students made between design thinking and self-directed learning in our design studio illustrates the value of developing self-directed learning capabilities in the studio environment. This is all the more relevant and pertinent in relation to Kolb's (2017) learning cycle theory that positions architectural students, as 'Accommodators' within the learning conditions afforded by contemporary design studio learning environments, being hands-on, as those who learn best from the experience they get from an exercise. Self-directed learning is especially valuable and appropriate in Lahore where the learning resources available may be limited which may not allow for the development of learners as effective independent thinkers.

A possible example of educator intervention might involve educator-develop self-directed, student led projects where students are able to choose their own topics or areas of interest within a more broadly stated design challenge. For example, the final project in the course might involve the design of a public space. Each student could select and focus on an aspect to guide their design, such as sustainability, cultural relevance, or technology. In providing self-directed guidance and learning resources, educators, should not take over students' research and decisions as that runs counter to the intent of the exercise. In doing so, students can take ownership of their learning and develop the confidence and skills necessary to be an independent learner and tackle complex design problems independently.

Finaly, students' inclination toward problem-driven design approaches suggests that while there is an understanding of creativity, there is a preference for methodical and analytical processes in design. This result is consistent with Leary's (1957) Interpersonal Theory of Personality which showed that a student's style of design is likely the same as their style of personality.

Example of Teacher Intervention: Teachers may help balance problem-driven and intuition-based strategies by using a phase-based structure for studio projects. The first phase can include analytical problem-solving where students specify and solve design problems, while the second phase would promote an intuitive and open exploration of design processes to invent creative solutions outside of the original problem. This type of phased approach will incorporate analytical and creative skills without being unequivocally anchored to one or the other, and would help students become more well-rounded in his or her design process.

CONCLUSION

This research study ultimately articulates major concerns regarding present-day architectural education in Lahore, illustrating particularly which areas need improving in relation to design studio pedagogy. Closing the gaps identified for example, through better framing of ideas, creating cognitive flexibility, infusing reflective practice, and enhancing articulation of theory and practice, which may foster a more supportive and engaged learning environment.

In addition, it is crucial to recognize that importing pedagogical frameworks without first rigorously testing them in the local context may lead to ineffective or misaligned outcomes. Educational practices suited to the realities of the region, culturally or practically are critical to ensuring that architects are educated to engage locally relevant work and ideas. These improvements are not merely beneficial but essential for cultivating architects who are innovative, adaptable, and well-prepared to meet the demands of contemporary architectural practice. As the profession continues to evolve, so must the educational frameworks that prepare future architects, making these pedagogical advancements both timely and necessary.

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BARRIERS TO SOCIALLY SUSTAINABLE RESIDENTIAL NEIGHBORHOODS PLANNING PRACTICE OF A GROWING CITY - A CASE STUDY OF QASIMABAD TALUKA HYDERABAD

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ABSTRACT

Geographically and historically, Hyderabad city has long been a draw for immigrants coming from other multiple settlements. The city's neighborhood has, however, been subjected to hinged ribbon development during the past few years, this problem is visible along with the key Qasimabad Taluka, thoroughfares. This phenomenon continues without considering any basic regard for making the city more habitable, interactions between various societal groupings, and their level of social ties. Unnecessary city fragmentation is a growing issue that has adverse effects on urban tissue in many ways. Rapid urbanization in a city may produce extreme characteristics and a severe lack of facilities, driving it swiftly toward unsustainable scenarios. Hence, this study focuses on the attributes of socially sustainable residential neighborhood conditions as it is important to consider all possible choices for connecting the neighborhood. Based on the aforementioned assertions of the literature review, the main objective of the research is to identify the sustainable neighborhood indicators and the fundamental characteristics of socially sustainable residential neighborhoods that may directly affect social sustainability. To formulate a relevant supplement and support sustainable neighborhood planning, nine impediments to the development of sustainable neighborhoods have been identified through thorough literature research. By using the quota sampling method, structured interviews have been conducted with the inhabitants of selected study areas, to investigate the barriers to socially Sustainable existing residential neighborhoods. The study found the sense of community, accessibility, safety and security, green spaces, and aesthetic appeal as attributes that contribute to social sustainability and resident satisfaction.

Keywords: Social Sustainability, Urbanization, Urban Fragmentation, Residential Neighborhoods, Qasimabad Taluka, Hyderabad City, Developing Countries.

INTRODUCTION

Urban design shapes and develops cities beyond just arranging buildings and streets. It involves creating public spaces, transportation systems, and amenities, defining a city's form and character. Architects, landscape designers, and urban planners collaborate to integrate streets, squares, and blocks into functional and aesthetically appealing environments (Abhijat & Pathak, 2023). While urban design focuses on the physical enhancement of public spaces (Aziz & Anwar, 2024), urban planning emphasizes managing private development through legal frameworks and sustainable practices (Marvi, et al., 2023).

In Pakistan, urban land is categorized into public, private, and land under conventional law (Zahir & Abdul, 2014). Despite significant government-owned land, neighborhood planning faces challenges due to inadequate facilities for residents (Korai, et. al., 2014). These challenges are particularly evident in Qasimabad, Hyderabad, where rapid urbanization has outpaced the provision of essential social infrastructure. Developing countries like Pakistan often lack critical social sustainability traits, resulting in lower living standards compared to developed nations (Aziz & Anwar, 2024). Deficiencies in healthcare, education, and public services hinder overall quality of life (Abbas & Hyowon, 2015; Joan & Ester, 2018), while poor infrastructure, inadequate clean water supply, and insufficient waste management systems contribute to substandard living conditions (Ahmed & Ali, 2017). The unchecked growth of informal settlements and urban sprawl further exacerbates social inequalities and environmental concerns.

Given these pressing issues, this study focuses on evaluating the social sustainability of residential neighborhood development in Qasimabad, Hyderabad, examining how current planning practices impact the quality of life and community well-being (Khan, 2020).

LITERATURE REVIEW

The concept of the neighborhood has captured the interest of urban planners, architects, and designers. It remains a compelling notion among both theorists and practitioners, perceived as a potential remedy for urban social challenges and as a means to address deficiencies in urban environments. Neighborhoods can be understood as structured local entities and collective activity patterns (Rachel & Hubert, 2000).

Neighborhood Communities and Social Sustainability

Neighborhood communities, defined by their social interactions, communal spaces, and collective ethos, play a pivotal role in everyday life by nurturing social connections and providing access to essential resources (Johnson, 2002). The design of residential areas significantly shapes these dynamics (Mohammad, et. al., 2020). As urban populations burgeon and the demand for infrastructural development increases to cater to social needs, the concept of sustainable development emerges prominently. This complexity has been extensively examined in contemporary research on social sustainability (Farr, 2011).

In developing nations as Pakistan, strategic neighborhood planning is vital for multiple reasons. Primarily, swift urbanization and population surges frequently result in the emergence of informal settlements, which often lack essential amenities and infrastructure, leading to substandard living conditions

(Marvi, et al., 2022; Okot-Okumu & Luwaga, 2016). Secondly, sustainability plays a crucial role in holistic sustainable development, fostering equity and social inclusion, which are pivotal for cultivating resilient communities (UN-Habitat., 2016). Additionally, sustainable neighborhoods can enhance community cohesion and social capital, mitigating the adverse effects of poverty and inequality (Marvi, et al., 2024). Modern neighborhoods face growing fragmentation due to increasing obstacles, potentially causing a range of issues (Sharifi, 2016; Sas-Bojarska, 2016). The key challenges include:

- Reduction in urban fabric complexity
- Functional deficiencies
- Environmental threats

These barriers, categorized into various groups, can provoke diverse conflicts within urban settings. Research indicates that the most significant hurdles include unsustainable urbanization trends, lack of enabling legislation, ineffective planning, and the absence of national standards assessment tools (Rabia, et al., 2022). Cities in Pakistan are expanding rapidly, often without proper planning, and they will not naturally evolve into attractive, innovative, well-organized, and functional entities on their own (Planning Commission, 2011; Marvi, et al., 2021)

Sustainable Development

The past few decades have witnessed significant global shifts characterized by rapid migration from rural to urban centers, driven by economic growth and industrial expansion (Newman & Kenworthy, 1999). Sustainable development introduces new urban lifestyles and guiding principles on a global scale. Sustainability is not a fixed achievement but an evolving process requiring continuous adaptation (Armin et al., 2021).

Urban neighborhoods hold a robust physical presence with diverse social and economic attributes, transforming them into essential components of the city's fabric (Joan & Ester, 2018). The aspiration for sustainable urban development has gained prominence, becoming a critical aspect of urban growth. Sustainable cities aim to improve living standards and promote a higher quality of life (Abbas & Hyowon, 2015). Giancarlo di Carlo, an Italian architect, famously stated, "Once we produced to consume, now we consume to produce" (Theodoridou, 2012). The concept of sustainable development arose as a response to urban environmental degradation in the twentieth century. The 1972 United Nations Conference in Stockholm underscored the importance

of human settlement and urban management issues (Saha & R, 2008).

Socially Sustainable Residential Neighborhood

Socially sustainable residential areas are essential for nurturing equity, well-being, and social cohesion in urban environments. In developing countries, these communities can enhance economic opportunities, promote civic engagement, and improve overall quality of life (Ancell & Thompson-fawcett, 2008). Bramley and Power 2009 provide a comprehensive framework for social sustainability, emphasizing distributive justice and equitable access to services. Their framework aligns with Sustainable Development Goal (SDG) 11, which advocates for sustainable, inclusive, and resilient cities (Council, 2021).

The development of socially responsible neighborhoods prioritizing accessibility, inclusivity, and community engagement is crucial for achieving SDG 11.7 and 11.7.1, which emphasize the need for safe, inclusive, and accessible public spaces for all, particularly marginalized and vulnerable groups (United Nations, 2015). However, despite growing attention to social sustainability, there is limited research on its practical implementation at the neighborhood level in mid-sized cities like Qasimabad, Hyderabad.

Table 01 illustrates the key characteristics essential for understanding and experiencing social sustainability through public engagement. Founded in 1978, the United Nations Human Settlements Program has advocated social sustainability by prioritizing the enhancement of residents' well-being and security (Saha & R, 2008). This initiative has garnered the attention of urban planners, architects, and designers, fostering trust, confidence, and social cohesion within communities. By investing in social sustainability, we can ensure that communities flourish for future generations (Sadasivam & Alpana , 2011)

An extensive literature review has synthesized a nuanced set of social sustainability characteristics to refine the study's focus. Utilizing these characteristics as a foundational framework, the social sustainability traits have been delineated under the following headings to facilitate a systematic collection of data aimed at assessing social sustainability within the context of Qasimabad, Hyderabad:

- Opportunities for Community/Residents to Engage;

- Inclusivity and Accessibility

- Facilities and Amenities, and;

- Social Cohesion & Safety.

This study primarily emphasizes the social pillar of the Sustainable Development Goals (SDGs), with a specific focus on Targets 11.7 and 11.7.1, which underscore the significance of safe, inclusive, and accessible public spaces for all residents.

Despite the growing emphasis on sustainable urban planning, limited research examines how social sustainability is implemented in neighborhood planning within Qasimabad, Hyderabad. Existing studies predominantly focus on broader

Table-1: Characteristics of Residential Neighborhoods for Social Sustainability.

Social Sustainability	Characteristic	Abbreviation
	Accessibility & Inclusivity	IA
	Technology & Transportation	TT
	Well-being & Health	HW
	Views & Aesthetics	VA
	Public Spaces	PS
	Social Equity	SE
	Social Cohesion	SC
	Community Engagement	CE
	Cultural Diversity	CD

Figure-1: Lack of Sustainability in Qasimabad; City Aesthetic Quality.

urban issues or larger cities, leaving a gap in understanding the localized challenges of social sustainability at the neighborhood level. This study aims to address this gap by analyzing the social sustainability of residential neighborhoods in Qasimabad, evaluating key barriers, and identifying planning shortcomings that affect community well-being.

By focusing on the neighborhood size and scale, this research contributes to a deeper understanding of how urban policies and planning strategies impact social sustainability in mid-sized cities of developing countries.

RESEARCH METHODOLOGY

Study Area

The city of Hyderabad, Qasimabad Taluka stands out as a unique area within Sindh's important A-category division, where land values are significantly high. Selected as the focus of our research, this neighborhood is facing the constant challenges of urbanization (see Figure 01).

Drawing on the lessons of older cities, it blends national and local rules to achieve fairness, efficiency, and lasting effects (Adams, 2016). However, as the urban vicinities become more crowded, the urgent need for environmental care grows stronger; Qasimabad is working to balance growth with sustainable ideals, adapting to changes while long-term planning appears to be slipping. It is important to make an effort for the well-being of its residents and guide the shared responsibility to the community (Kristina 2016; Korai, et al., 2014).

Balancing the needs of the present and the future is essential for environmental well-being. Therefore, the urban stewards and strategists must focus on innovative technologies that swiftly rescue our cities and provide vital solutions (Gopal, et al., 2022; Abbas & Hyowon, 2015). Recognizing the significance of community planning in achieving social sustainability, this study not only benefits construction and

management experts by enhancing their skills but also supports communities affected by imprecise design (Qian, et al., 2016).

Problem Statement

Qasimabad Taluka, once a hub for migrant workers, is experiencing rapid urbanization that has led to deteriorating neighborhood livability and weakened social cohesion. The unchecked expansion along its main corridors prioritizes commercial development over community well-being, resulting in fragmented urban growth, limited public spaces, and inadequate social amenities. These conditions hinder social sustainability by restricting access to essential services, reducing opportunities for community interaction, and exacerbating spatial and social inequalities.

Despite the growing population—expected to reach 1.85 million in Hyderabad by 2020 and a 269% increase in Qasimabad's population from 1998 to 2017—the area continues to face planning deficiencies, lack of inclusive policies, and ineffective urban governance. This has resulted in unstructured urban expansion, encroachments, and the degradation of residential environments, making socially sustainable neighborhood planning a critical challenge. This study evaluates the social sustainability of Qasimabad's residential neighborhoods by analyzing nine key characteristics derived from literature and assessing their local applicability. Findings from this research aim to provide urban planners and policymakers with insights for fostering socially inclusive and well-connected neighborhoods that enhance livability and quality of life.

Data Collection

During the data collection phase, the study employs quantitative data analysis. The international literature review serves as our guiding tool, illuminating the intricate relationship between sustainability and the built environment. Additionally, the incorporation of local case studies and national literature enriches our understanding of the specific challenges and opportunities within the context of Qasimabad. This residential neighborhood, situated in Hyderabad City, faces a significant challenge: as the availability of approved facilities declines, land values continue to rise, undermining the principles of sustainable living. By examining both global and national perspectives, this research aims to contextualize the findings within local reliability. Through the lens of socially sustainable neighborhood planning, the study seeks to unravel the complexities of existing lacking, uncovering the hidden barriers that hinder progress toward sustainable development. View Figure 02, etched below, Framework of research methodology.

The process of data collection unfolded through a meticulously designed multi-stage sampling approach (University, n.d.). Our focus centered on discerning indicators and characteristics that gauge social sustainability. This
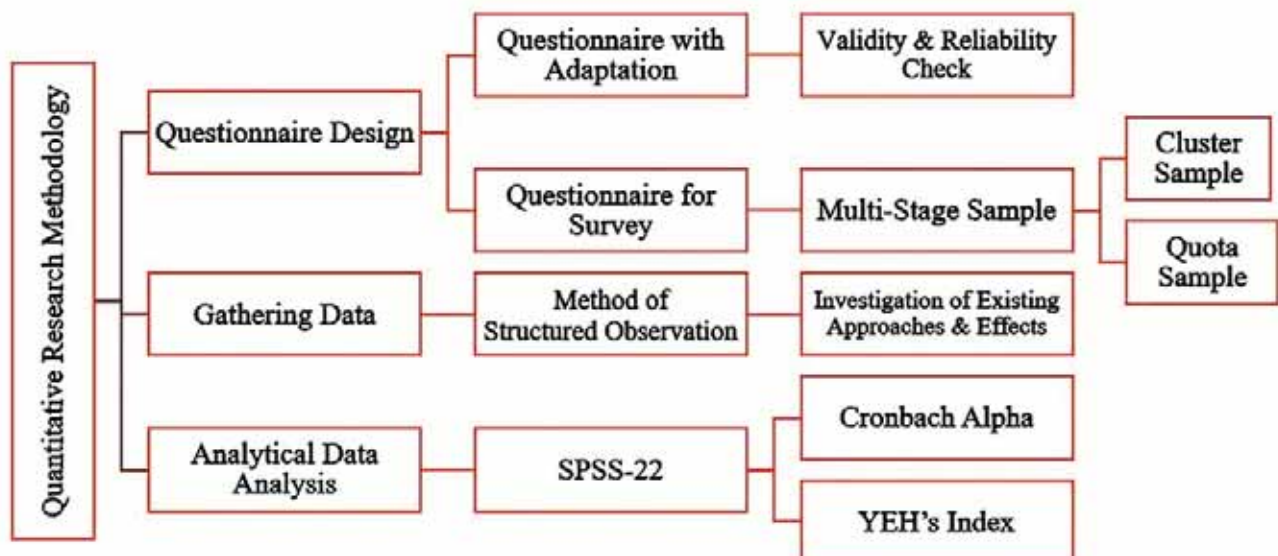
Figure-2: Framework of Research Methodology

encompassed understanding neighboring residents, fostering interactions, and emphasizing accessibility and safety. Opinions from individuals regarding convenience, architectural form, and communal spaces were also considered (Saima, et al., 2022). The dataset, sourced from the Planning and Development Control Department in Hyderabad (Sindh Building Control Authority, 2021), encompasses a total of 226 approved housing schemes up to 2021. Employing Cluster Sampling, we selected a housing scheme from our study area, representing 5% to 7% of the total. Within each chosen scheme, Quota Sampling (10% to 12%) allowed us to collect data comprehensively (John & Miller 2010; Krejcie & Morgan, 2012). Our investigation honed in on socially sustainable attributes, aligning with SDG Goal 11, to foster a harmonious neighborhood. These attributes encompassed Community Engagement, Inclusivity & Accessibility, Social Equity, Health and Well-being, Cultural Diversity, Education, Social Cohesion, Safety, and aesthetics.

Size of Sample

In the year 1979, the Qasimabad taluka within Hyderabad city began its transformation. Spanning 6114 acres (Sindh Building Control Authority, n.d.), this land—over time—has blossomed into a tapestry of urban development. Some portions now stand fully realized; their architectural dreams fulfilled. Our sampling approach, akin to a mosaic, selects housing schemes across different decades. Each slice of time contributes 5-7% to our canvas, capturing the essence of progress. Behold Table 02, revealing the chosen housing schemes within our sample size.

Results and Discussion

The selected housing schemes were analyzed by characteristics of social sustainable development by various researchers. The analysis of the following is discussed below.

Satisfaction and Reliability Index (Cronbach's Alpha; Based on Standardized Items)

Data on satisfaction and reliability indices were analyzed using SPSS-22, examining the frequencies of each variable (Marvi, et al., 2023). The reliability of the chosen variables for social sustainability was assessed, with the reliability index categorized as follows: Good at 0.60, Better at 0.70 - 0.80, and Excellent at 0.90 (Mohamad, et al., 2018). The variables selected for each characteristic yielded a reliability index ranging from 0.6150 to 0.9010, indicating levels from good to excellent. The satisfaction index for each variable spans from -60.7910% to +53.9560%, with a detailed analysis presented in Table 03.

Table-2: Cluster Sampling Responses

Name of Housing Scheme	List	Housing Unit in each Housing Scheme	Quantity	10% Qs Responses	Responses
	Happy Homes		141		14
	Marvi Town		215		22
	Naseem Nagar I & II		109		11
	Al Mustafa Town		113		12
	Al Rehman Cottages		152		15
	Abdullah Town		205		21
	Gulshan e Bakhtawar		129		12
	Citizen Colony		268		27
	Naqash Villas		200		20
	Abdullah Heaven		121		12
	Prince Town I and II		86		9
	Hyderabad Town Phase I		94		9
	Faraz Villas Phase II		190		19
	London Town		421		40
	Mother Village		480		15
	Isra Village		88		9
	Palm Residency		128		12
Total Responses Collected					**279**

N-Item	Variables	Satisfaction	Dissatisfaction	Satisfaction Index	Reliability Index
	Opportunities for Community/Residents to Engage				
1	Street Cleanliness	96	145	-17.6200 %	
2	Clean Water Supply	119	76	15.4600 %	
3	Street Lighting	117	125	-2.8770 %	00.7930
4	Community Decision Making	117	124	-2.5710 %	
5	Social Connection	116	59	20.5030 %	
	Inclusivity and Accessibility				
1	Local Transport	100	107	-2.5170 %	
2	Cycling Route	28	197	-60.7910 %	00.6150
3	Pedestrian Passage	53	181	-46.0430 %	
4	Private Vehicle	130	77	19.0640 %	
	Facilities and Amenities				
1	Clean Environment	132	106	9.3520 %	
2	Green Spaces	107	157	-17.9850 %	
3	Street-Side Plantation	82	168	-30.9350 %	
4	Sanitation/Hygiene	67	148	-29.1360 %	
5	Public Spaces	87	147	-21.5820 %	00.9010
6	Health Facilities	94	122	-10.07100 %	
7	Education	162	66	34.5320 %	
8	Parking Facility	53	171	-42.4460 %	
9	Facilities Accessible for all age-groups	75	161	-30.9350 %	
	Social Cohesion & Safety				
1	Cultural and Recreational Activities	116	138	-7.9130 %	
2	Social Gathering	105	142	-13.3090 %	
3	Community Space	106	147	-14.7480 %	00.8920
4	Safety During Day	196	46	53.9560 %	
5	Safety During Evening	158	50	38.8480 %	
6	Safety During Night	113	111	0.7190 %	
7	Safety During Traffic	125	96	10.4310 %	

In evaluating social sustainability within the neighborhood of Qasimabad, Hyderabad, Pakistan, various factors contribute to residents' satisfaction or dissatisfaction with their living environment. These traits encompass the opportunities for community engagement, inclusivity, accessibility, available facilities, and the overall sense of social cohesion and safety.

Opportunities for Community/Residents to Engage

Opportunities for residents to actively engage with their surroundings and each other are critical for fostering a socially sustainable community. In Qasimabad, street cleanliness was a major concern, with 145 residents expressing dissatisfaction against 96 who were satisfied, resulting in a negative satisfaction index of -17.62%. This indicates a clear need for improvement in maintaining clean streets. However, the availability of clean water supply received a positive satisfaction index of 15.46%, showing that the majority of the population (119 residents) is content with the water quality and supply. Street lighting, essential for safety and community interaction, had nearly equal satisfaction (117) and dissatisfaction (125), with a slightly negative satisfaction index of -2.88%, indicating the need for more reliable street lighting. In terms of community decision-making, residents exhibited a similar division, with a satisfaction index of -2.57%, suggesting that greater efforts are needed to involve the community in local governance and decision-making processes. On a positive note, social connections among residents were reported to be strong, with a satisfaction index of 20.50%, highlighting a strong sense of community and interpersonal engagement.

Inclusivity and Accessibility

Inclusive infrastructure that ensures accessibility for all is a fundamental element of social sustainability. In Qasimabad, local transport services received a satisfaction index of -2.52%, showing that public transport options need enhancement to meet residents' expectations. Cycling routes, crucial for promoting eco-friendly transportation and accessibility, scored the lowest in this category with a satisfaction index of -60.79%, as only 28 residents were satisfied compared to 197 who were dissatisfied. Pedestrian passages also faced a high dissatisfaction rate, with a negative satisfaction index of -46.04%, indicating that walkability is a serious issue in the area. On the other hand, private vehicle users expressed satisfaction with the availability of vehicle access, reflected in a positive satisfaction index of 19.06%, though this may also point to overreliance on personal vehicles due to inadequate public or non-motorized transport options.

Facilities and Amenities

The availability and quality of essential facilities and amenities significantly influence the overall well-being of residents. In Qasimabad, environmental cleanliness was moderately satisfactory, with a satisfaction index of 9.35%, indicating that 132 residents are pleased with their surroundings, although 106 remain dissatisfied. Green spaces, however, presented a clear issue, with a negative satisfaction index of -17.99%, showing that 157 residents found the available green areas insufficient or poorly maintained. Street-side plantation further exemplified this trend with a -30.94% satisfaction index, highlighting a lack of greenery along streets. Sanitation and hygiene also saw high dissatisfaction, with a -29.14% index, suggesting that waste management and hygiene practices are inadequate. Public spaces, necessary for social interaction and leisure, also fared poorly, with a -21.58% satisfaction index. Health facilities, vital to the community's well-being, showed a negative satisfaction index of -10.07%, indicating that the current health infrastructure does not fully meet the needs of residents. Education services stood out as a positive aspect, with a strong satisfaction index of 34.53%, reflecting the high satisfaction of 162 residents with the educational facilities in the area. Conversely, parking facilities presented a major challenge, with a -42.45% satisfaction index, as many residents found parking to be inadequate. Additionally, facilities that cater to all age groups showed a negative satisfaction index of -30.94%, pointing to gaps in inclusivity for different generations within the community.

Social Cohesion & Safety

A strong sense of social cohesion and safety is critical to the well-being of residents. In Qasimabad, cultural and recreational activities were lacking, as evidenced by a negative satisfaction index of -7.91%. Social gatherings, important for community bonding, had a satisfaction index of -13.31%, indicating insufficient opportunities for communal interaction. Community spaces also faced dissatisfaction, with a -14.75% index, signaling a shortage of designated areas where residents can gather. In contrast, perceptions of safety were quite positive. During the day, residents felt secure, as shown by a strong satisfaction index of 53.96%. Evening safety was also satisfactory, with a satisfaction index of 38.85%, though slightly lower than daytime safety. However, safety during the night presented more mixed results, with a satisfaction index of 0.72%, indicating nearly equal satisfaction and dissatisfaction. Traffic safety, on the other hand, showed a positive satisfaction index of 10.43%, suggesting that most residents feel relatively safe navigating the area's streets.
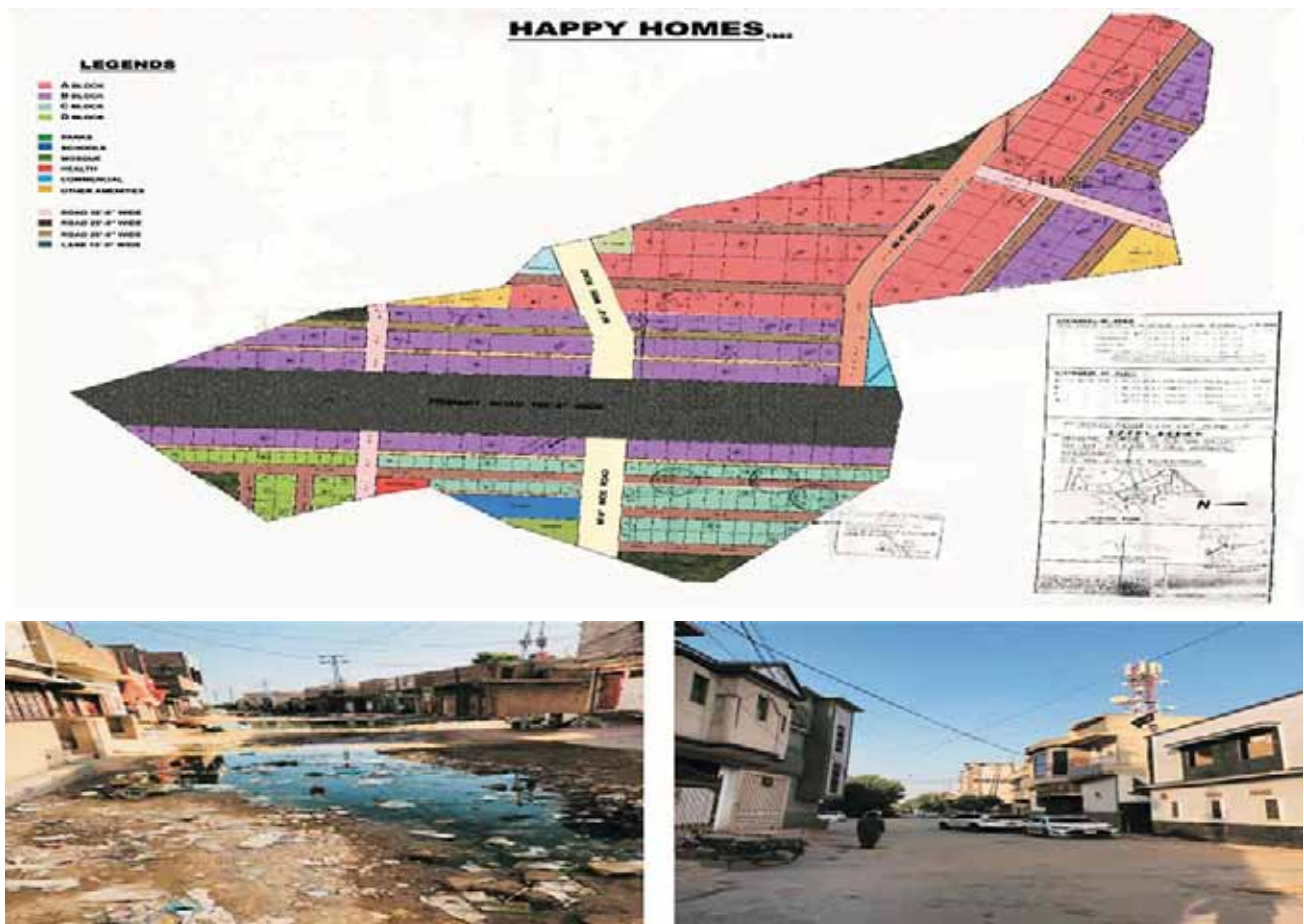
Figure-3: Housing Scheme from 1983 (Happy Homes)

Social Sustainability in Residential Neighborhood Qasimabad (Study Area)

To understand and visualize the barriers to social sustainability in Qasimabad, an analysis of housing schemes, chosen from each decade has been overlooked by examining the approved maps; i-e: collected from the government authority of Hyderabad city (Planning and Developing Control (P&DC), 2021). Three housing schemes approved maps have been taken from the authority i-e: Happy Homes, established in 1983; Gulshan-e-Bakhtawar, approved in 1995; and Isra Village, approved in 2008; to determine the lack . These schemes were evaluated based on their ability to satisfy the social sustainability criteria necessary for the well-being of inhabitants.

Happy Homes, established in 1983, figure 03; initially featured designated green patches intended to serve as communal spaces for residents. However, the current condition of Happy Homes reveals a stark contrast to the original plan. The streets are untidy, and the green patches have been neglected and transformed into garbage dumps, negating their purpose as social interactive spaces.

Similarly, Gulshan-e-Bakhtawar, figure 04, approved in 1995, was planned with green patches at the edges of the scheme, aiming to provide areas for social interaction and leisure. Unfortunately, these areas have also deteriorated over time. The intended green patches have suffered the same fate as those in Happy Homes, now functioning as garbage dumps instead of communal spaces.

To ensure a comprehensive analysis of social sustainability in Qasimabad, Hyderabad, the data collection integrates both quantitative and qualitative approaches, reinforcing the authenticity of findings. Table 02 presents a structured cluster sampling method, selecting diverse housing schemes developed
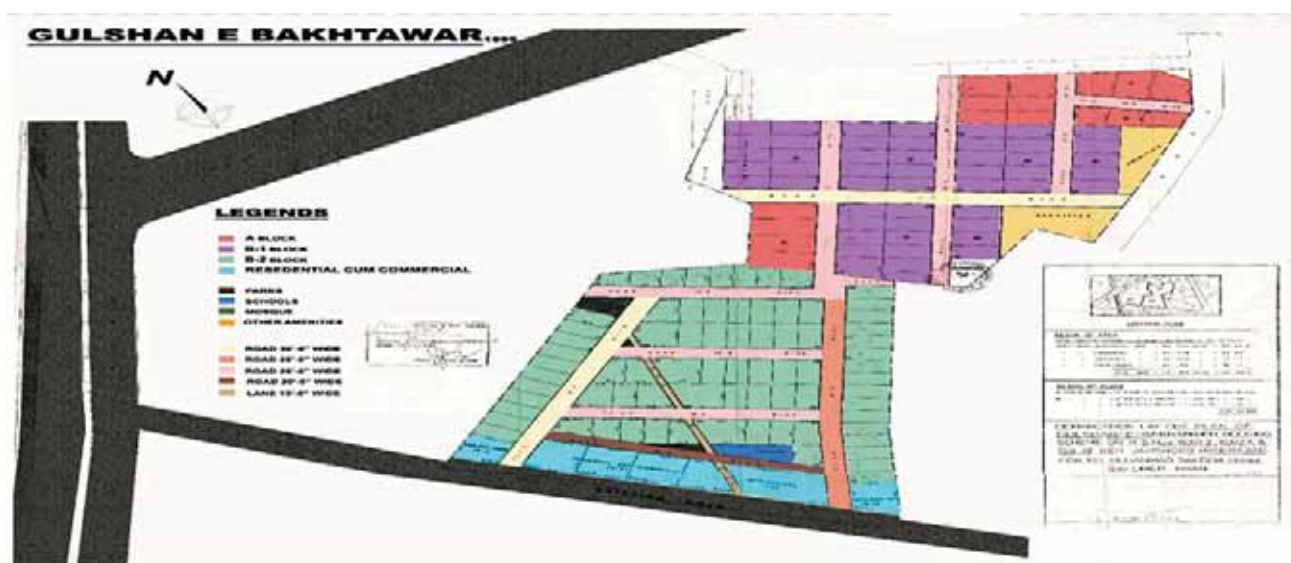
Figure-4: Housing Scheme from 1995 (Gulshan-e-Bakhtawar)

over different decades to capture a representative understanding of urban growth and social challenges. The satisfaction and reliability indices in Table 03 further validate the study by providing measurable insights into key social sustainability indicators such as accessibility, amenities, community engagement, and safety. These statistical findings are corroborated through Figures 03, 04, and 05, which visually depict the disconnect between the approved planning of housing schemes and their existing conditions. The transformation of designated green spaces into neglected areas or waste dumps, as illustrated in these images, substantiates the survey results highlighting dissatisfaction with public spaces, sanitation, and social interaction opportunities. By aligning empirical evidence from structured sampling, statistical analysis, and on-ground visual documentation, the study presents a well-rounded, verifiable assessment of the barriers to social sustainability in Qasimabad.

Research Findings

Photographic evidence, supported by data obtained from relevant authorities and on-site observations, highlights the deteriorating conditions in Qasimabad's housing schemes. The study area exhibits unpaved streets, irregular waste disposal, and a severe shortage of functional public spaces (see Figures 03, 04, and 05). The lack of regulatory oversight and maintenance has led to the progressive degradation of these spaces. Additionally, the failure to preserve designated green areas over the decades, exacerbated by unchecked encroachments and commercial expansion, has significantly reduced opportunities for social interaction. This ongoing neglect presents a major barrier to achieving social sustainability in Qasimabad. The absence of well-maintained and accessible public spaces deprives residents of essential healthy interactive areas, further weakening community bonds and diminishing the overall quality of urban life.
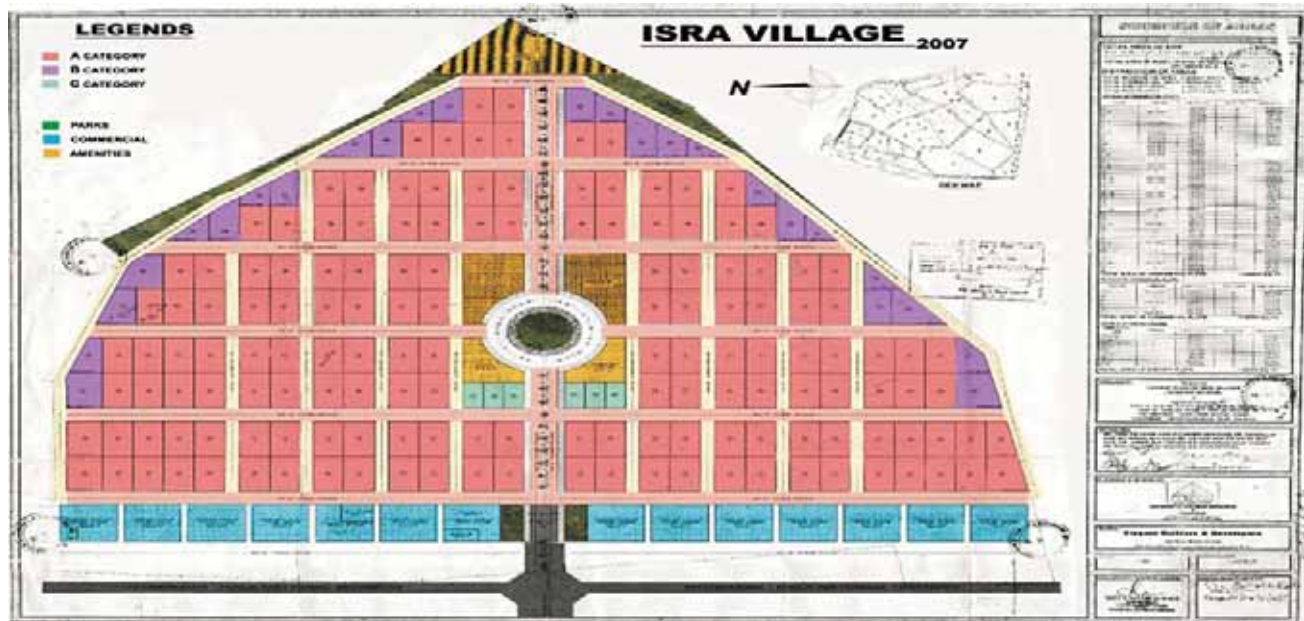
Figure-5: Housing Scheme from 2008 (Isra Village)

Community Engagement (CE)

Opportunities for community interaction in Qasimabad remain limited, with few dedicated spaces for gatherings, cultural events, or social activities. Residents expressed a need for improved public spaces, such as parks and community centers, to enhance social interaction. The absence of structured events and inclusive spaces hinders the development of a strong community identity, reducing overall social cohesion.

Technology & Transportation (TT)

Qasimabad's transportation infrastructure is inadequate, with limited access to efficient public transit and poor road conditions exacerbating daily commuting challenges. The absence of well-planned pedestrian pathways, lack of dedicated cycling tracks, and increasing congestion due to unregulated urban expansion further restrict mobility. Additionally, digital integration in urban planning remains minimal, preventing effective service delivery and infrastructure management.

Inclusivity and Accessibility (IA)

Residents, particularly women, elderly individuals, and lower-income groups, face difficulties accessing essential services such as healthcare, education, and markets. Public transport options are scarce, leading to reliance on expensive private transportation. Moreover, a lack of wheelchair-friendly infrastructure and poor pedestrian facilities further marginalize vulnerable populations, underscoring the need for an inclusive urban development approach.

Health and Well-being (HW)

Qasimabad's sanitation issues, including overflowing garbage dumps, open sewage drains, and inadequate healthcare facilities, contribute to declining public health conditions.

Waterborne diseases and respiratory issues due to poor waste management practices are common concerns among residents. Insufficient medical services and long travel distances to healthcare centers add to the burden, highlighting an urgent need for improved hygiene and accessible healthcare.

Social Equity (SE)

Inequitable access to educational institutions and security concerns are major obstacles in Qasimabad. Lower-income neighborhoods experience a disparity in school quality and availability, limiting upward social mobility. Safety issues, including insufficient street lighting and rising petty crimes, contribute to a sense of insecurity, particularly for women and children. Addressing these challenges through equitable policies and enhanced security measures is crucial for sustainable community development.

Cultural Diversity (CD)

While Qasimabad is home to a diverse population, the lack of platforms for cultural expression and engagement has limited its impact on social integration. Public spaces do not adequately reflect the cultural heritage and traditions of the community, reducing opportunities for fostering inclusivity and mutual respect among residents.

Social Cohesion (SC)

Weak social cohesion is evident due to fragmented neighborhood structures and a lack of shared community spaces. Many neighborhoods remain isolated due to rapid commercialization and poorly planned urban expansions, further diminishing opportunities for social engagement. Creating accessible and interactive community hubs is essential for strengthening neighborhood bonds.

Public Spaces (PS)

Public spaces in Qasimabad are either poorly maintained or repurposed for commercial activities, reducing recreational opportunities for residents. The lack of shaded sitting areas, child-friendly parks, and sports facilities discourages outdoor activities, impacting social interaction and community engagement.

Views and Aesthetics (VA)

The visual and aesthetic quality of Qasimabad has deteriorated due to unchecked construction, encroachments, and poor maintenance of streets and public buildings. Narrow roads, haphazard signage, and neglected green belts contribute to an unappealing urban environment. Implementing urban beautification initiatives, including regulated building facades, public art projects, and well-maintained streetscapes, could significantly enhance the neighborhood's livability and social sustainability.

Thus, improving public spaces, ensuring inclusivity, and enhancing urban management are essential for social sustainability in Qasimabad. Without these measures, deteriorating conditions will continue to weaken community well-being and cohesion. Prioritizing structured community engagement and accessible infrastructure can create a more livable and connected neighborhood.

Actionable Approaches for Social Sustainability in Qasimabad

To achieve social sustainability in Qasimabad, targeted interventions are essential across multiple sectors. Enhancing public spaces, improving mobility, ensuring inclusivity, and strengthening urban management will create a more livable and connected community.

- Restore parks, prevent encroachments, and engage public-private partnerships for upkeep.

- Form local committees, establish community centers, and promote cultural events.

- Expand affordable public transit, develop pedestrian and cycling infrastructure, and integrate digital urban planning tools.

- Ensure wheelchair-friendly infrastructure, subsidized transport, and decentralized service hubs.

- Health & Sanitation: Improve waste management, expand healthcare facilities, and monitor air and water quality.

- Enhance street lighting, increase security, and improve educational access.

- Regulate building facades, support public art, and promote green infrastructure.

- Strengthen regulations, encourage public-private collaboration, use data-driven planning, and secure sustainable funding.

These approaches help to create a more livable, inclusive, and sustainable Qasimabad.

CONCLUSION

This study examines social sustainability in Qasimabad Taluka, Hyderabad, revealing the complex relationship between urban growth, community involvement, and access to essential services. Surveys and spatial analysis indicate that while residents express a strong desire for social connectivity, several systemic barriers—such as inefficient public transport, limited healthcare and educational facilities, and neglected public spaces—impede their ability to establish meaningful community interactions.

The absence of well-planned social infrastructure negatively affects residents' quality of life. Key areas requiring immediate attention include the provision of inclusive public amenities, targeted interventions for underprivileged groups, and policy measures ensuring equitable access to resources. The study identifies a misalignment between current urban planning practices and social sustainability principles. Dissatisfaction was particularly high regarding community engagement and essential services. While some aspects, such as educational institutions, received moderate satisfaction ratings (34.53%), severe deficiencies were noted in street cleanliness (-17.62%) and cycling infrastructure (-60.79%).

Achieving social sustainability in Qasimabad requires decisive action to address systemic deficiencies in urban infrastructure, community engagement, and public services. The proposed strategies—ranging from revitalizing public spaces and improving mobility to ensuring inclusivity and strengthening governance—provide a roadmap for a more connected and equitable urban environment. By implementing these measures, policymakers can bridge gaps in accessibility, enhance public safety, and promote social cohesion

Addressing these deficiencies will enable urban planners and policymakers to align development efforts with Sustainable Development Goal 11, fostering more inclusive, resilient, and vibrant communities. Encouraging community-driven initiatives, implementing equitable policies, and addressing social inequalities are key to transforming Qasimabad into a socially sustainable urban environment. By improving access to social amenities and fostering a sense of belonging, Qasimabad can evolve into a cohesive and livable neighborhood that enhances the well-being of its residents.

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SONAR SCREEN: MICROCONTROLLER PROTOTYPING FOR SUSTAINABILITY

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ABSTRACT

The paper presents a detailed account of "Sonar Screen", an interactive architecture prototype developed by faculty members and students of the Department of Architecture at COMSATS University Islamabad, Lahore Campus (DACUI) for the IAPEX 2020 Expo organized by the Institute of Architects Pakistan Lahore Chapter (IAP-LC) in January 2020. The project was sponsored by IAP-LC and showcased as part of the exhibit titled "Architect's Corner". The purpose of the project was to utilize the microcontroller platform Arduino, to explore the application of parametric design in response to climate change. While conventional training of architecture means that students and faculty lack the necessary skills of programming and circuit design, the popularity of Arduino as an open-source platform also meant that project members could benefit from freely available online resources for learning. By designing the prototype as an installation, the project was deployed in a public event space to initiate discourse regarding climate change and the role of innovative architectural technologies for a sustainable future. The paper explains the challenges met during development, its impact regarding public engagement, and the potential of low-cost computing platforms for future design research at an undergraduate level.

Keywords: Parametric Design, Public Installation, Interactive Architecture, Arduino, Pedagogy

INTRODUCTION

Sustainable Interactive Architecture

Interactive design as a methodology was first popularized in visual arts and media due to increasing usage of computers and digital systems. By programming logic and responses, interactive systems can respond to physical environments or external stimuli. Following World War II, research into cybernetics opened new avenues for architects to understand the environment as a system in equilibrium. This led to new possibilities for integrating digital systems create responsive architectural forms (Steenson, 2017; Mcmahon, 2013). Buildings, spaces, and cities could be regulated in response to individual needs and external forces.

With time, improvements in sensing technologies have allowed us to quantify changes within our environment thereby altering our understanding of ecology and our complex lived realities (Alexander, 1964). Awareness regarding climate change and resource scarcity with an ever-increasing human population has made it crucial for architecture to be integrated with information to create a dynamic landscape that can minimize our impact in a sustainable manner.

Computational Thinking for Design

Digital tools and applications are developed by writing algorithms as sequential set of instructions for computers to execute. Computational Thinking (CT) as defined by

Wing (2006) therefore requires breaking down of a complex problem into clear set of causal relations between distinct factors and systems. Meanwhile, Senske (2014) relates this constructivist form of problem-solving to architectural design processes in which various factors, constraints, conditions and relations are used to create spatial solutions that are appropriate for specific contexts and user requirements. As Alexander (1964) also demonstrated through his seminal thesis, a complex design process can be broken down into more manageable sub-processes by using an algorithmic approach. Since then, digital technologies and CT have helped transform architectural design and construction industries by increased productivity and lowered risks. It has also led to exploration of material configurations through generative processes leading to tectonic expressions that were not possible before (Hauck et al., 2017). However, in countries like Pakistan, digital innovation in architecture is an uphill battle. While digital design systems such as Building Information Modelling (BIM) are used in many parts of the world to streamline design and construction processes, adoption rates in Pakistan are slow due to economic, social, and cultural factors (Farooq et al., 2020; Akdag and Maqsood, 2020).

Parametric Design Pedagogy in Comsats Lahore

To train students of architecture for better integration of emerging technologies using CT, DACUI initiated an advance course for digital tools focusing on parametric design in 2017. Parametric design in architecture refers to a systems-approach of abstracting a design process to create generative algorithms of spatial design. With advancements in software reducing the learning threshold, it is not necessary for designers to write code for designing interactive architecture. With parametric design tools, architects can employ CT to solve complex design problems (Loukissas, 2012).

One of the most popular tools for parametric design in recent years is the Grasshopper plugin for Rhino3D modelling application which provides a visual interface to create algorithms (or scripts) by connecting wires between diverse sets of components (inputs, outputs, and functions). By using this tool, architects can link spatial elements explicitly to environmental factors. Any change in context such as climate, movement, or material constraints dynamically affects the design outcome through such a script. Furthermore, it also allows architects to use the outputs directly for construction and fabrication in a seamless manner, thereby creating more efficient and sustainable forms of architecture (Hauck et al., 2017). While Grasshopper is not a programming language itself, it allows non-coders to use CT to create forms of

architecture integrated with the environment.

IAPEX as a Platform for Public Engagement

The Institute of Architects Pakistan (IAP) was established in 1957 as a social group by architects of Pakistan to promote architectural design at a regional level predating official recognition of architects in Pakistan (Lari, 2008). Since inception, IAP has been actively engaging with not just professionals but also academics across Pakistan for improving public understanding of architects' role in developing the built environment.

In 2004, IAP organized the first IAPEX event in the city Karachi for connecting research activities with the wider public (Business Recorder, 2004). Now an annual architecture expo organized in each of the major cities of Pakistan, IAPEX is a multi-day exhibit usually featuring academic seminars, talks by prominent practitioners, student discussion panels, and exhibits for innovative building materials. As a major public event in major cities of Pakistan, IAPEX provides the opportunity to directly engage with the wider public regarding architecture and its role in sustainability. For the Lahore edition of IAPEX of 2020, the organizing committee IAP-LC planned a public exhibit to showcase prototypes developed by architects known as "The Architect's Corner". The expo was planned to run from 31st January 2020 till 3rd February 2020 at the Expo Centre Lahore in Johar Town. To diversify the experiments for the proposed exhibit, faculty members of DACUI were invited to participate and design an installation. As a significant public event, the exhibit offered not only a public platform for climate change awareness but also a chance for students to explore innovative approaches to parametric design and fabrication in a hands-on manner.

RESEARCH QUESTIONS

- How does the use of open-source platforms like Arduino reduce cost barriers for researching climate responsive architecture in developing countries facing digital divide?

- Can parametric design knowledge and CT be effectively translated into rapid prototyping and programming for training students of architecture for exploring computational design?

- How can interactive architectural installations foster public engagement regarding climate challenges and the role that architecture can play in creating sustainable built environments?

Considering the context and opportunity to deploy an experimental structure within the public sphere, following research questions were outlined by members of DACUI to investigate during and after deployment of the project:

DEVELOPMENT

The following section presents a detailed account of the project, experiences, challenges, and outcomes in a chronological manner along with findings by various members of the faculty and student body who participated in this project. The project was initiated by faculty of the DACUI in December 2019 a month before the start of IAPEX Lahore 2020. IAP-LC in collaboration with DACUI provided all materials, funding, and resources for this project.

Project Planning and Collaboration

Interactive design and parametric design both involve generating dynamic systems that adapt to varying inputs. To showcase this, the exhibit focused on the application of parametric design in a real-world scenario. The project had a faculty lead (author) and co-led who were subject experts Professor Juliane Eick Aziz. Several faculty members and students interested in exploring parametric design also took part due to the complexity of the project in various capacities during planning, design, and execution stages.

Arduino Platform

For the hardware and software platform, Arduino microcontrollers were chosen to create real-time interactive systems. Arduino is an electronics platform developed primarily as a low-cost prototyping kit for academic environments (Kushner, 2011). The Arduino platform consists of small, printed circuit boards (PCB) with integrated microcontrollers, input and output pins, and power circuits that can be used for diverse purposes. Unlike computers, microcontrollers can only handle simple instructions based on inputs (sensors or pre-defined variables) and can provide signals to control other systems as output. Furthermore, microcontrollers cannot run applications or store an operating system (OS) but contain enough memory to store the source code. This makes microcontrollers cheaper and easier to use for prototyping projects. The small form factor and low power requirement allows the microcontroller to be embedded into various smart devices and products. The language used to write instructions for the microcontroller is based on the more conventional C++ programming language. Different programming tools can be used to write code, test it on

another computer (with Arduino plugged into the USB port), and upload the code to the microcontroller so that it would keep on executing instructions when powered on. During development of the original Arduino platform, the inventors decided to make the entire platform (hardware and software) open source, allowing organizations and individuals to develop their own variants of the microcontroller or a compatible sensor. Because of its low cost and open-source knowledge base, the Arduino platform quickly became a popular Do-It-Yourself (DIY) and educational tool around the world. In Pakistan, major institutions teaching courses for robotics or electrical engineering make use of Arduino to teach students about programming, remote sensing, robotics, or Internet of Things (IoT) (University of Engineering and Technology Taxila, 2017; Mehran University of Engineering & Technology, 2024). However architectural education usually does not include similar skills. In the last few decades, an increasing number of architects have been acquiring programming skills with more schools offering programming courses (Loukissas, 2012). Project members decided that relying on open-source and online resources in combination with existing parametric design knowledge would be a more effective approach for acquiring skills in Arduino programming.

Foreseeable Limitations

During early discussions regarding the objectives, scope of research, and logistics, several challenges were brought to light. Some of these limitations determined the hardware used for developing prototypes and the final installation, whereas other limitations were simply due to shortage of time. Some of the challenges identified early on were as follows:

Lack of Existing Expertise

Members of faculty and students of DACUI did not possess any skills in terms of programming. This meant that developing and testing algorithms for the Sonar Screen would be challenging and time-consuming. Fortunately, parametric design knowledge helps using CT to think of systems in architecture and how they can interact with one another. Moreover, as a popular open-source platform, project members could easily rely on publicly available learning resources including the official Arduino website, YouTube videos explaining various prototypes, and plethora of online forums for troubleshooting.

Autonomous Functioning in a Public Space

The intended site for deploying the installation was a public space during a multi-day event. Ideally, the installation needed to run for the entire duration of the event with minimal supervision. This meant that the entire system had to be designed as an integrated system with its own power and processing capability. Arduino boards and software allows for quick prototyping by connecting the boards and sensors to any computer through USB. However, for sake of the public event it was decided to add separate power supplies and enough Arduino boards to eliminate any need for additional computers and supervision.

On-Site Assembly

For ease of assembly of the installation and its various components, it was decided to design and fabricate the support structure in a way that gave project members physical access to all the wiring and components without causing disturbance in the public space or interrupting foot traffic. This was crucial since the exhibition space was shared with other practitioners.

Cost of Fabrication and Assembly

To minimize costs while fabricating a large installation to engage the public, the facade system was designed in a modular manner. This allowed for quick assembly in a repetitive manner and helped in laser-cutting various parts needed in an economical manner. It also added redundancy in terms of circuit design as each module could run independently. In case a module failed, it could be easily replaced without affecting the entire installation.

Lack of Microclimatic Stimuli

Sonar Screen designed to use microcontrollers for creating an interactive installation, that could garner interest regarding the role of climate-responsive architecture for sustainable living. This would require using climatic stimulus such as sunlight, heat, or humidity as an input for the installation to respond accordingly. Because the exhibit was indoors, there were no possible inputs that could be used to drive the interactive components. Even if the installation could be placed outside (which was a consideration during early discussions), no climatic or environmental stimuli could help achieve a dynamic result to garner public interest due to the speed at which environmental factors change at a micro scale. The result would have been a seemingly static installation requiring frequent observations to notice any change. Since observers were expected to be constantly moving within the exhibition area, the team decided to use this to their advantage. By using pedestrian movement itself as a stimulus, rapid changes in interactive elements of the installation could be easier to notice. While this meant that the installation would not have been climate-responsive, from a pedagogical point of view it could effectively attract public attention leading to further discourse. With the limitations and challenges, the project leads initiated design and prototyping stage. Lead took on the role of experimenting with algorithms and sensors while co-lead prototyping the physical design of the modules that would move in response to sensor values and servo outcomes. As the project developed, groups were devised with students to distribute tasks and share learning outcomes from the initial stages. Student feedback was also crucial in exploring alternatives for both programming as well as physical prototyping.

Rapid Prototyping

Since the invention of the Arduino microcontroller platform, several different versions and iterations of microcontroller PCBs have been released. Each variant of Arduino offers similar processing capabilities but differs in terms of size, form, and connectivity. This allows users to find and select Arduino boards suitable for their projects (Arduino, 2021). In the case of Sonar Screen, Arduino Nano was selected as the most appropriate board. While significantly smaller to other boards such as Arduino Uno (which has integrated power and input/output connectors), the Arduino Nano microcontroller at the time was easier to buy in large quantities in Lahore. Furthermore, the Nano is smaller than Uno which made it ideal for a public installation as the smaller size allowed for more flexibility for attaching it to the physical structure even with added modules and sensors. To counter lack of dynamic environmental stimuli as mentioned earlier, early prototyping focused on experimenting with different kinds of stimuli that could be easily measured in an indoor space with random pedestrian movement. As Arduino platform is meant for ease of learning and rapid prototyping, several accompanying modules can be used to test various iterations without any need to solder connections. Breadboards, which are modular plastic bases with inbuilt connections can be combined with jump wires to design and test circuits in a plug and play manner. Developments in electrical engineering have made diverse kinds of sensors accessible at an economical cost which can allow architects to design interactive systems that take into account various aspects of the user and context (Cascone et al., 2017). For initial tests, two sensors were used: a light dependent resistor

(LDR) for measuring changes in light and a microphone-based sensor to measure amplitude of sound signals to test for suitability for the public installation (Figure 1). It was found that the sensitivity for both the light and sound sensor only allowed them to pick up changes in near proximity. For an interactive installation in a public space, variations in values and overall range of values were not enough to create a dynamic system. Further exploration made it clear that a more appropriate stimulus would be the changes in relative distances for individuals and groups. For this purpose, the ultrasound sensor was ideal as it uses sound signals to measure distances over a significant range. The sensor consists of both an emitter and a receiver. The sensor measures distance by first emitting a sound and measuring the time till the sound signal bounces back and is received by the sensor as shown in Figure 2. As a result, the sensor had a much better range and sensitivity to detect changes in a public space due to movement of users.

To transform the readings from the sonar sensor into facade articulation, values of the sensor were mapped to a range between 0 and 90. These values represented the opening and closing of each of the facade modules. With a microcontroller, absolute angular values can be used as input to instruct the servo, this opens a range of possibilities in terms of interactive facade prototyping. For the shading components, several prototypes were tested ranging from flexible carboard strips to origami inspired folds which could open and close using one pivot. However, the limiting factor was the small amount of torque offered by the servo module. The prototype which worked without issues was a ribbed pattern cut out of cardboard sheets to add flexibility and reduce mass (Figure 3). The scoring pattern allowed the servo to twist the entire panel and create openings depending on how close a person is in front of the ultrasonic sensor.

Design

Following the prototyping stage, the precut panel module was further iterated for stability and tested for longer periods of time to ensure that the sheet was flexible and thick enough to rotate multiple times without any permanent damage. The bleach board eventually selected was of 350 gsm (gram/sq. meter) with each opening size limited to 250 mm x 250 mm within an acrylic frame. To optimize for cost, each microcontroller was programmed to operate 3 openings in a single module (3 ultrasonic sensors and 3 servo motors). Due to limitations of on-board memory of the Arduino Nano microcontroller, 3 servos and sensors were the limit beyond which performance was not responsive enough for a public installation. The algorithm consisted of initializing sensors and a loop in which distance was determined using duration between ultrasonic signals transmitted and ultrasonic signals received. The constant loop allowed for continuous adjustment of servo angles to control the openings. For each module, three loops were programmed so that the
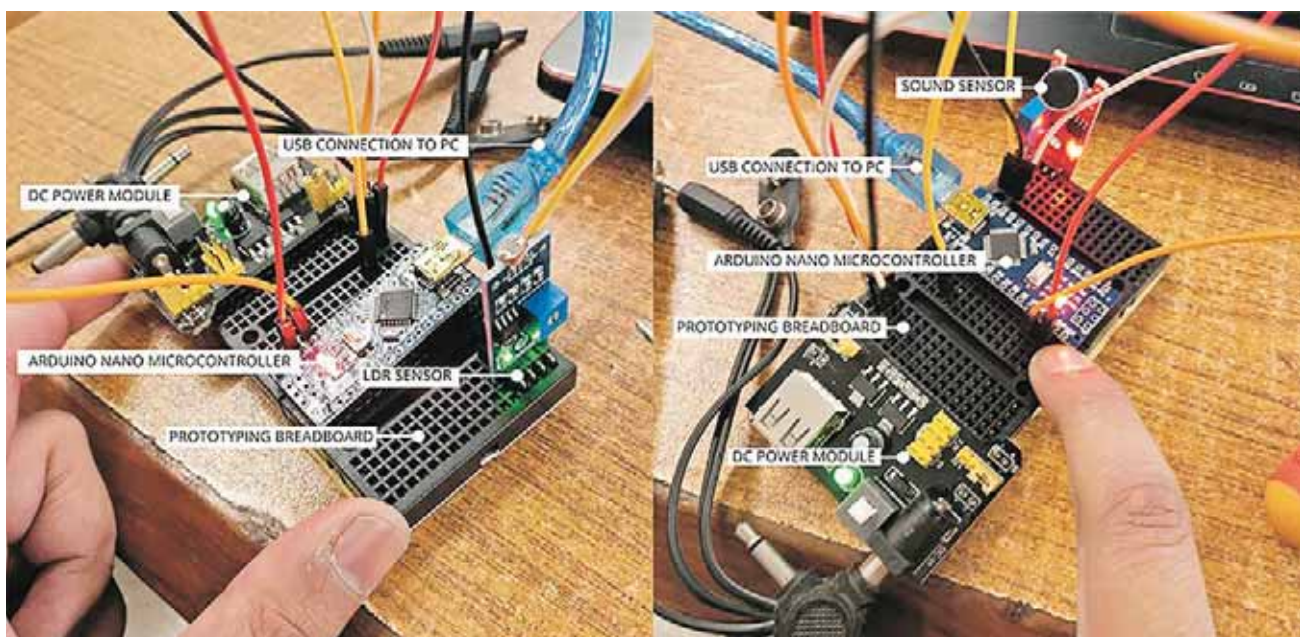
Figure-1: Breadboard Prototyping for Testing Various Sensors using Arduino Nano.
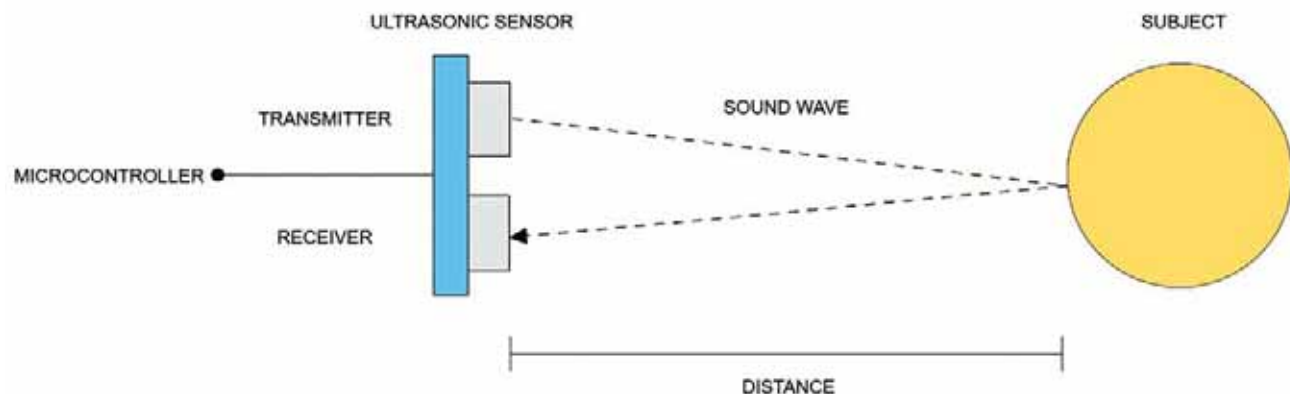
Figure-2: Distance Measurement Using Ultrasonic Signals.

microcontroller could cycle through each sensor and servo sequentially. The following diagram demonstrates the algorithmic logic and necessary variables required (Figure 4).

The output from the microcontroller determined the angular input for the servo motors attached to the bleach card panel, resulting in a twisting motion inside each opening as a person would move in front of the ultrasonic sensor attached on top of each panel as shown in Figure 5.

To provide sufficient power and facilitate assembly, each module's microcontroller was connected to an Input/Output (I/O) extension board. The I/O shield allowed for the same ease of use as the larger Arduino UNO while keeping costs relatively lower. To provide power from the mains supply at the venue, multiple I/O shields and controllers were grouped and connected to AC/DC variable power converters. In this manner, four panels (each with three panels, three sensors, three servos and a microcontroller) could be powered by a single power supply unit (PSU). This modular approach enabled a simplified assembly process by bolting each module onto the wooden structure with ample space in the back for assembly and troubleshooting (Figure 6).

Fabrication

Once the design was finalized, the rotating fin elements along with acrylic frames were fabricated using laser cutting for high precision since the electronic components had to be attached to the frames. For each module on the Sonar Screen, wiring lengths were calculated to prepare jumper

Figure-3: Shading Prototypes.

connections for each of the I/O shields. Students from DACUI managed the wiring and testing process to ensure that every wire could be attached to respective components and PSUs on site.

Simultaneously, a separate team of faculty and student volunteers led by co-lead helped plan, paint, and fabricate the support structure with the head of woodwork workshop.

SONAR SCREEN DEPLOYMENT AT IAPEX 2020 LAHORE

Once fabrication was completed and transported to the exhibition space, each of the modules were screwed to create a seamless facade grid. Using the dedicated space for maintenance, project members connected the necessary wiring from each of the modules to their respective microcontrollers and PSUs (Figure 7).

Figure-4: Process Flow Diagram for Algorithm

At the time of its first test, one of the power supply adapters failed to run. As it was not possible to obtain a new one, the team quickly re-wired the microcontrollers to use two adapters instead of three as originally planned. This turned out to be sufficient in terms of power requirements. One of the biggest advantages of using dedicated microcontrollers instead of a consumer PC is significantly lower power consumption: approximately 30 Watts for the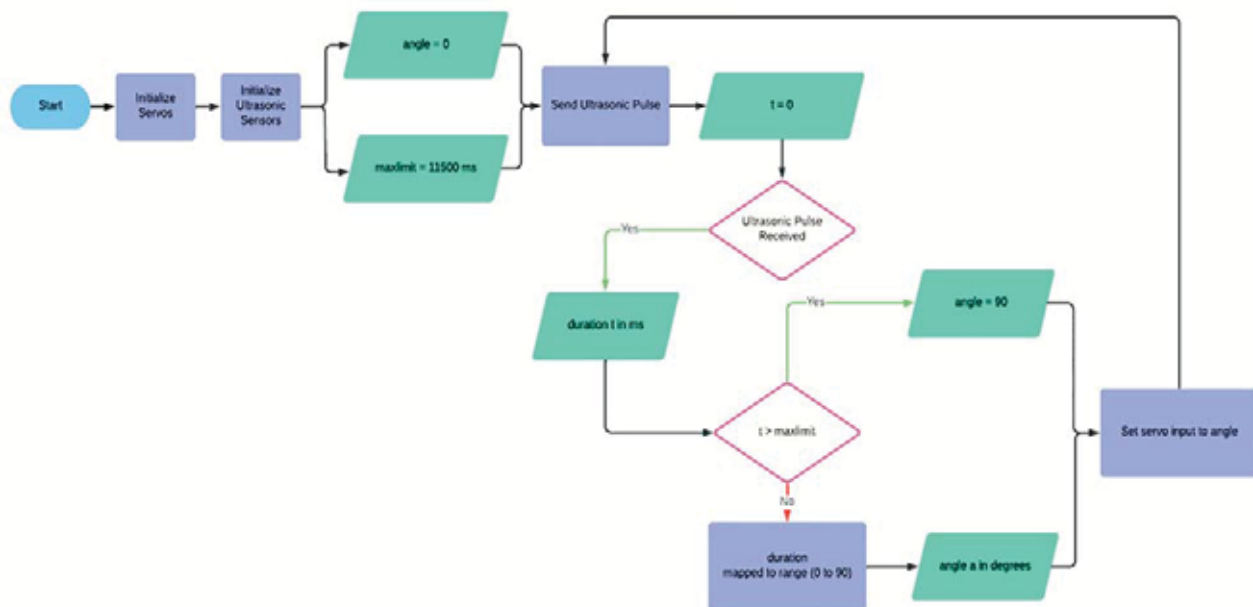 entire facade prototype using Arduino microcontrollers, sensors, and servos as opposed to 50 Watts for an average consumer laptop alone.

Another issue that became apparent after running the complete assembly was sensor interference for the ultrasonic sensors. The size of the modules was limited by several factors including flexibility, ease of fabrication, and torque of the servo motors. This determined the placement of all the ultrasonic sensors along the facade prototype. However, any sound wave is spread outwards during transmission. This outward spread meant that all transmission waves were overlapping while bouncing off various users. Without any filter mechanism to distinguish one signal from another, various sensors were inadvertently detecting signals transmitted by the adjacent ultrasonic sensor. Due to this interference, the response from each frame was much more unpredictable and chaotic. This issue could have been solved by increasing the distance between each sensor, using fewer sensors per unit area of the facade prototype, using diverse range of sensors in tandem, or by adding a timed delay

within the code to stagger the transmission signals hence reducing interference from neighbouring sensors. However, the issues listed above were not detrimental to the performance of the installation and the project successfully responded to movement within the space without any need for supervision, providing team members ample time and opportunities to interact with attendees, fellow participants, and members of the AEC industry to investigate the research aspects (Figure 8).

OUTCOMES

Cost Barrier for Open-Source Technologies

In many developing countries such as Pakistan, rate of adopting new technologies is slow in the AEC sector. Despite awareness of the productive output and improved capabilities of innovative digital tools, designers and engineers hesitate in changing their workflows because of any financial risks in the short term (Farooq et al., 2020). This phenomenon leads to only partial change of conventions methods of design, experimentation, and fabrication in architecture (Hauck et al., 2017).

In case of the Sonar Screen, the aim for working with open-source tools and hardware was to challenge such perceptions when using innovative tools for prototyping and problem-solving. Hardware platforms such as Arduino can reach a wider userbase around the world because the schematics
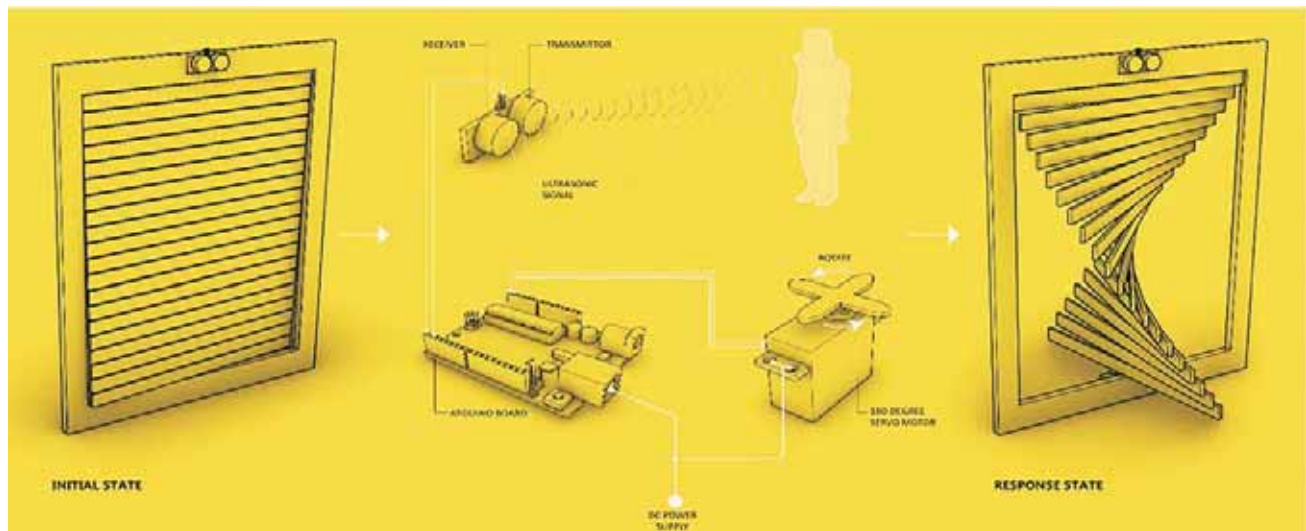
Figure-5: Twisting Facade Module Design
Source: Shahzeb Khan
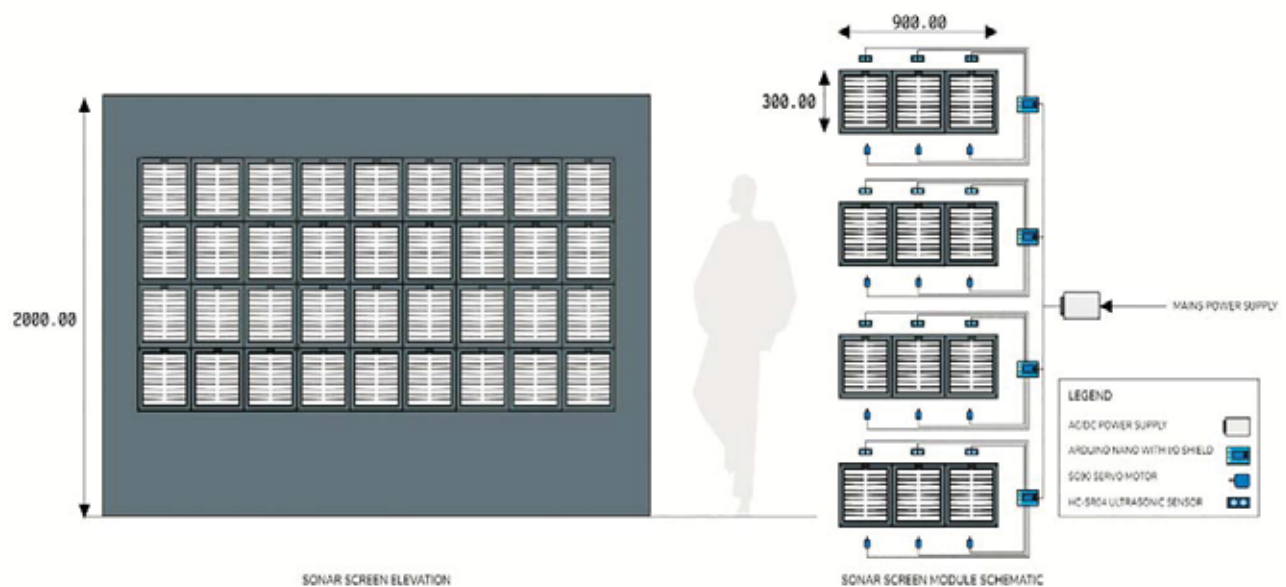
Figure-6: Sonar Screen Schematic

and knowledge associated is made publicly available. Arduino has numerous third-party variants that bring costs down by being manufactured in different parts of the world. Thus, making such systems ideal for quick deployment in developing countries like Pakistan, not only bridging the digital divide but also fostering architectural research and experimentation.

After completion of the project, material costs were evaluated. The hardware and material costs for the Sonar Screen installation at the time was approximately $645 (Rs. 100,000 as per exchange rate in 2020) with most of the costs due to the structure itself as shown in Figure 9. Furthermore, the electrical components are reusable which meant that DACUI could set up a repository available to all faculty members and students motivated to explore further without incurring additional costs.

Public Engagement and Pedagogy

Public engagement through installation is not only crucial for demonstrating the role of architecture innovation but

Figure-7: Wiring and Assembly.

Figure-8: Sonar Screen Exhibit

also beneficial for architectural training since architectural practice is based on co-creation with diverse stakeholders. Differing and diverse subjective experiences can provide useful insights for contextually informing the design process. Within the academic studio, design projects are developed in a highly controlled environment without any public interaction. By co-designing prototypes with the wider public, students of architecture design can understand how cultural and social nuances can be integrated (Selcuk et al., 2024).

It was observed during the event that the ultrasonic sensors instantly responded to passersby stimulating curiosity which led to interesting questions and discussions regarding the role of architecture and technology to create sustainable spaces. Users intuitively understood the causal relation between their movements and the façade as they were able to control the installation with playful gestures and postures. Originally it was planned for Sonar Screen to be controlled by user movement rather than environmental stimuli. The installation also featured literature explaining the objectives of the Sonar Screen, as a demonstration of climate responsive architecture. However, this led to discussions on site exploring another purpose that was not considered initially but was proposed by several members of the public: to design adaptive screens that provided ample privacy without compromising natural lighting and ventilation. The code for the Sonar Screen explained earlier was designed so that standing closer to the screen resulted in modules opening. However, several users felt that if the angles were inversed (modules closing as users walked closer to the screen), the screen could block direct view from the other side of the screen. This inquiry and discussion meant that users were envisioning applications within their local context. In Pakistan, privacy is considered an integral spatial aspect for differentiating domestic from public spaces. Even within domestic spaces, individuals exercise privacy based on

social structures, norms, and cultural sensibilities. This is also evident from the various types of intricate screens seen in traditional and vernacular architecture of Pakistan. However, limited visibility in screens also means limited natural light and ventilation. The fact that several users perceived Sonar Screen and application of computational design within their local context implied that the installation was effective in terms of public pedagogy. Public engagement through physical exhibitions not only helps in terms of pedagogy but also can provide useful and interesting feedback that can help with future technological developments (Claypool et al., 2020).

Computational Thinking for Design Pedagogy

From an academic perspective, this prototype was intended to demonstrate that rapid prototyping using open-source technologies is a viable method for employing CT for undergraduate architectural training. CT has been demonstrated as critical for teaching not only efficient application of digital technologies but also cognitive abilities to solve complex problems. As per Wing (2017), CT as an analytical and problem-solving strategy is fundamental for facing complex challenges any domain in the 21st century. Furthermore, several studies from developing countries categorized with immense digital divide demonstrate positive correlation between CT and problem-solving capabilities (Jehan and Akram, 2023; Kaleem et al., 2024).

Since the DACUI undergraduate architectural training program included parametric design as an essential skill in digital tools, students were already being trained to employ CT to solve complex problems. Working with open-source hardware platforms such as Arduino allowed faculty members and students of DACUI to further explore those skills for computational design. To understand the learning experience and opinion regarding computational design for sustainability,
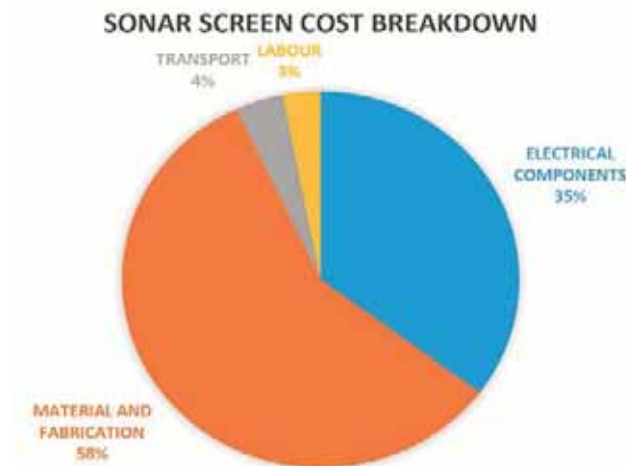
Figure-9: Cost Breakdown for Design and Fabrication

Figure-10: Bio Integrated Design Prototype

Figure-11: Arduino Prototype for Bio Integrated Design Exploration.
Source: Ahmad Sohail and Mohammad Abubakar

a qualitative survey using the Likert scale was conducted amongst students (n=60) at DACUI. Of the students who participated, 20 (33.33%) students were directly or indirectly involved in the Sonar Screen project, while 40 (66.66%) students were familiar with parametric design and CT based on their curriculum. The findings are shown in Table 1.

As seen, a strong consensus exists among students on the significance of these tools for the future of the profession. A majority (77%) rated computational tools as "Important" or "Very Important" for the future of architecture in Pakistan. Similarly, 90% agreed that interactive technologies can enhance public engagement in architecture. The educational value of open-source platforms like Arduino was also widely recognized, with 81% agreeing or strongly agreeing that such platforms benefit architectural education. The Sonar Screen project itself appeared to be an effective learning tool: 80% of students reported that it helped them understand how CT applies to architectural design. Additionally, 78% of participants felt they were able to apply their parametric design knowledge during the project. Looking ahead, 79% of the students agreed these tools can support sustainable architecture in developing countries. Notably, there was overwhelming support (90%) for interdisciplinary learning that combines design with coding and electronics, and an equal percentage recommended greater emphasis on computational tools within the architecture curriculum. Overall, the survey results demonstrate a clear student interest in and appreciation for integrating CT and interactive prototyping into architectural education and practice, affirming the relevance and impact of the Sonar Screen initiative.

After completion of the Sonar Screen project, further projects were initiated by faculty members and students to explore computational design. One example is the bio-architecture project led by DACUI faculty member, who along with a group of students, conducted several experiments for using computational design to explore organic materials for sustainable fabrication techniques using organic matter Figure 10.

Students who were directly or indirectly involved with the Sonar Screen project also incorporated computational design and interactive architecture in their own projects such as the thesis project titled "Pakistan Auto Odyssey, an Automotive Experience Centre". For this project, the student collavorated with peers to develop the necessary algorithms for facade prototyping as showing in Figure 11.

Table-1: DACUI Survey Results for CT and Sonar Screen.

Q1.	How important do you think computational tools are for the future of architecture in Pakistan?				
A1.	Not Important at All	Slightly Important	Moderately Important	Important	Very Important
Score	2%	4%	17%	35%	42%
Q2.	Interactive technologies can improve public engagement in architecture.				
A2,	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Score	4%	0%	6%	27%	63%
Q3.	Open-Source platforms (Like Arduino) can benefit architectural education in Pakistan.				
A3.	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Score	4%	2%	13%	35%	46%
Q4.	Sonar screen helped me understand how computational thinking applies to architectural design.				
A4.	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Score	0%	5%	15%	20%	60%
Q5.	I was able to apply my knowledge of parametric design (e.g., Grasshopper) in this project.				
A5.	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Score	0%	0%	22%	22%	56%
Q6.	Computational tools can help create sustainable architecture in developing countries.				
A6.	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Score	4%	2%	15%	33%	46%
Q7.	Interdisciplinary learning (e.g., design + coding/electronics) is important for architects today.				
A7.	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Score	2%	2%	6%	25%	65%
Q8.	I would recommend more focus on computational tools in the architecture curriculum.				
A8.	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Score	4%	2%	8%	21%	65%

The examples demonstrate the viability of open-source technologies to apply parametric design skills and CT for exploring interactive and sustainable architecture. Without a high-cost barrier, architecture schools in developing regions can incorporate applied computational design research within their curriculum to meet challenges of the future.

CONCLUSIONS

The Sonar Screen installation helped initiating discourse regarding architecture, climate change, and the potential for innovative technologies to create a more sustainable future within context of Pakistan. The project members not only learned programming skills for architectural design but also learned about the value of such installations for public engagement. Furthermore, the project proved as a valuable benchmark for using similar open-source technologies in a feasible manner specifically in context of developing countries such as Pakistan where technological development is constrained by limited access to emerging digital tools. Arduino and similar platforms can augment current educational programs in developing regions to foster problem-solving skills using CT. By integrating computational design skills with accessible prototyping, future professionals and researchers can help in developing robust architectural solutions that are adaptive to changing climatic conditions of Pakistan.

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THE PIGEON HOUSES ON THE PICTURE WALL OF LAHORE FORT: A LIVING SANCTUARY

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ABSTRACT

The Picture wall of Lahore Fort; a UNESCO World Heritage site, has the world's largest glazed tile mosaic work spanning 1450 feet. The tile mosaics depict hunting scenes, social events, and scenes from everyday life in the courts of Mughal Emperors. The monument also features avian micro-architecture; more than two hundred miniature structures and cubby holes that host a large population of pigeons. No official historical record makes a mention of their existence except a reference to them as miniature balcony windows or loopholes for weaponry by Jean Phillippe Vogel, superintendent for the Archaeological Survey of India. After critically analyzing historical data, on-site observations, and surveys, the study attempts to bring to light the purpose of these structures as pigeon houses, their significance, and their role on the picture wall of Lahore Fort. The methodology adopted for the paper included a study of similar historical trends, patterns, and philosophies to identify the structures' purpose and raise awareness regarding their role as a living avian sanctuary. The research contributes to the discourse regarding the application of concepts of ecological awareness in traditional architectural practice. The study will also aid in conservation efforts toward the retention of the picture wall as a living sanctuary for the local avian population.

Keywords: Avian Micro-Architecture, Ecological awareness, Lahore Fort, Mughal Architecture, Pigeon Houses, Picture Wall.

INTRODUCTION

The city of Lahore, Pakistan is home to a few UNESCO World Heritage sites (Sarwar and Hafeez, 2024) and was once the capital of the Mughal Empire (Mubin, et al, 2013). On the northern edge of the Lahore Fort lies the world's largest tile mosaic work of art (Figure 1) which was also the reason for the inscription of the Lahore Fort as a UNESCO World Heritage site in the year 1984. The Picture wall of Lahore Fort is a 1450 feet long and 50 feet high apron wall with a richly decorated *Kashikari*[1] work and elaborate natural motifs depicting 16th-century life at the Mughal court (Arif and Essa, 2017). However, it has been overlooked throughout history until recent conservation works taken up by the Aga Khan Trust for Culture (AKTC). There is little to no mention of it in historical accounts even by the Mughal chroniclers and travelers who witnessed the fortress in its days of glory. The wall comprises glazed tile mosaics (Figure 2) and the first person to highlight the beauty and significance of this wall was British officer T.H. Thornton, who served in various

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[1] Glazed tile mosaic.
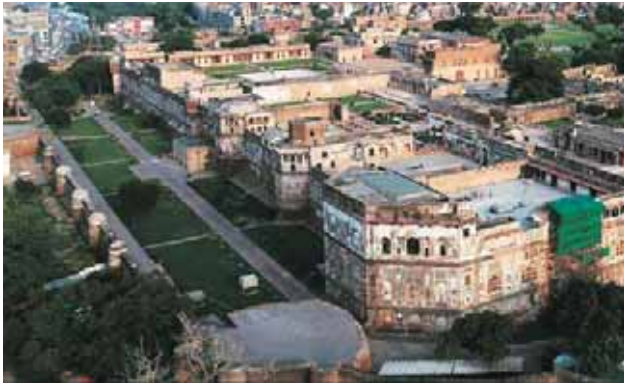
Figure-1: An Ariel view of the Lahore Fort, Lahore, Pakistan. A UNESCO world heritage site with the picture wall on the left.
Source: Agha khan Trust for Culture, 2019

Figure-2: An image of the conserved picture wall at Lahore Fort showing tile mosaics and miniature structures.
Source: Agha khan Trust for Culture, 2019

Figure-3: An image of the conserved picture wall at Lahore.
Source: Author

capacities in Lahore after the annexation of Punjab in 1849. He published a guidebook titled "Lahore" in 1860 which brought the picture wall to public attention. Thornton discussed the wall under different categories such as "Colored designs on the palace front", Historical interest of the designs" and "Origin of the art called Kasha" (Arif and Essa, 2017). Nevertheless, he makes no mention of the micro-avian architecture on the picture wall. The only detailed account of the tile mosaics of the picture wall and its pigeon houses was by the superintendent of Punjab for the archaeological survey of India (1901-1914), a Dutch professor of Sanskrit and epigraphist Jeane Philippe Vogel. He wrote that the imperial palace of Lahore outshines all buildings by the princely magnitude of its colour and decoration. He went into great detail about the origins of the art form of glazing of the tiles and the imagery they depicted. However, the pigeon houses were unable to capture his interest as much, Vogel described them as miniature balcony windows in his documentation.

"In the middle of the lower recesses, we notice projecting miniature balcony windows *Bukharcha*[2] which add grace and variety to the decorated surface (Plate IV, a-d). They are continued along the whole length of the palace wall but have suffered a great deal. The upper recesses are all pierced in the centre with arched openings perhaps meant for loopholes" (Vogel, 1920) (Figure 3).

Another account of these structures in a book; History of Mughal Architecture (volume III) describes these structures as decorative miniature *Jharokhas*[3] with no other purpose than to provide relief to the otherwise flat facade of the wall

(Nath, 1933). Many in their voyages to the palace wrote a great deal about the paintings and other works of architecture but this component of the picture wall has been overlooked. After recent conservation works, a report issued by the Aga Khan Trust for Culture (AKTC) has used the term pigeon houses for these structures (Aga Khan Trust for Culture, 2019). This paper aims to highlight the role of these structures as pigeon houses on the world's largest mural wall and attempt to understand their role in the Mughal cosmos.

Location of the Pigeon Houses

The picture wall is located on the northern end of the citadel (Figure 4), which once ran parallel to the River Ravi (Kapuria and Kumar, 2022). The pigeon houses run along the entire length of the fortress wall and face outwards towards the open lands that were once covered with forests (Figure 5).

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[2] Balcony window

[3] A bay window projected from the facade of a building in India Architecture.
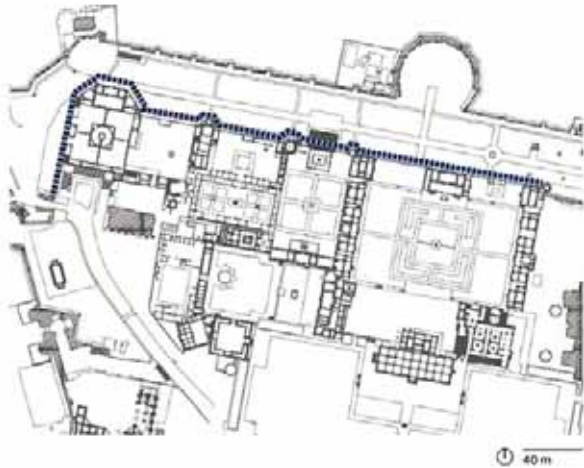
Figure-4: The location of the Picture wall with respect to the Mughal Fortress of Lahore.
Source: Jodidio, 2019

Figure-5: An image of the picture wall in its existing state with a pavement where the river used to be.
Source: Author

Timeline of Construction

Based on the timeline of construction the structures represent two architectural periods. In the case of the pigeon houses found on the picture wall, the building and extension of the wall under different benefactors and different periods enabled innovation in this regard as well. The area of the picture wall ascribable to Jahangir (1605-1627) spans between the first tower on the eastern end of the northern wall to the limits of the Kala Burj, while Shah Jahan's (1628-1658) segment starts at this point and culminates at the Hathi pol towards the end of the western wall (Figure 6).

Significance of Birds in Religious Context

Considering the possibility of the structures on the picture wall having been built to provide shelter for birds represents a materialization of the religious beliefs of their makers i.e., the Mughals. Several cultures view birds as the closest creatures to God and attribute a divine meaning because of their ability to fly freely and defy gravity (Erman, 2014). In a long-standing tradition, birds have been symbolized as souls both human and divine specifically in storytelling, spirituality Islamic poetry**.** The symbolic significance of the birds as representations of the soul is best presented in the most famous and beloved work of Persian Sufi poetry;

Farid-ud-Din Attar's "The Conference of the Birds". In this context, providing shelter for birds can be viewed as a crystallization of ideas surrounding ecological awareness and a culture of living together with nature. An idea that has its roots in the Islamic concept of "Tawheed", re-affirming
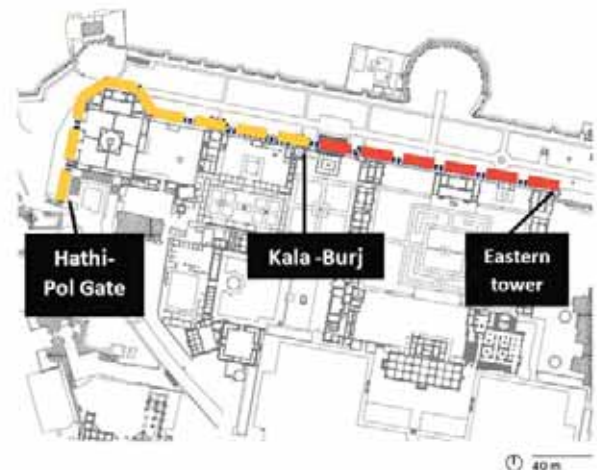
Figure-6: A map of Lahore fort showing the picture wall marked on the top most edge. The line marked red indicates the part of the wall constructed during Emperor Jahangir's reign while the yellow line represents the extension of the wall during Emperor Shah-Jahan's reign.
Source: Jodidio, 2019

man's status as the Vicegerent of God on earth and his custodial duties regarding all His creation (Cinar and Yirmibesoglu, 2019).

Micro-Architecture in a Regional Context

The Mughals developed a symbolic and metaphorical "multilingualism" to reach large audiences and establish themselves as the ideal and universal kings. They did this by drawing inspiration from a variety of available sources (Koch, 2019). A link may be established between the avian micro-architecture in practice in pre-Mughal times and its

Figure-7: Aedicule from the Pantheon; drawing by Giuliano da Sangallo.
Source: Nesselrath, 2015

Study of embedded aedicular components in a Dravida Vimana
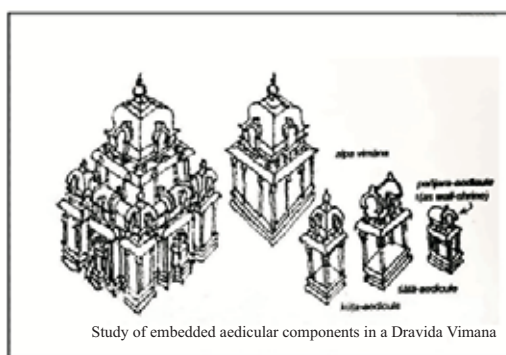
Figure-8: Aedicule in Indian temple showing various modules used in the development of the overall larger whole of the temple building.

Figure-9: An aedicule niche carved into the wall in Akbar's palace at Fatehpur Sikri, India.
Source: Johnsson, 2014

adoption and use by the Mughals in their buildings, particularly in this case on the picture wall. The external form chosen for these miniature structures may be traced back to an element called an *Aedicule*[4]. A wide range of such structural forms can be observed from the Gandhara civilization with links to both the Hellenistic West (Figure 7), Roman architecture, and peninsular India (Hardy, 2019). Used as an integral part of Indian temple architecture (Figure 8), aediculea appeared as niches in the wall. The rhythmic and repetitive positioning of this element with scalar gradation on the exterior makes up the entire temple facade. In other words, the smaller aediculea are miniature replicas of the larger whole. This architectural feature can be observed in niches for deities and other objects within the Mughal palatial buildings. Emperor Akbar also used it in his presidential palace in the Capital city of the empire; Fatehpur Sikri, India (Figure 9).

Historical Precedence of the Phenomenon

A historical analysis considering similar practices in other parts of the world helped develop a better understanding of the purpose of these avian micro-architectural structures. The earliest examples can be taken from the pigeon towers of Isfahan that were meant to house wild pigeons. The use of Avian architecture then evolved into its current form under Ottoman rule and the Sultanate period in the Asian sub-continent, where miniature structures like the ones on the picture wall started to appear on the buildings. They were a part of the facades of public buildings, palaces, and mosques in Ottoman Turkey and shrine complexes and mosque facades in the Asian sub-continent.

Pigeon Towers of Isfahan, Iran

Iran was an important point of reference, especially since the time of exile of Humayun the second Mughal emperor between the years 1543 A.D – 1545 A.D. This was an essential element in the Mughal syncretistic venture and influenced the arts, architecture, and literature (Koch, 2010). One such influence was the culture of building structures for birdkeeping. Built using vernacular techniques of construction and design, the farmers built pigeon towers in the villages of Isfahan to attract Persian wild pigeons whose dung they harvested each year to fertilize melon fields. The erection of these towers gives an insight into the altruistic relationship between the people and their avian friends and the natural tendency of man to develop symbiotic relationships with other species. The birds are given shelter and the freedom to come and go at their own will (Gemaiey, 2016).

Examples from Ottoman Turkey

The Ottoman Turks understood flora and fauna to be an important element that made up and enhanced the quality of public places as well as palatial buildings. They experimented with making shelters for the local birds on building facades. These first shelters were in the shape of cavities, however, at the beginning of the 16th century they began to take on new forms that protruded from structures (Figure 10) (Cinar and Yirmibesoglu, 2019). This architectural feature gained a special place in the Ottoman Mosque architecture, not only did they enable birds to have shelter but they were also a way to avoid birds making their nest elsewhere and ending up damaging the structure of the

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[4] A niche in the wall intended for the statue of a deity in Greek and Roman temples.

Figure-10: A pigeon houses on the Ayazma Mosque, Uskudar Istanbul, Turkey.
Source: Cangul, 2017

Figure-11: Pigeon house on a building from the Ottoman Era, Turkey.
Source: Cangul, 2017

Figure-12: A pigeon house on the Salimiye Mosque, Turkey.
Source: Cangul, 2017

Figure-13: Pigeon house on the shrine of Tahir Khan Nahar's tomb, Uch, Punjab, Pakistan
Source: Ali 2021b

Figure-14: Projecting pigeon houses on the facade of the tomb near Khalid Waleed Mausoleum complex, Khanewal, Punjab, Pakistan.
Source: Ali 2021a
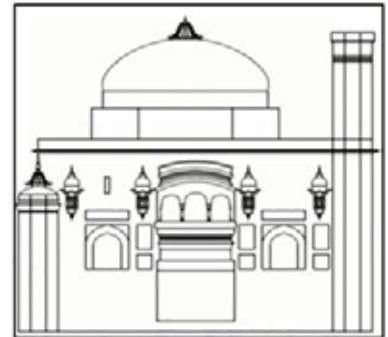
Figure-15: Western elevation of Mosque Trinda Madho Khan featuring pigeon houses.
Source: Abdul Rehman, 2016
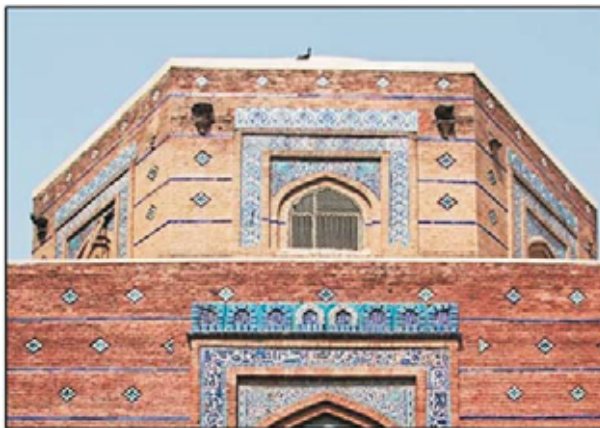
Figure-16: Pigeon houses featured on the top band featured on the facade of the tomb of Sakhi Yahya Nawab, 1618 A.D. located in the city of Multan
Source: Ahmed, 2011

Figure-17: A picture of the tomb of Bibi Jaiwindi in Uch Sharif, showing pigeon houses on the top band of the facade
Source: Ali, 2016
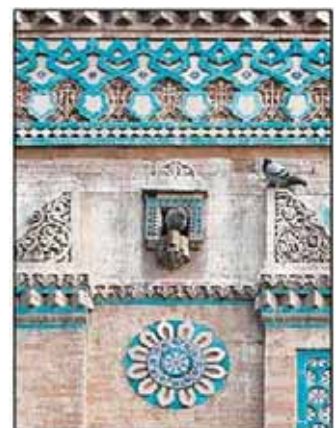
Figure-18: Pigeon house featured on the facade of the the tomb of Shah-rukn-e-alam, Multan.
Source: Ali, 2019

building due to droppings. The idea also had religious connotations, it was expected that providing shelter for birds would earn people good deeds. The making of miniature architectural structures projecting out of buildings can be attributed to the Ottoman Turks with structures dating back to the foundation (1299 – 1451) and classical periods (1451-1703) of the Ottoman Empire (Figure 11,12). The first avian-micro architecture that appeared on Sivas's crucial Kavus Darissifa (hospital) was built by the Anatolian Seljuks in the 13th century BC as shelters for birds. Installing shelters for birds on buildings and decorating them was seen in the classical Ottoman architecture of the 16th century. The designs of these smaller structures assume the form of the larger building they are a part of, and in some cases were miniature replicas that were built in styles conforming to the spirit of the building (Erman, 2014).

Examples from the Asian Sub-Continent

Instances where the local birds were provided shelter by providing miniature structures such as pigeon houses built onto the facades of buildings can be found in the architecture of the Sultanate period in the provinces of Punjab and Sindh. In the historic city of Uch in southern Punjab, projecting structures can be found on the tomb of Tahir Khan Nahar, in Sitpur, Punjab. Constructed in the 1530s, the tomb contains numerous pigeon holes which were intended as residences for pigeons (Figure 13). Another tomb in the Khanewal region of the province of Punjab (Figure 14) shows projecting structures serving the same purpose. This practice can also be observed in other parts of the nearby areas, one example being Trinda Madho Khan Mosque located in a village in southern Punjab. Rehman (2016), noticed the presence of pigeon holes as prominent and integral features on two sides of the mosque facade (Figure 15). Their use as ornaments on the facade can be seen in the Janpur mosque in the same region, here again, the structure takes a very primitive form of cavities in the walls. The facade is split into three sections vertically, the uppermost section has niches for birds, while the lower section has blind arches set within rectangular panels finished with blue glazed tiles (Rehman, 2016).

Pigeon houses installed on shrines can also be seen in the city of Multan in the province of Punjab. The mausoleum of Sakhi Yahya Nawab (Figure 16) 1560 A.D – 1618 A.D a Sufi saint features these structures near the top band of the shrine building. The tomb of Bibi Jaiwindi in the historic city of Uch showcases pigeon houses on its turrets (Figure 17). Similar projecting structures occupied by birds can be seen in the tomb of Shah Rukn-e-Alam built in the Tughlaq style of architecture (Figure 18) on each corner of the octagonal story (Qureshi, 2014). The people who come to visit provide food and water to the birds living at these shrines became a cultural norm for earning good deeds and continues to this day.

The Mughals crossed paths with and were influenced by the shrine culture when the second Mughal Emperor Akbar became a disciple of Saint Muinuddin Chisti, founder of the Chishtiya Sufi order in India. He later gained the status of *Pir*[5] which helped in projecting the 'spiritual' aspect of his Kingship. By deciding matters and presiding over the *Dargah*[6] he symbolised the appropriation of the spiritual powers of the saint. These saints were revered by Muslims and Hindus alike, therefore having close affiliations with them made the kingships acceptable to a wider range of audience (Khan, 2018). An affection for the saints that was passed down the generations culminated in the relationship between his great-grandson Dara Shikoh – the eldest son of Emperor Shahjahan, and his Patron saint Mian Mir of the Qadriya order (Latif and Mushtaq, 2013). Pigeons are a common sight on the shrines of these saints (Figure 16-18), these birds are seen as pure divine souls and are therefore respected and honoured. Perhaps visuals of the same birds residing in the Mughal Fort would make the people revere the Mughals as pious living saints, and their residences as divine and respectful as the shrines.

RESEARCH METHODOLOGY

A thorough historical analysis of the phenomenon through cultural, religious, and political lenses helped develop the framework, which aided in determining the function of structures. The first step of the study included an analysis of similar historical trends, patterns, philosophies, and designs. Influences from the surrounding areas and around the world were studied to identify the possible origins of such structures and to understand their role. Data was collected through in-person observations, documentation, and photographic surveys of the picture wall of Lahore Fort. The data collected during the first step was analyzed against data collected through websites and published books, archives, academic journals, and autobiographies of the Mughal emperors to find historical references to the phenomenon.

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[5] Spiritual Teacher

[6] A shrine or a tomb built over the grave of a revered religious figure.

ANALYSIS

The Solomonic Model of Kingship

The ability of a king to rule over all creatures was a way of ensuring and displaying the Solomonic divine providence for kingship. The animal world became an extension of the court's jurisdiction based on the model of the legendary rule of King Solomon, who was known for his just power over all creatures as even the Qur'an testifies. The idea that a ruler who brings peace to the world is a just ruler informed the eulogies of many Muslim kings, they tried to imitate this through the expression of the metaphor of pacified animals (Koch, 2010). In the translation of the biography of the Mughal Emperor Humayun (Qanun-i-Humayun) by the court historian Khvandamir (ca 1475-1535), (Prashad, Baini, 1940) states;

"*Under the protection and shelter of his justice, deer sleep carelessly in the lap of panthers, and fish fearlessly take rest near crocodiles; pigeons become friends of falcons and sparrows chirp fearlessly in front of eagles".* (Prasnad, 194D, Pg. 55)

Mughal Emperors Jahangir and Shah Jahan followed the artistic program of their grandfather Emperor Humayun who depicted the king as a Solomonic model affirming their stations as rulers of the natural world (Hickey, 2020). The image of Orpheus as a pacifier of animals in the form of a pietra dura tablet set into the wall behind the throne of the Emperor in the Delhi fort has been used to re-affirm the model of the ideal king, the keeper of world peace and pacifier of animals. They cleverly made use of these visuals to represent an emperor intertwined with the natural world to try to proclaim the legitimacy of the throne through diverse sources of power (Hickey, 2020). The theme of pacified animals under the control of the Emperor can also be observed through the use of pigeons trained to carry messages. In Tuzk-I-Jahangiri (Memoirs of Jahangir), Emperor Jahangir talks about instructing pigeon fanciers termed "Ishq-baz" to train their pigeons to carry messages (Rogers, 2015).

Avians in the Mughal Court

The Mughal emperors held a great amount of interest in the natural world. They were aware of the flora and fauna that enlivened their landscapes, this may be partly because of their Mongol descent. It is possible that by weaving themselves into the natural world they were trying to maintain a connection with their roots by symbolically presenting images of an empire that had grown out of and blended into the local context (Hickey, 2020). Emperor Jahangir was a naturalist who took every opportunity to satisfy his love of nature and his curiosity by engaging with the non-human subjects of his empire (Rogers, 2015). From acquiring exotic animals to conducting experiments with his royal pets the king mentions all in his autobiography. Similarly, the Avians were an important part of the Mughal court, their presence in the Mughal cosmos took many forms. The constant presence of birds in Mughal art, poetry, memoirs, hunting expeditions, and court aviaries represent conscious extensions of the Emperor himself. The Mughals surrounded themselves with birds of every kind. Their dominion over the bird world was majorly manifested through aviaries kept in pleasure gardens. Emperors and their courtiers frequented these enclosures kept up by eunuchs. They served as venues for education, entertainment, and supervised animal interactions. The birds in these gardens were housed there for an extended period, not for conservation or rehabilitation, but rather to entertain the courtiers (Hickey, 2020). The garden of Pari Mahal in Kashmir had a multistory building built for housing carrier pigeons for communication between the Royal fort and the different locations within the vicinity (Moynihan, 1979).

The Practice of Bird Keeping in the Mughal Lineage

From the very beginning of the empire, the culture of bird keeping was a noble hobby, one that in a particular incident took the life of the father of the first Mughal Emperor Babur. Abu'l Fazl the court biographer and *Vizier*[7] states in his book Akbarnama (Biography of Mughal Emperor Akbar) that "training pigeons caused great joy and the demise of Babur's father, Umar Sheikh Mirza, who died after a pigeon house collapsed on him". His love for pigeons passed on to his descendants, into Akbar's widely-professed love for the birds (Ibn-Mubarak, Beveridge, 1907). Blochmann & Heinrich, (1873) in Ain-e-Akbari (The Constitution of Akbar) state that the tumbling and flight of pigeons amused Emperor Akbar, the second Mughal Emperor, as it brought to mind the euphoria and transport of fervent dervishes. An account written by Topsfield, (2013) recalls the deep relationship between the birds and their keepers. He states that among the 20,000 pigeons that Akbar kept his favourite was a well-trained, bluish-grey pigeon named Mohana.

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[7] A high official in the court.

Figure-19: Tile mosaic work showing two birds mid-flight on the picture wall.
Source: Vogel, 1920

Figure-20: Tile mosaic work found on the picture wall showing a mystical creature known as the Simurgh.
Source: Vogel, 1920

Avian Art in the Mughal Court

The arts produced in the courts during the 16th and 17th centuries constantly featured birds. They were used as motifs that made Mughals a part of the long-standing tradition of storytelling. This intricate relationship between the Mughals and their avian subjects reveals a Mughal conception of the empire, one with fluid boundaries between the animal kingdom and their own (Hickey, 2020). Keeping in mind this context the picture wall would appear to be a befitting place for these pigeon houses to be built. Due to its location, it was essentially a means of broadcasting the royal narrative of divine kingship. Tile mosaic Figures of both real (Figure 19) and imaginal (Figure 20) birds engaged in different activities can also be seen featured on the Picture wall alongside the pigeon houses. The winged creatures on the picture wall manifest the fantasy of flight and a wish to forge connections with the heavens. Further study into the subject helped develop a clear understanding of the role of the avians in the Mughal cosmos.

Ecological Awareness and Providing Sanctuary (Hima)

Hima in Arabic means "a protected place", essentially to provide a living sanctuary to the animals or plants of a specific region (Ibrahim et al., 2013). Examples of the Mughals practising such concepts of having reserved or protected lands can be found in the area of Shah-dara on the outskirts of the city of Lahore, and the city of Sheikhupura having the famous Hiran Minar monumental complex built by Emperor Jahangir. The use of avian micro-architecture on the building facades for providing safe shelters can be seen as an application of the same concept in a different form. Gruber, (2021) states that the birdhouses built during the Ottoman Era may have served as architectural atonement for the trees that humans had cut and cleared at a time of urban development. This hypothesis does not fit into the case of structures found on the picture wall of Lahore Fort. In the time of the Mughal Empire, the River Ravi ran next to the Fort with forests beyond its shores, this makes it difficult to justify the theory of the birds having to leave the forests and live on these built structures. However, the other explanation can be sought from the theory by (Erin, et. al., 2019) which states that feral pigeons prefer urban environments to natural ones where access to food sources is easy. They have adapted to living among human populations over thousands of years. Hence it may be stated that the pigeon houses of the picture wall were meant to provide a living sanctuary for these specific birds' i.e. pigeons.

Documentation of Miniature Structures on the Picture Wall

The projecting structures on the picture wall take different forms according to the design palette of the emperor who ordered their construction. They can be categorized into three types based on architectural styles and internal layout. The court historian Lahori gives an insight into the keen interest Emperor Shah-Jahan had in the architecture of his palaces by stating that the Emperor paid much attention to the planning and construction of buildings and liked to
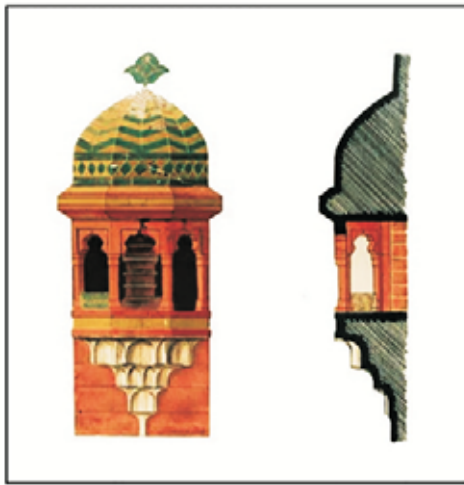
Figure-21: Type A structure as documented by Vogel (1920).
Source: Vogel, 1920
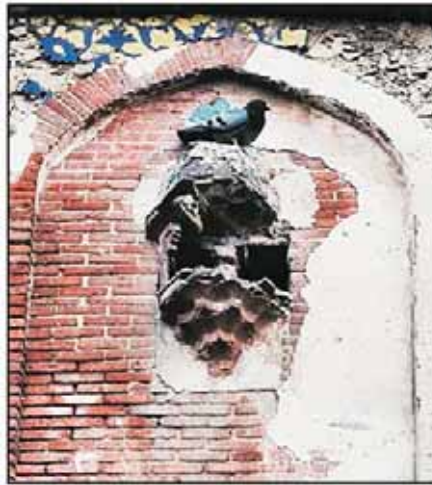
Figure-22: Cut-brick arches showing details of the arch
Source: Author

Figure-23: Type A structure in damaged conditions on-site
Source: Author

Figure-24: Type B structure as documented by Vogel (1920).
Source: Vogel, 1920

Figure-25: Restored Type B structure as found on site.
Source: Author

Figure-26: A picture showing the cut-brick fretwork.
Source: Author
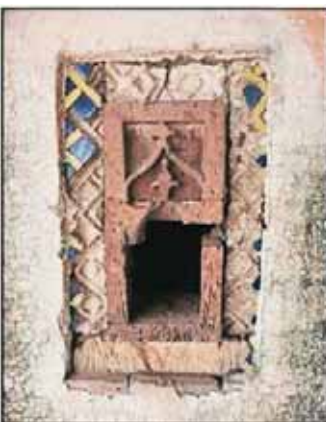
Figure-27: Type 03 structure as found on site
Source: Author
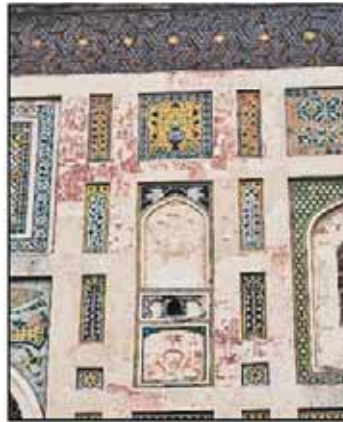
Figure-28: Type 03 structure with a square front opening as found on the wall.
Source: Author
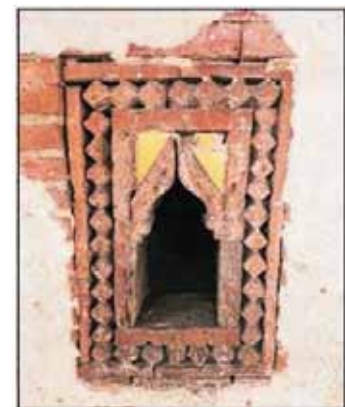
Figure-29: Type 03 structure with a different external design.
Source: Author
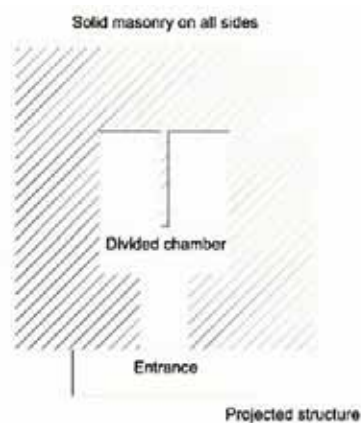
Figure-30: The typical internal layout of a miniature projecting structure on the picture wall.
Source: Author

Figure-31: The damaged structure with three chambers.
Source: Author
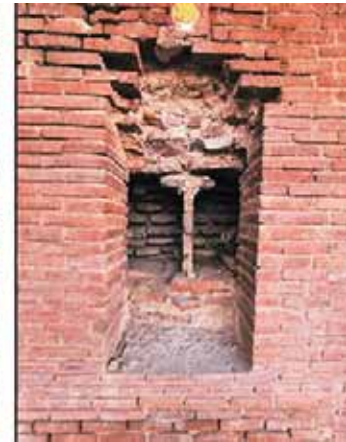
Figure-32: Damaged front structure revealing the internal chambers.
Source: Author

design most of the buildings himself (Necipoglu, 2018).

Classification of Structures:

Based on their designs, the structures found on the picture wall can be classified into the following three categories.

Type-A Structure

The structures being classified here as type-A (Figure 21) can be assumed to be the oldest ones considering their architectural vocabulary and the position on the wall. They are located on the left-most side of the northern wall and below the sleeping chambers of Emperor Jahangir bearing the architectural elements from his style and his father's i.e. the Akbari style of architecture, with domes covered with geometric designs of glazed tiles with a 2-dimensional floral motif as the pinnacle. The semi-octagonal miniature portico features three arched openings and miniature versions of columns, the likes of which were used in the eastern and western *Dalans*8 and other prominent structures such as the Deewan-e-Am or the Hall of Common Audience in the Lahore fort itself. These are designed as lookout points carved out of cut-brick with intricate borders resting on a corbelled octagonal star base (Figure 22-23). Other features include glazed tile work on facades of the pigeon houses. The style of the pigeon house and the craftsmanship that went into making these miniature versions of life-sized structures is a testament to the dedication put into materializing the emperor's vision. Currently, there are no type-A pigeon houses that are completely intact and not more than three structures can be identified in this category.

The pigeon houses remaining have damaged front facades with exposed cut-brick construction, intact corbelled bases and semi-intact domes showing remnants of blue tile work.

Type-B structure

The type of structure classified as type-B (Figure 24) is based on a style that seems to be more to the liking of the Mughal Emperor Shah Jahan; the emperor who is credited with continuing the construction of the picture wall after his father Emperor Jahangir. The exact timeline of construction though is not clear, it has been discussed by (Vogel, 1920) in his Journal when he documented the structures in 1905, "The tile decoration was commenced in Jahangir's reign on that portion of the wall which corresponds to the quadrangle bearing his name. In the early years of Shah Jahan's reign. When the art had attained greater perfection. It was continued, first on the Shah Burj, and then on the Adjoining curtain wall; and it reached its zenith and completion on the splendidly decorated Elephant Gate".

These projections seem to conform to the typical style of the balcony windows added to palace rooms. The rectangular form of the projection and crown is an architectural style developed during Shah Jahan's reign. It can be observed here that the matter of the design of these pigeon houses was something important enough to be taken up as an opportunity to leave a signature of sorts for the emperors of the time. The overall form (Figure 25) is rectangular with a crown having a two-dimensional pinnacle on top, eaves projecting out over a central arched opening while the sides of the entrance arch are decorated with geometric designs.

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8 A verandah or open hall for reception of visitors.

Figure-33: a) A picture of a building belonging to Emperor Akbar's era with an Akbari style Jharokha (balcony window).
Source: Ali, 2012a
b)An image of a miniature structure as documented by Vogel (1920) located on the picture wall.
Source: Vogel, 1920
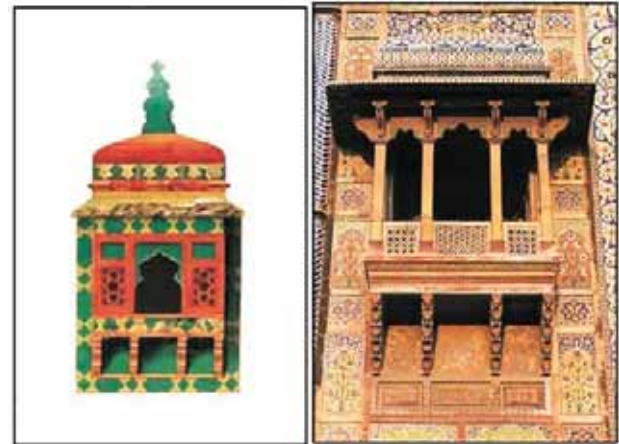
Figure-34: a) An image of a miniature structure as documented by Vogel (1920) located on the picture wall.
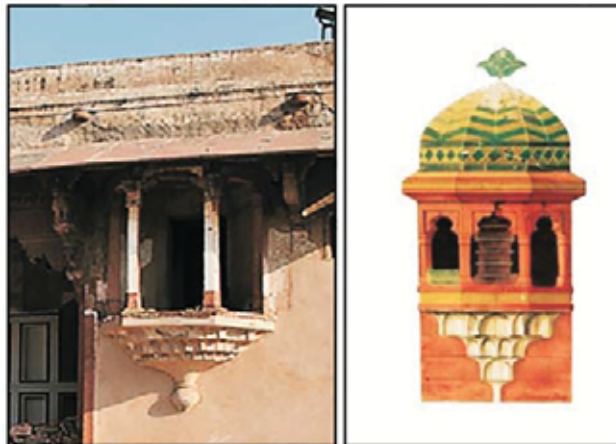**Source:** Vogel, 1920
b)A picture of a Jharoka window on the entrance portal to the Wazir Khan Mosque, Lahore.
Source: Ali, 2012a

The fretwork built using cut brick perhaps keeping in mind the hot summers of Lahore ensures proper ventilation while the structure is supported with corbelled brackets at the bottom (Figure 26). Majority of the structures found on the picture wall belong to this type. The intact structures show exposed brick-cut structure and fretwork while the façade exhibit blue and yellow tile mosaic work.

Type-C Structure

The third type of structure classified as type-C (Figure 27) goes back to the very basics of the concept of providing a domicile for the birds as seen in the 13th century. This is a cubby hole in the wall (Figure 28) with an arched opening decorated with tile mosaics. Vogel makes a mention of these in his Journal in the following manner: The upper recesses are all pierced in the centre with arched openings perhaps meant for loopholes. He tried to identify these as meant for some sort of military use from inside the wall but no trace of any access can be found from behind these holes indicating they were only accessible from the outside. These holes can be found on the wall's highest bands, making them even harder to access (Figure 3). This type can be divided into further types based on the location on the wall and the external design around the opening (Figure 29).

Dimensions and Internal Layout

While the outer form of the pigeon houses may vary the internal layout is almost the same, a square layout with partitions inside (Figure 30). Some of the pigeon houses contain two and in the larger ones three chambers that are

separated by a brick wall (Figure 31-32). The chambers are 1 foot 5 inches x 1 foot 6 inches with a 5-inch wide opening.

Architectural Design of the Structures

The pigeon houses found on the picture wall are more than just a shelter, they are witness to the artistic and technical expertise of the Mughals and the use of architecture as a tool to disseminate their ideologies. The structures built in the reign of the Mughal Emperor Jahangir feature the architectural language of his preference and that of his predecessor i.e. his father Emperor Akbar. The pigeon house design consists of recessed niches within the brick wall with cut brick facades as semi-octagonal projection, the dome on top, and the corbelled circular base for support on the bottom conforms to the official architectural language of the period. This can be observed in the life-size Jharokhas (Figure 33-a) in an Akbari period structure still standing in the northeast corner of Jahangir's quadrangle in the Lahore fort. The pigeon houses corresponding to this architectural language can be found on parts of the wall (Figure 33-b) running right below the buildings built by Emperors Akbar and Jahangir. The ones built later on during the period of the Mughal Emperor Shah Jahan stand witness to his refined tastes in tile mosaics and a more colourful facade. A rectangular projection with a rectangular roof and a tile mosaic two-dimensional pinnacle is a testament to the language preferred by Shah Jahan in his architectural endeavours (Figure 34-a). An example of this type of structure being used in a life-sized form can be observed on the facade of the Wazir Khan mosque in the walled city of Lahore

Figure-35: An image of the Jharokha Darshan at the hall of common audience at Lahore fort, Lahore, Pakistan.
Source: Ali, 2012b

Figure-36: Image of pigeon residing in one of the restored structures on the Picture wall .
Source: Author

(Figure 34-b). The method of construction also differs from their Turkish counterparts in the way that the Ottomans carved out the projecting structure from one single piece of stone, here these structures have been broken down into components.

The design of these miniature structures bears a striking resemblance to an element of the Mughal architectural vocabulary, a Jharokha. Zulfiqar, (2018) defines the Jharokha as a type of overhanging oriel window supported by brackets or corbelling typically used in Mughal and Rajasthan architecture. During the time of the Mughal Emperor Akbar, The Jharokha for viewing the king known as Jharokha *Darshan*[9] (Figure 35) was popularized. Emperors Jahangir and Shah-Jahan introduced it in their public audience halls allowing them to engage with the public (Figure 7). The appearance of the semi-divine king at the Jharokha for his people made the balcony windows a somewhat sacred spot (Koch, 2019). It is perhaps this similarity in external form that caused the misidentification of these structures as miniature balcony windows by Vogel in his documentation of the picture wall (Figure 36).

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[9] A balcony for the king to engage with his audience.

The Mughal architects and artists had no issue appropriating ideas from Central Asia, Persia, the Near East, India, and Europe if it suited their needs (Kach, 2010). In the matter of designing the external form of the pigeon house, choosing an existing design element from the local context and the derivation or recapitulation of its role and use seem to have been given careful consideration. The use of the aedicular form carries with it the associated symbolic significance of it being a place for deities or objects of importance. Similarly as discussed earlier, the fact that pigeon houses also resemble the form of Jharokha Darshan, where the Emperor's throne was placed, based on the realization of the Solomonic throne highlights the symbolic significance associated with the Jharokha. The absorption of these two elements into the design for these structures with all their symbolic significance seems to be a conscious choice rather than an accidental one, chosen to emphasize the role and stature that was awarded to these avian royal subjects. The internal layout of the pigeon houses has segregations that seem to have been intended for multiple occupancy. Each of these structures on the picture wall is a testament to the refined understanding and wisdom of the architects and designers, and the

Figure-37: Picture giving an idea of scale of the pigeon house and its openings.
Source: Author

Figure-38: Picture showing the inside of one of the pigeon houses .
Source: Author

craftsmanship that went into choosing a particular design for them. This remarkable amount of sensitivity to the understanding of the use of the space by the birds attests to the thought that went into making these structures habitable and perhaps is the reason that even after 400 years they are still in use by the residents for whom they were designed.

Discussions

The Lahore Fort in the City of Lahore, Pakistan, is home to a unique feature that has not been observed in any other Royal monuments of the Mughal period in the region: the picture wall. The largest tile mosaic wall in the world, it might also be considered a host to architectural experimentation for realizing religious ideals in material form.

Miniature Structures as Pigeon Houses

The idea of miniature structures found on the picture wall having been built as pigeon houses can be based on the following discussion. The use of these structures as "miniature windows" as Vogel, (1920) suggested may be dismissed based on the following evidence. The authors observed that there were no openings on the other side of the wall nor were there any signs of openings closed later at any point.

Hence the authors conclude that these structures could not have served the purpose of fenestration or loopholes as Vogel suggested. On the other hand, if we consider the possibility of them being pigeon houses, the following is an argument that can be made in favour of this idea. Cinar and Yirmibesoglu, (2019) state that for a structure to be a well-functioning pigeon house, it needs to consist of three elements: invisibility, inaccessibility, and impenetrability. The miniature structures on the picture wall achieve all three goals to create a safe and livable environment. Their location on the northern wall of the Lahore Fort makes them invisible to the entire city. The wall marks the end of the Fort and the city which is why the tile mosaics of the picture wall were rarely seen or known by anyone in the city. Vogel, (1920) mentions this in his journal saying that people who have lived in Lahore for a long time were unaware of their existence. The location combined with the height at which these structures were placed makes them inaccessible considering the entire northern wall was the residential quarters of the royals, especially the women's quarters.
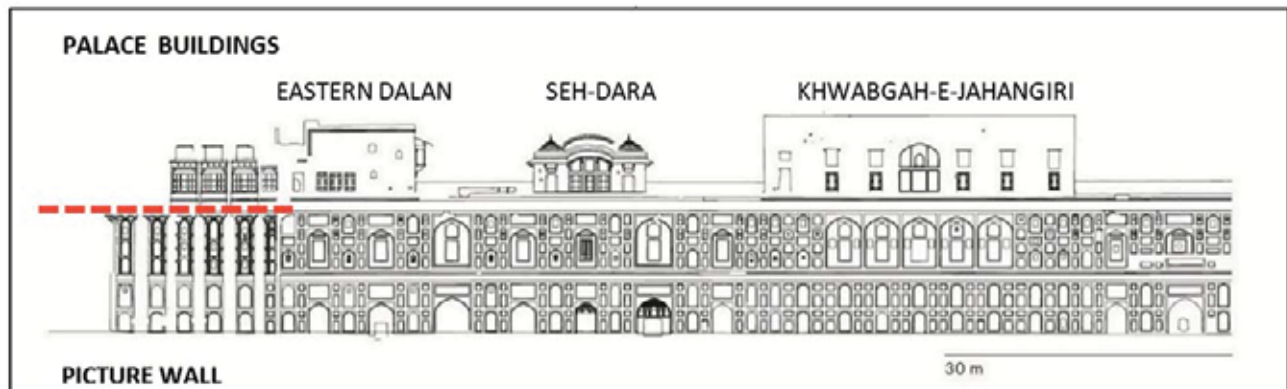
Figure-39: Elevation of the oldest part of the picture wall showing palace buildings on top and rows of pigeon houses on the walls below.
Source: Jodidio, 2019

Therefore, it is safe to assume that no one from the ordinary public had access to these parts of the citadel without permission. The design of the structures made the third objective possible, the openings or the entrance points for all the designed structures were made small enough (in most cases 5 inches in width – (Figure 37) to house small birds). The openings were not big enough and blocked on most sides by stone screens for predatory birds providing the smaller birds with a safe place to dwell and raise their young (Figure 38).

The Picture Wall as a Sanctuary

The modern world may claim ecological awareness and responsibility or sensitivity towards the environment as a modern thought, its roots go back hundreds of years and these structures may be taken as a testament to it. It is noteworthy that the pigeon houses found on the picture wall did not serve any functional purpose for the residents of the palace, instead, it appears that the idea for the structures on the picture wall stems from a selfless intention and sympathy, providing shelter to the creatures of God and not seeking anything in return. In the previously mentioned cases an existing habitat is marked and placed under protection as a sanctuary, but to design and build it as a part of the largest mural wall in the world is a unique architectural endeavour.

Placement of the Pigeon Houses

Based on the research, the placement of these miniature structures in this specific location might have provided a two-fold advantage. First, it might have provided a good opportunity for broadcasting the royal narrative of divine rule based on the Solomonic model of kingship and secondly, it must have offered a safe location for the bird abodes that were out of range from predators. The choice of placement of the pigeon houses on the picture wall of the citadel seems not just symbolic but a literal representation of the animal's gaining protection under the watchful eye of the emperor as these structures are positioned right under the building known as "khwabgah-e-Jahangiri (The sleeping chamber of Emperor Jahangir) (Figure 39).

Restoration of the Pigeon Houses:

As a part of the ongoing restoration works on the picture wall of the Lahore fort, the pigeon houses have been restored to their original form using Vogel's documentation as no other documented record of these structures exists. The exposed holes and partially damaged pigeon houses have been restored by The AGA Khan Trust for Culture. The materials used in their restoration are similar to those used for the original construction (Figures 40 and 41). The decision to keep the structures functional helped revive the role of the Picture Wall as a living sanctuary. The restored structures have been re-occupied by the local pigeon population enabling the picture wall to continue to serve one of its intended purposes.

Conclusions and Recommendations

The Mughals were masters of using the architectural craft to create narratives, they took cues from regional and cultural practices to create a unique architectural expression. This research has attempted to unfold the possible reasons behind the making of a unique architectural endeavour that has its roots in the religious and cultural context. A result of the absorption of ideas based on the long-standing traditions of developing altruistic relationships with the local fauna. The Picture wall of Lahore Fort is the only one-of-its-kind having examples of avian-micro architecture found on a Mughal monument in the city of Lahore. The wall serves as a 1450 feet long living sanctuary for the local avian population with

Figure-40: Image showing a prototype for restoration of the pigeon houses developed by AKTC for the Picture wall .
Source: Author

Figure-41: Image showing a restored type 3 pigeon house.
Source: Author

pigeon houses built into it. The evidence discussed in this article suggests that due to the lack of research done on the subject, the projecting structures had long been seen as miniature balcony windows and loopholes or as just a part of the aesthetic scheme of the picture wall by the previous scholarship. This article has aimed to present a multidimensional point of view for looking at the monumental project as having layers of sublime and at times obvious meanings. The pigeon houses add layers of meanings to the purpose of the picture wall as a medium to broadcast subtle narratives to its viewers. The pigeon houses are in a sense three-dimensional living paintings alongside their two-dimensional tile mosaic counterparts on the wall. Perhaps these structures on the Picture Wall of Lahore Fort were seen as an opportunity to use birds as architectural ornaments that live and breathe. The choice of location, the placement of

the structures, and a deep understanding of the needs of the avian friends of the court are the reasons the sanctuary is habitable to this day. What makes it different from other examples of birdkeeping is that there is no concept of possession, the birds were free to come and go as they will and are free to do so even today. Their mesmerizing beauty, melodious sounds, and the one thing man has forever longed to achieve; flight, makes them essential components for getting a step closer to representing the visions of the emperor's divine dominion on earth. The picture wall continues to serve its role as a living sanctuary housing hundreds of birds despite being located next to Iqbal Park, one of the largest parks in Lahore. It serves as an exemplary display of ecological sensitivity and inclusion into the practice of designing our built environments to date and in the future.

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POST OCCUPANCY EVALUATION OF RESIDENTIAL SATISFACTION IN GATED COMMUNITIES - AN EMPIRICAL STUDY OF NAYA NAZIMABAD IN KARACHI, PAKISTAN

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ABSTRACT

International literature has revealed that the post-occupancy evaluation (POE) of gated communities provides valuable insights into the effectiveness of these developments in meeting residential satisfaction and improving urban living conditions. Gated communities, especially in the Global South cities, have proliferated as responses to increasing concerns about safety, privacy, and the quality of urban life, for the growing middle class of people. Karachi, one of the largest and most populous cities in Pakistan, exemplifies many of these concerns. Despite, many gated community projects being completed, limited POE research has been conducted in Karachi, Pakistan. Therefore, this study aims to explore the POE of the emerging gated community of Naya Nazimabad, to assess the living quality, amenities, safety, and community dynamics from the residents' perspective. Data was collected from 300 residents through a structured questionnaire survey which focused on the residents' socio-demographic profiles and key determinants of the neighbourhood and housing environment within the gated community to identify strengths and areas for improvement. The research findings highlight that while Naya Nazimabad often provides enhanced safety, better amenities, and a sense of exclusivity for the middle and upper-middle class, it also raises concerns regarding social segregation, inequality, and the exclusion of lower-income groups in the neighbouring urban environment. Finally, this evaluation contributes to understanding how gated communities function post-occupancy and offers recommendations for improving their design and management related to community engagement and integration with the wider urban fabric.

Keywords: Gated Communities, Global South Cities, Naya Nazimabad, Karachi, Post Occupancy Evaluation, Residential Satisfaction.

INTRODUCTION

Gated communities are widespread across the world as housing developments with gates and boundaries that limit access from the surrounding region (Blakely & Snyder, 1997a) (Borgoni, et al., 2018) . Post-occupancy evaluation (POE) of gated communities in the Global South provides a comprehensive understanding of how well these developments meet the expectations and needs of residents (Dowling, et al., 2010; Al Omari, 2015).

The concept of 'Global South Cities' is often marked by informal settlements, a growing middle class, and the increasing influence of the private sector in urban development (Bandouko, et al., 2022) . Recently, gated communities have become a desirable living option in the Global South cities (Omar & Khalid, 2015; Kalantari, et al., 2017) which can also be termed "residential satisfaction" that affects the entire family's activity, well-being, social life, employment, and education in addition to defining the linkages with the urban environment (Molin, 2011; Wanas,

et al., 2014). Research has shown that gated community residents in the Global South cities like Rio de Janeiro, Johannesburg, and Cairo, often report satisfaction with security provisions and improved living standards (Breetzke, et al., 2014, Caldiera, 2000, Khamis, et al., 2023) , however, they often contribute to urban fragmentation, reinforcing social inequality and reducing engagement with surrounding urban areas (Almatarneh, 2013, Breetzke, et al., 2014). Despite the growing popularity of gated communities the Global South cities (Almatarneh, 2013, Nazmy, et al., 2016), few studies have cited the factors affecting the preferences of residing in gated communities, particularly in Karachi, a Global South city of Pakistan, using a POE approach (Nadeem, et al., 2013).

In Karachi, globalization, sporadic urbanization, insufficient land availability, and inadequate public infrastructure are fundamental reasons directing the implementation of an intensified population density approach for housing projects (Nadeem, et al., 2013). These conditions have led to a growing demand for secure, self-contained living spaces, where middle and upper-middle-class residents seek to escape the unpredictability of the city's informal settlements and congested neighborhoods (Kaker, 2014). This demand has fueled the development of gated communities, which offer enhanced security, modern amenities, and a controlled environment (Hasan, 2008; Ahmed, 2010).

As the figure of gated communities is rising in Karachi, POE-based studies of emerging gated communities need to be conducted. Thus, this research study aims "To evaluate the satisfaction levels of the occupants in Naya Nazimabad through a post-occupancy evaluation". Naya Nazimabad is a developing middle-income gated community. In addition to providing input for housing research, the paper's findings will assist in defining areas that require additional modification to guarantee that the gated community's design is user responsive. The conduction of an appraisal of the Naya Nazimabad after occupation will help the professionals better understand the end user's outlooks.

RESIDENTIAL SATISFACTION

The concept of residential satisfaction

Residential satisfaction is the notion of comfort and happiness when one has completed what one wants or aspires in a living environment (Mohit & Raja, 2014). Residential satisfaction can also be outlined as a yardstick of residents' opinion of the overall quality of life, and it can imply that an individual's anticipation of housing is fulfilled (Tan,

2016). Evaluating residential satisfaction has become a critical tool for determining the success of residential developments (Borgoni, et al., 2018; Tan, 2016). Studies about residential satisfaction may vary in terms of conditions, inhabitants, ethnicity, and most importantly for assessing the pros and cons of housing projects (Kuriakose, 2014), reviewing the needs and choices of the residents (Ibem, et al., 2013) to mark as a life quality index (Addo, 2015). It is crucial to design thriving housing developments and employ effective housing policies (Addo, 2015).

Residential Satisfaction in Gated Communities

Multitudinous studies have examined residential satisfaction in gated communities. Numerous studies indicate that living in gated communities can occasionally be linked to disappointments and unfulfilled desires due to elements like expensive maintenance and service fees and extreme social exclusion (Ilesanmi, 2012; Manzelat, 2016; Mohd, et al., 2016) the majority of the research, however, indicates that people who dwell in gated communities are generally content with their environment. For instance, according to a study done in Istanbul, Turkey, people who live in gated communities are generally happier with the amount of security, diversity of amenities, proximity to green spaces, and upkeep of their residential neighbourhoods (Berkoz, 2008). According to a study done in Malaysia, monetary benefits, societal status, and lifestyle amenities are especially linked to the comparatively high levels of residential satisfaction among residents of gated communities (Tan, 2016). Likewise, in the context of Egypt, two studies done in Cairo (El Sayed, 2016) and Alexandria reveal that inhabitants tend to be happy with their move to gated communities principally with an improved lifestyle, enhanced status, and the protection of their real estate investing. As observed in Medan City, the spatial satisfaction criteria were the characteristics of housing namely place and design along with the communal amenities provided, while safekeeping, social interaction among inhabitants, and housing tenancy formed the socio-economic satisfaction component (Aulia & Ismail, 2016). A study on residential satisfaction in the Nigerian context discovered that according to the facilities provided in the gated communities, tenure, household size, provision of facilities, safety, location, size of the gated community, and proximity to the workplace were some of the important factors in satisfaction (Ogunbayo, et al., 2018; Ajibola, et al., 2011). Moreover, a survey of public gated communities in the Maldives showed that the success of the housing project is not assured by only the physical provision of housing, it is vital to converge the capacities and preferences of the

residents also (Mohit & Azim, 2018). However, the determinants of residential satisfaction may vary across contexts.

THE DETERMINANTS OF RESIDENTIAL SATISFACTION

Residential satisfaction is a multifaceted paradigm, that hinges on satisfaction with the singular modules and traits of the housing conditions (Berkoz, 2008; Galster & Hesser, 1981; Molloy, et al., 2018). Residential satisfaction requires to be considered and assessed through the attributes and individualities of the neighbourhood and housing environments using the socio-demographic characteristics of the residents (Mohit & Raja, 2014). The neighbourhood components of residential satisfaction concern the physical environment of the neighborhood contiguous to the residence (Waziri, et al., 2014, Molloy, et al., 2018). The housing elements are also important measurements of residential satisfaction that include social relations and relations with the living atmosphere (Berkoz, 2008, Molloy, et al., 2018). Research that summarized the empirical studies on residential satisfaction in gated communities at a cross-cultural level (Mohit & Raja, 2014) was based on the research (Amerigo & Aragones, 1997) which consists of three components;

- socio-demographic characteristics of the residents
- housing environment
- neighbourhood environment

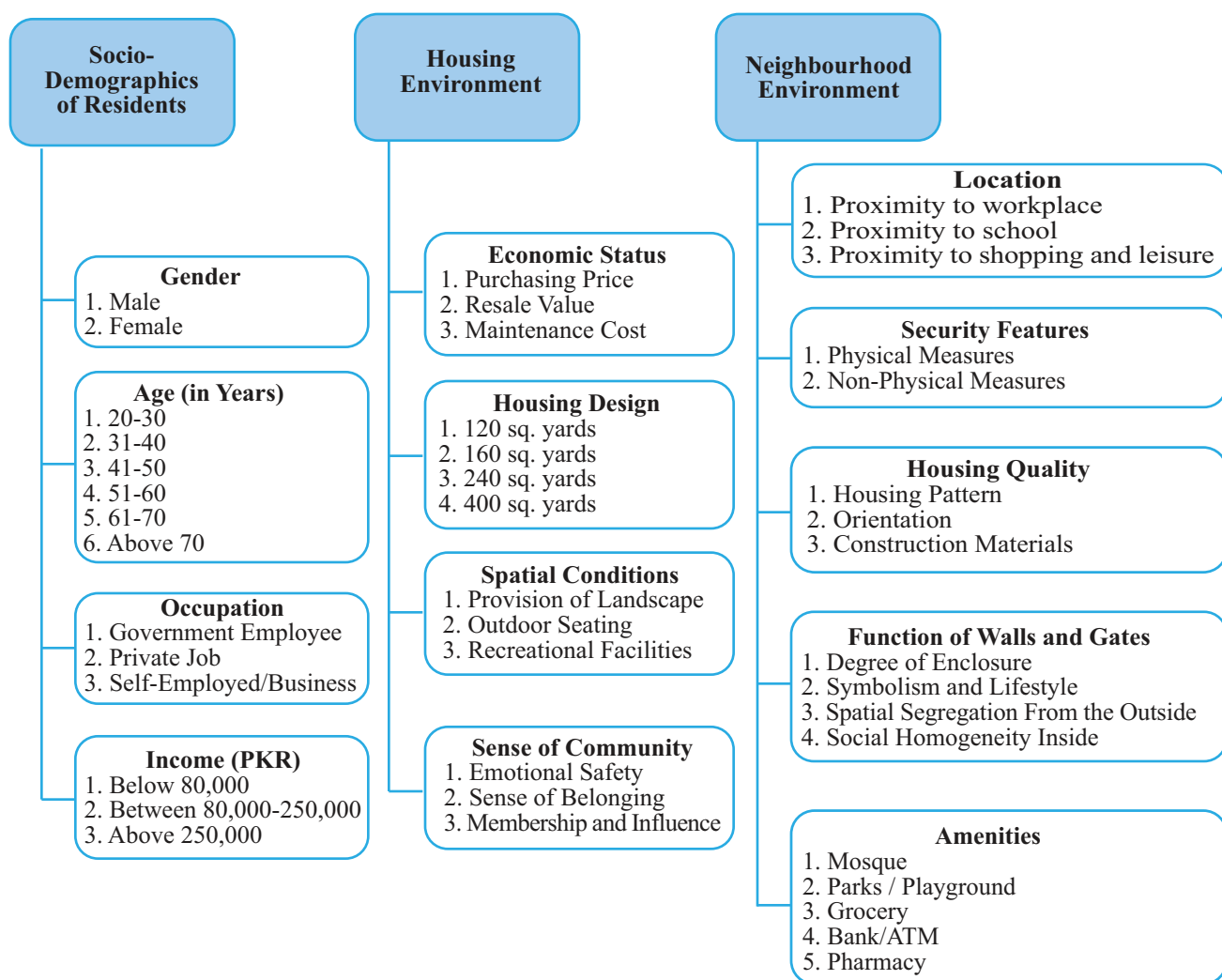The determinants of each component are mentioned below (Figure 1).

Figure-1: Determinants of Residential Satisfaction.
Source: Author

RESEARCH METHODOLOGY

This research aims to conduct a POE in Naya Nazimabad, Karachi, to evaluate the residential satisfaction levels of its occupants. A review of extant literature indicates that in the past studies on "residential satisfaction", a POE approach was pragmatic to investigate the presence and interrelation of the factors contributing to living in gated communities (Preiser, et al., 2015), as it provides a logical compilation and evaluation of the execution of any housing project after the occupation (Stevenson, 2008).

Survey Questionnaire Design: Data collection involved a structured survey questionnaire which permits a varied and detailed examination of the perceptions of the residents which quantifiable approaches may not have the capacity to offer (Hennink, et al., 2020). The survey questionnaire was divided into 3 sections, based on residents' profiles, factors determining the neighbourhood environment, and factors determining the housing environment. As suggested by (Camparo, 2013) the design of the questionnaire used a 5-point Likert scale (ranging from 1-5) along with multiple-choice questions, allowing for a comprehensive analysis of residents' perceptions and experiences.

Sampling method: A stratified random sampling method, targeting a representative sample of residents from different age groups, income levels, and types of housing units within Naya Nazimabad, for post-occupancy household surveys, specifically in the occupied Blocks of A, B, C, and D. Respondents were owners of housing units as perceived that owners conveyed more connection towards their home environment and neighbourhoods (Zhang & Lin, 2012). This approach ensures that diverse perspectives are captured and helps generalize the findings across the entire population.

Survey Methodology: To begin, an estimate of the total number of households or residents in Naya Nazimabad was needed, since the population may vary as the community grows, we can use an approximate population estimate. For example, if the population is around 100,000 people (as suggested previously), and assuming each household has an average of 5 members, there may be around 20,000 households in total. Based on the population estimate, households in Naya Nazimabad were assigned random numbers, and a questionnaire was given out in person. As Naya Nazimabad is being developed in phases, some blocks may have higher occupancy rates, especially those that have been completed earlier, and other blocks of the development may still be under construction, leading to lower occupancy in those zones. As the current growing population cannot

be determined, based on 50% of conservative value, 350 questionnaires were initially distributed, out of which 300 residents volunteered and hence, 300 complete questionnaires were gathered. Tables were used to present the data, and a rationale was furnished. Concerning the questionnaire data, narrative analysis was utilized to present the results in a way that was descriptive and reflected the pertinent factors of the neighbourhood and housing environment concerning residents' profiles.

STUDY AREA

Within the administrative divisions, District West was chosen because it is not densely populated with gated communities in Karachi, within which the area of Manghopir was chosen due to the presence of Naya Nazimabad, which is a recently developing gated community in Karachi as derived from the of the mapping data (Figure 2). Naya Nazimabad is a gated community that is being developed around Manghopir Lake. The master plan of Naya Nazimabad has a total area of 50 hectares (1300 acres) and it is developed by Javedan Corporation Limited, which is a part of the Arif Habib Group, Mr.Haji Ghani Usmani and Mr. Shunaid Qureshi (Figure 2).

It has been chosen as a case study for the following purposes:

● The area has densified from low population density to high population density
● Typical case of gated communities in the Global South involving the number of units, amenities and security provided, etc.
● Provides for a variety of higher middle and middle-income classes.
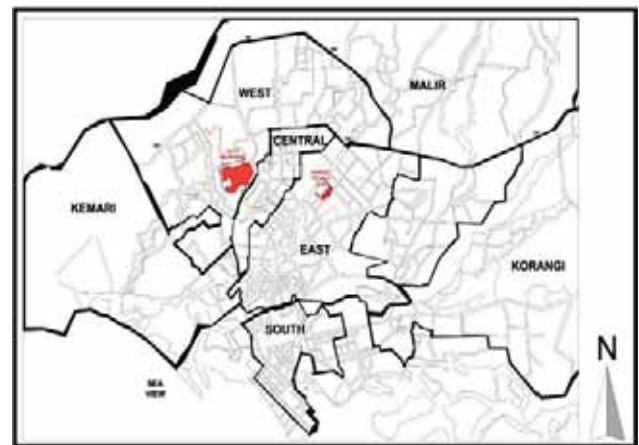● A recent developing gated community

Figure-2: Location of Naya Nazimabad in District West - Karachi.

Survey Results

Residents' Profile

This part presents the socio-demographic characteristics of the residents residing in Naya Nazimabad. These are related to the gender, age, occupation, and income (Table 1).

Gender

The findings indicate that out of the respondents who contributed to the survey, 43% were female and 57% were male. This specified that one-fourth of the sample were females, whereas, three-fourths of the residents' family leaders, whether renters or owners were males. As the male population dominated, therefore, they were the main decision holders and contributors towards the attainment of residential satisfaction.

Age of the Respondents

According to the results in Table 1, the larger sample of the population belonged to the age brackets range namely 31-40 years at 33% and 41-50 years at 23%, while 17% were aged up to 30 years and 10% and 3% respectively were aged between 61-70 years and above 70 years. This entails that most of the people (33% + 23% = 56%) living in Naya Nazimabad are in the middle age group, who are young families and have decided to reside in a gated community and raise their children there.

Occupation

This portion discusses the occupation of the residents in Naya Nazimabad. The occupation factor was split into two main groupings. These were formal employment (Government and private) and self-employment. According to the results, most of the household heads (males) were formally employed (23+60=83) and they had to leave the gated community for work. Therefore, the accessibility of Naya Nazimabad and the safety of their families were their main priorities for residing there.

Income Level

The findings suggest that 11% of the respondents indicated that they had monthly earnings of below 80,000 PKR. 27% of the people had a monthly income between 80,000-250,000 PKR and 62% of the respondents had a monthly income of over 250,000 PKR. This indicates that most of the residents are middle-income earners ranging from low to high, as the

Table-1: Frequency Distribution of Demographic Attributes of Residents.

Rresidents' Profile	Frequency	Percentage
Gender		
Male	170	57
Female	130	43
Total	**300**	**100**
Age (in Years)		
20-30	50	17
31-40	100	33
41-50	70	23
51-60	40	14
61-70	30	10
Above 70	10	3
Total	**300**	**100**
Occupation		
Government Employee	70	23
Private Job	180	60
Self-Employed/Bussines	50	17
Total	**300**	**100**
Income (PKR)		
Below 80,000	35	11
80,000-250,000	80	27
Above 250,000	185	62
Total	**300**	**100**

administrators of Naya Nazimabad indicate it to be a thriving middle-income neighbourhood.

Residential Satisfaction Determinants

Neighbourhood Environment

The factors that were determined for residential satisfaction in the neighbourhood environment are location, security features, housing pattern, functions of walls and gates, and amenities (Table 2).

Location

Justification: Though Naya Nazimabad is a self-contained community, its citizens must have access to important business, educational, and medical facilities in Karachi. This determinant aids in assessing how effectively the community is integrated into the larger urban fabric and if locals feel alone or at home in the city's infrastructure.

The study sought to establish location as a determinant of neighbourhood characteristics based on the parameters of

Factors	Variables	Likert Scae Rating	Frequency	Percentage
Location	Proximity to workplace	Less	80	28
	Proximity to school	Less	120	40
	Proximity to shopping and leisure	More	195	35
Security features	Physical measures	More	50	50
	Nonphysical measures	More	150	50
Housing Quality	Housing pattern	More	140	47
	Orientation	More	100	33
	Construction materials	Adequate	115	20
Functions of walls and gates	Degree of enclosuere	More	100	33
	Symbolism and lifestyle	Neutral	75	25
	Spatial segregation from the outside	More	90	30
	Social homogeneity inside	Less	35	12
Amenities	Mosque	More	100	33
	Park/Playground	More	50	17
	Grocery	Less	30	10
	Bank/ATM	Adequate	10	3
	Pharmacy	Less	10	3
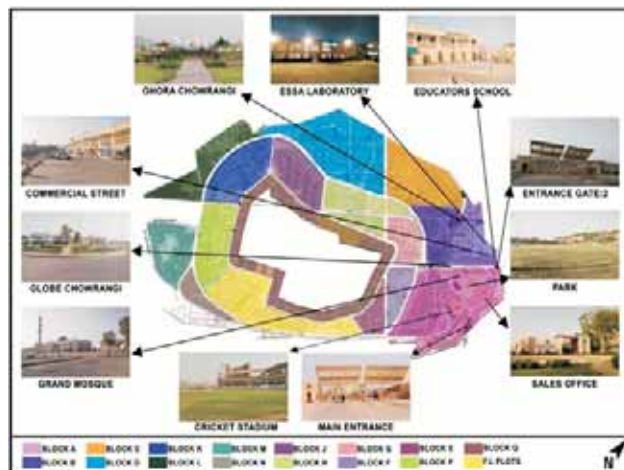
Figure-3: The Master Plan of Naya Nazimabad.

Figure-4: Accessibility and Connectivity of Naya Nazimabad.

propinquity to theÊworkplace, closeness to school, and proximity to shopping and leisure (Figure 4). According to 28% of responses, Naya Nazimabad's location on the outskirts of Karachi can be inconvenient for residents who need to frequently travel to central business districts like Saddar, Korangi, or Karachi's industrial zones. The limited access to major roads connecting the area to central Karachi can result in time-consuming travel. However, the area is well-served by local and private transport vans, buses, and hiaces, providing accessibility for residents. This proximity allows

for integration between disadvantaged people and gated community inhabitants, primarily through employment opportunities and service offerings. 40% of responses highlighted that Naya Nazimabad is home to various amenities, such as Madina Masjid (Nusrat Bhutto Colony), Dove Foundation Public School (Shahra-e-Noor-Jahan Road), Holy Family Catholic Church (New Mianwali Colony), and several parks and schools. However, many residents must travel to other parts of the city for higher education and more specialized services, as the development

of these services in the area is still in progress. The survey also revealed that 35% of residents feel the commercial zone in Naya Nazimabad is underdeveloped. The lack of surrounding commercial zones, schools, and healthcare facilities forces residents to travel long distances for basic needs, which increases fuel costs and time spent navigating Karachi's notorious traffic, especially during peak hours.

Security Features

Justification: In a city like Karachi, where crime rates are on the rise, this determinant is essential for assessing how effectively Naya Nazimabad satisfies the aspirations of its residents for safety and peace of mind given their worries about crime and need for personal protection.

The study establishes the physical and nonphysical parameters of security as determinants of neighbourhood characteristics. All the respondents (50%+50%) agreed that two types of security features define the extent of enclosure of Naya Nazimabad that comprises a combination of physical and technological security measures, including entryways, boundary walls, lift-arm barriers, electric fencing, and security officers at the main entrance. Additionally, a central security system with CCTV cameras and WIFI radios is used by security personnel. While these measures can deter some types of intrusion, they do not eliminate the risk of more sophisticated criminal activities, such as break-ins or burglaries, as a few cases have been reported by residents.

Survey responses indicate that ID cards for residents and visitors are regularly checked, and patrols are conducted twice a day. However, some guards may lack proper training to effectively identify security threats, potentially leading to lapses in controlling unauthorized access. Block A and Block B benefit from comprehensive security services, including static guards, mobile escorts, and nearby security teams. In contrast, Block C lacks specific guards or cameras, leaving it more vulnerable. Block D features higher, more solid walls with electric fences. The scenario presents an uneven distribution of security resources across the blocks creating vulnerabilities. The over-reliance on physical barriers and the lack of adequate surveillance in some areas compromise the overall safety of the community (Figure 5).

Housing Quality

Justification: Naya Nazimabad offers a range of housing options aimed at middle and upper-middle-class families, and satisfaction with the pattern, construction materials, and layout of these houses is crucial. Proper ventilation, natural light, and space optimization are important features that impact residents' comfort and long-term satisfaction.

The study builds upon housing quality as a determinant of neighbourhood characteristics based on the parameters of housing pattern and orientation, in addition to the construction materials. In Naya Nazimabad, the linear housing pattern design fosters social connectivity, with 47% of residents noting that the spatial layout enhances the overall community feel and accommodates diverse housing types (Figure 6). Additionally, 33% of respondents appreciate the ample natural light and fresh air in the units, as well as the pleasant views provided by the centrally located park and mosque. The construction quality is generally good, with only minimal issues like cracks, leaks, or insulation problems, as reported by 20% of residents. However, a downside is that the pre-built homes offer little flexibility for personalization, which may not appeal to those wanting customized spaces. Furthermore, some units suffer from inefficient layouts,

Figure-5: High Boundary Walls with Eleectric Fencing.

Figure-6: Linear Housing Pattern.

leading to inadequate ventilation and uncomfortable living conditions for certain residents. While the overall housing design has its merits, there are still areas where improvements could be made, particularly in ventilation and customization options.

Functions of Walls and Gates

Justification: In Naya Nazimabad, walls and gates play an important role in defining the neighborhood's safety, privacy, visual appeal, and community relations. These physical barriers are more than just structural aspects; they influence people's everyday experiences, interactions, and overall contentment with their living conditions.

The study determines theÊfunctions of walls and gates as a determinant of neighbourhood characteristics corresponding to the parameters of theÊdegree of enclosure, symbolism, lifestyle, spatial segregation from the outside, and social homogeneity inside. In Naya Nazimabad, 33% of residents note that the development is designed with five gates (Figure 7), though only two are operational. While the modest design of the main entryway, as described by 30% of respondents, fosters a sense of enclosure and encourages social homogeneity within the community, it also creates a sense of spatial segregation from the outside, potentially isolating residents. Additionally, 25% of residents view the gates and walls as "ornamental gating," symbolizing exclusivity and a lifestyle previously inaccessible to them.

This sense of exclusivity is further enhanced by amenities like entertainment facilities, private spaces, and consistent

services such as waste removal, water, and electricity, as reported by 30% of respondents. However, a downside is that the underutilization of gates and walls may lead to a lack of connectivity with surrounding neighborhoods, reinforcing the physical and social separation. Furthermore, the reliance on the gated structure for security and convenience may lead to complacency, creating a false sense of complete safety and security.

Amenities

Justification: The daily lives of people living in Naya Nazimabad are directly impacted by the availability of clean roads, electricity, water, garbage disposal, and recreational amenities. It improves living quality and guarantees convenience. Many residents believe that these elements enhance the community's attraction and increase its capacity for self-sufficiency.

The study brings forth the basic amenities as a determinant of neighbourhood characteristics and the survey results reported that Naya Nazimabad has catered to most of the basic and high-end facilities of the residents (Figure 8). In Naya Nazimabad, 33% of residents note that Block A is conveniently located near key amenities such as a mosque, cricket stadium, parks, mart, meat shops, and salons, with these facilities within walking distance. This accessibility is enhanced by a 100-foot-wide road between Block A and the commercial zone, although only 10% of the commercial area is developed, leaving the rest under construction. Block A's faster development has led to a well-established, self-sustained environment. However, Block B lacks any amenities, requiring residents to travel outside the area for basic services, while the Mohalla Masjid in Block C offers a spiritual landmark. Additionally, 50% of the youth are

enthusiastic about the newly built football stadium, promoting

Figure-7: Gates of Naya Nazimabad.
Gate 1: Main Entrance
Gate 2: Lal Gate
Gate 3: Connecting Karachi Ijtama Gah
Gate 4: Connecting Mir Muhammad Goth
Gate 5: Connecting MPR Colony

Figure-8: Amenities in Naya Nazimabad.

fitness. The residents share the costs for community maintenance, and the neighbourhood is perceived as safe, with facilities and services fostering a secure, convenient lifestyle. However, the underdevelopment of commercial areas, limited amenities in certain blocks, and reliance on shared maintenance costs can be seen as drawbacks. The lack of amenities in Block B and the slow development of commercial infrastructure may hinder the overall convenience for residents.

Housing Environment

The factors that were determined for residential housing satisfaction in the housing environment are economic status, dwelling unit size, spatial conditions, and sense of community (Table 3).

Economic Status

Justification: While Naya Nazimabad is marketed to middle and upper-middle-class people, affordability remains an important factor in residential satisfaction. Residents look over the financial accessibility of housing, maintenance fees, and other living expenses to match their financial capacities according to the community amenities provided and quality of life.

The study interprets the economic status of the residents based on the parameters of purchasing price, resale value, and maintenance costs of the residential properties. According to the 33% of responses, Naya Nazimabad has

become a popular choice for middle and lower-middle-class residents who purchased land a decade ago, as the area's development has increased their living standards, elevating them to the upper-middle class. Initially affordable, the market value of plots and bungalows has risen by 33% since 2011, with resale values now ranging from Rs. 1,000,000 to Rs. 3,000,000 depending on plot size. The neighborhood's affordability, especially for genuine buyers and investors, has made it an attractive option. Maintenance fees, ranging from 2,500 PKR to 4,000 PKR per month, cover essential services like electricity, water, gas, sewage, and maintenance personnel, relieving residents from environmental upkeep concerns and providing convenient access to facilities. However, the rise in property values has also made the area less affordable for new buyers, potentially leading to socio-economic segregation. The increasing prices could limit access for lower-income groups, and the burden of maintenance fees may be challenging for some residents. Additionally, the growing property values may attract speculation, impacting long-term affordability and stability in the market. Despite the development, there is a risk that overcrowding and strain on resources could become a concern as the area continues to grow.

Housing Design

Justification: In a rapidly developing gated community like Naya Nazimabad, where the population is growing and the demand for quality housing is high, housing design directly impacts how well residents' needs are met in terms of comfort, aesthetic appeal, functionality, and overall living

Table-3: Frequency Distribution of Factors Affecting the Housing Environment.

Factors	Variables	Likert Scae Rating	Frequency	Percentage
Economic Status	Purchasing Price	Adequate	100	33
	Resale Value	More	120	34
	Maintenance Cost	More	80	27
Housing Design	120 sq yards	More	50	17
	160 sq yards	Very Less	50	17
	240 sq yards	Adequate	100	33
	400 sq yards	Less	100	33
Spatial Conditions	Provision of Landscape	More	130	40
	Outdoor Seating	More	85	30
	Recreational Facilities	More	85	30
Sense of Community	Emotional Safety	Adequate	140	45
	Sense of Belonging	Less	85	30
	Membership and Influence	Adequate	75	25

experience.

The study launched the housing design of residential properties and according to the survey results, it was found that Naya Nazimabad offers a well-developed community with four residential blocks, A, B, C, and D. Blocks A, B, and C are 80% developed and inhabited, while Block D is still under development. The residential units, which cater primarily to middle-income groups, range in size from 120 sq. yards to 400 sq. yards, connected by 40-foot-wide roads and well-integrated infrastructure. The community features single and double-stored bungalows with moderate facilities and a uniform architectural style that ensures cohesion across the area. These features contribute to an ideal community living environment, with access to essential services and amenities. However, the limited variety of dwelling unit sizes may not meet the needs of larger families or higher-income groups, and the standard architectural design might lack individuality, restricting customization options. The ongoing development of Block D also creates inconvenience for residents in the more developed blocks. Furthermore, as the area grows, overcrowding may become a concern, particularly in higher-density housing, potentially straining resources and impacting the overall quality of living.

Spatial Conditions

Justification: In Naya Nazimabad, the emphasis on green spaces and environmentally friendly design helps improve the aesthetic appeal of the community and contributes to residents' mental and physical health and overall satisfaction with the community environment.

The study dwells upon the spatial conditions of Naya Nazimabad, relative to the parameters of landscape, outdoor seating, and recreational facilities. Although Naya Nazimabad claims to have a balanced ratio of 50% open and green spaces and 50% covered space, 40% of residents feel that this strategy has primarily served as a marketing tool to attract potential buyers. The neighbourhood offers pedestrian walkways, jogging tracks, and playgrounds, with street furniture, lighting, and soft landscape components like open green areas and diverse plants that contribute to a healthy and aesthetically pleasing environment.

30% of residents appreciate the green pockets and parks within the blocks, which feature benches for seating. However, while the walkways and footpaths have palm trees, they lack shade trees, making walks uncomfortable during the day. Additionally, trash bins are placed every two houses,

and streetlights are installed along pedestrian pathways to maintain cleanliness and order. Concerning recreation, 30% of residents report having access to playgrounds, stadiums, and gyms, contributing to personal and social well-being. Despite these benefits, there are drawbacks such as the lack of sufficient shade, which impacts outdoor comfort, and the perception that the green space ratio is more of a selling point than a fully realized environmental benefit. Moreover, the rapid increase in the area's value may lead to affordability concerns, potentially pricing out future residents.

Sense of community

Justification: In Naya Nazimabad, this determinant is reflected in the physical design and social infrastructure facilitating positive interactions among neighbours in community spaces such as parks, recreational areas, and community centers.

The study aimed to recognize whether Naya Nazimabad contributes to a sense of community, focusing on the parameters of emotional safety, sense of belonging, and membership and influence. The results showed that 45% of the residents enjoyed living within the boundaries of Naya Nazimabad, as they felt they could trust their fellow citizens. The presence of children playing together also fostered a sense of security, as they were always under adult supervision, which helped build trust, safety, and strong community bonds. Additionally, 55% of residents reported an improved sense of community and belonging, as living within the boundaries allowed them to form closer relationships with neighbors. Many also believed that working together could influence community decisions and help maintain a positive living environment. However, while the sense of community is strong, some residents may feel socially isolated from the wider city due to the closed nature of the gated community. The reliance on close-knit relationships could also limit interaction with diverse groups outside the boundaries, potentially fostering insularity. Furthermore, the sense of security might create a false sense of safety, leading to complacency about broader security challenges or neglect of important neighborhood issues outside the community's direct influence.

DISCUSSION OF THE RESULTS

While Naya Nazimabad has made tremendous progress in providing a modern and secure living environment, there are still areas for development that can boost residents' satisfaction and contribute to the community's long-term success. These

areas for development are based on resident feedback, urban planning best practices, and common issues encountered by similar gated communities in Karachi and many Global South cities. The following are significant areas where improvements could be made to ensure long-term residential satisfaction and also promote Naya Nazimabad as a model for future gated communities in Karachi and beyond.

Despite being a self-contained community, Naya Nazimabad doesn't offer the best connectivity to other parts of Karachi. It may present difficulties for residents who use public transport regularly to access other parts of the city. To ensure improved transportation infrastructure, dedicated bus routes can be introduced to connect Naya Nazimabad to major destinations of Karachi, and also ride-sharing and shuttle services can be introduced, in addition to better quality of road networks for reducing travel time and cultivating traffic flow.

Naya Nazimabad predominantly marks the middle-income and upper-middle-income families, however, considering a rise in future housing demand, affordability may pose an issue for a wider range of potential residents. Integration of lower income groups within Naya Nazimabad could help attract a more diverse population by providing economically accessible units without compromising on basic amenities and security by offering flexible financing options.

To maintain the quality of regular upkeep the environmental quality of the community, a resident feedback system can be introduced to report maintenance issues promptly for timely action. For capitalizing on sustainable practices and eco-friendly infrastructure, sustainable practices such as recycling, composting, and green energy solutions can benefit both aesthetics and environmental responsibility. Also, integrate eco-friendlier building materials and energy-efficient systems into housing units and community buildings (e.g., solar panels, rainwater harvesting systems).

Gated communities, such as Naya Nazimabad, have the potential to create close-knit communities, but if they are not planned with social interaction in mind, they can occasionally create a sense of isolation. For this reason, community events can be held where residents can interact with their neighbours. Also, form a residents' committee to allow residents to voice concerns and suggestions along with generating some welcome programs for new residents by including them in social activities. There is a need to strengthen resident engagement in decision-making process by involving them in the governance of Naya Nazimabad through feedback surveys or community meetings. Such meetings can help to promote transparency in managing maintenance schedules,

changes in fees, and community developments. This will help to resolve the grievances of residents, and they will not feel ignored and dissatisfied.

As the population grows and ages, Naya Nazimabad will need to expand its healthcare facilities by providing more walking and cycling tracks for exercise, and recreational use and promoting active lifestyles. There will also be a need to establish more healthcare clinics, with specialized services.

CONCLUSIONS AND RECOMMENDATIONS

The original Nazimabad, like many parts of Karachi, faced swift urbanization and overpopulation, especially as the city's population swelled due to migration from rural areas and other provinces, putting pressure on housing, infrastructure, and public services, thus, weakening living standards. The development of Naya Nazimabad sought to address these problems by offering a planned, secure, and attractive alternative for middle and upper-middle-class families, providing a better quality of life in a growing and increasingly urbanized city. By addressing the shortcomings of the old Nazimabad, Naya Nazimabad aimed to provide a model of better urban planning and infrastructure for future developments, in addition to providing a safe and secure environment. The gated community appealed to buyers looking for a better return on investment in a community with improved prospects and more reliable and well-integrated civic services.

Conclusions

Nevertheless, the central thesis of the Post-Occupation Evaluation (POE) of Naya Nazimabad is that, while the development represents a modern approach to urban living through its design, infrastructure, and amenities, this evaluation also examines how Naya Nazimabad aligns with or deviates from the prevailing urban trends and the implications it holds for future residential developments in Karachi. Firstly, Naya Nazimabad, like other gated communities in Karachi, tends to reinforce social stratification, creating divisions between residents within gated developments and those outside them. This trend highlights the broader shift toward urban enclaves that often exclude lower-income groups, further exacerbating inequality in the city. Next, Naya Nazimabad's integration of sustainable design features—such as energy-efficient systems, green spaces, and waste management—mirrors growing global concerns about environmental sustainability. However, questions remain about the true effectiveness of these

initiatives and whether such developments can be sustained in the long term, especially in a rapidly urbanizing city like Karachi. Thirdly, the POE reflects a shift in housing preferences, as residents increasingly seek more controlled, secure, and self-contained living environments. This trend points to broader urban shifts in Karachi, where more affluent populations are increasingly drawn to private, gated spaces that promise safety, and exclusive, and modern amenities. In this way, Naya Nazimabad raises concerns about the concentration of resources in these areas and the potential neglect of neighboring, less affluent areas. The POE underscores the challenge of ensuring the equitable distribution of urban resources and maintaining efficient connectivity to avoid creating isolated or fragmented urban zones.

Recommendations

The rise of gated communities in Karachi has sparked important discussions about urban equity, sustainability, and the long-term consequences for both the residents within these communities and the broader city context. In essence, the POE of Naya Nazimabad suggests that the development model needs to evolve to address these issues, and a future research agenda should aim to explore these aspects in-depth to provide insights into more equitable and sustainable urban planning. The following research areas are suggested to guide future investigations:

● Investigate the socio-economic disparities between residents of gated communities and those in non-gated areas of Karachi, particularly regarding access to basic services (healthcare, education, transportation, etc.), public space, and job opportunities.

● Examine the environmental, economic, and social sustainability of gated communities in Karachi over time to promote sustainable urban living.

● Investigate the allocation and quality of infrastructure and public services in gated communities compared to the wider urban sprawl of Karachi to analyze whether resources are disproportionately allocated to gated communities and the consequences of this for urban planning.

● Investigate the role of governance structures within gated communities and their impact on the broader urban governance framework of Karachi. The research focuses on how these communities interact with local and municipal authorities, and how policy shapes their development and functioning.

● Study the impact of gated communities on urban mobility and connectivity, with a particular focus on how they affect the flow of people, goods, and services between gated and non-gated neighbourhoods.

By focusing on these key areas, researchers can provide valuable insights that help shape future urban policies and guide the development of more inclusive, sustainable, and socially cohesive communities in Karachi.

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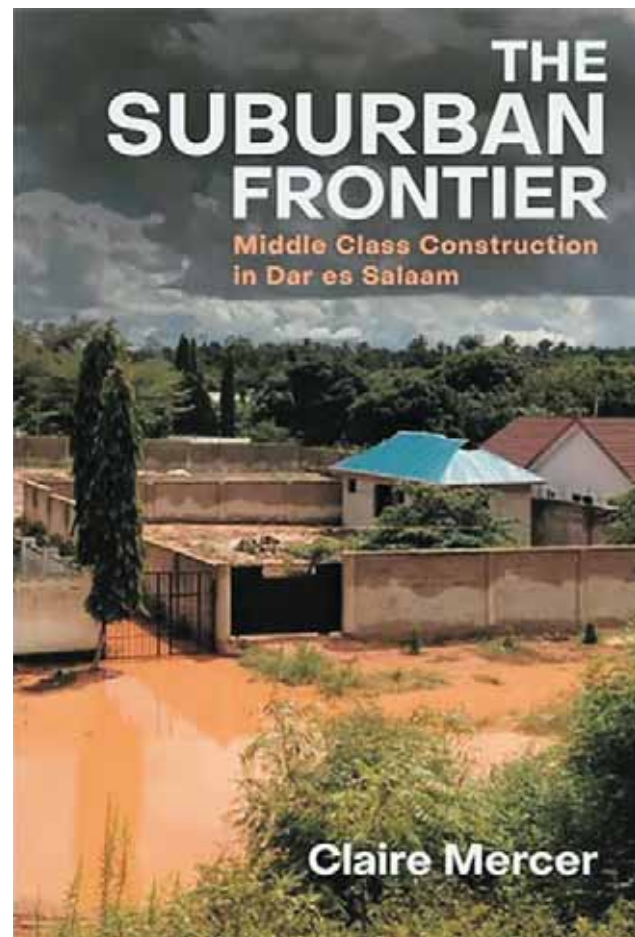# The Suburban Frontier: Middle-Class Construction in Dar es Salaam
Claire Mercer, A Publication of California Press July 30, 2024

Reviewed by Duane Ebesu*****

BOOK REVIEW

Claire Mercer's *The Suburban Frontier: Middle-Class Construction in Dar es Salaam* is a significant contribution to the study of urban transformation, social mobility, and middle-class identity within the context of African urbanization. As a sensitive combination of historical analysis, ethnographic fieldwork, and theoretical reflection, Mercer challenges understandings of how urban spaces come into being and how class identities are forged on the peripheries of rapidly growing cities. Based in Dar es Salaam's suburban zones, focused largely on Salasala, Mercer forms a compelling account of aspirations, uncertainty, and precariousness within an emergent middle class in Tanzania. It is here that her central argument that middle-class status is both a process of becoming and an achieved state becomes truly original. It critically engages with Mercer's perceptions on property-making, architectural aesthetics, gender dynamics, and the colonial legacy that still characterizes and shapes urban landscapes within Tanzania.

What underpins Mercer's argument is the suggestion that suburbanization in Dar es Salaam is a social, *not just physical* process. The book argues that Tanzania's middle classes are actively fashioning their identities through property ownership, home-building projects, and lifestyle choices all of which become realized in its suburban frontier. It is not only a site for settlement, but also the social terrain on which respectability, status, and modernity become contested, as well as affirmed. By ethnographically engaging with suburban residents usually those with no formal land titles. Mercer unravels how land acquisition and house-building activities are integrally constrained to class formation. In this manner, the suburban frontier becomes a site of opportunity where residents pursue upward mobility, but also a place of vulnerability marked by legal uncertainties, land disputes, and infrastructural deficiencies.

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Mercer's concept of urbanization deviates from more traditional models that rely on large property developments led by multinational corporations or state-led urban planning; here, she posits that urban growth in Dar es Salaam is generally anchored in self-built, cash-based developments initiated by individuals and their families. Mercer argues that these projects support the aspirations of the Tanzanian middle class for social status, accumulation of wealth, and stability (for the next generation). But these ambitions are tempered by the uncertainty of informal property markets, where land ownership is often not legally recognized and disputes over boundaries are common. The focus that Mercer places on such small-scale, individual projects problematizes dominant narratives about African urbanization, long dependent upon personal agency and local networks for shaping urban landscapes.

Undoubtedly, one of the more interesting dimensions of the book are the aesthetic descriptions of suburban architecture. Mercer reveals how the architectural styles in suburbs such as Salasala are anything but merely functional; they symbolize social identity. The residents of these neighbourhoods invest great time, energy, and money in designing homes that reflect their aspirations and signal an allegiance to global middle-class ideals. Pastel-coloured walls, decorative gates, and landscaped gardens are features that represent a desire for differentiation from lower classes, affirming ideals of respectability and modernity. Mercer exposes how class is more than an economic category, operating as a cultural practice in the aesthetics of everyday life. The book places the Tanzanian middle class within a larger global trend towards suburbanization, where domestic spaces are an arena to declare status and identity.

Expanding her analysis, Mercer discusses the gender dynamics within suburbia. Providing thorough portraits of people such as Gilda businesswoman and manager of several pharmacies and beauty salons Mercer describes how middle-class women negotiate the interaction of entrepreneurship, family life, and social expectations. Gilda's work ethos strikes a balance between business ventures and domestic chores, illustrating the changing role of women in Tanzanian society by combining economic activities with caregiving. However, Mercer resists simplistic stories of empowerment by recognizing the additional pressures facing women in dual roles, between professional and domestic services. This nuanced portrayal of gender challenges the assumption that uniform benefits accrue to women as a result of economic liberalization, as it is equally true that complex contestations

and contradictions shape their experiences of suburban life.

One of the running themes of the book is how aspiration is coupled with insecurity. Ironically, while most suburban residents have attained a degree of financial stability where they can afford a new home construction, they lead precarious lives because of risks related to land disputes, government interventions, and market fluctuations. Examples given by Mercer illustrate how residents employ a variety of measures to secure properties, from the construction of fences to negotiating with neighbours and seeking recognition from local authorities. These are widely understood precautions, since ownership in informal settlements remain bereft of legal footing. Mercer's analysis of these dynamics underlines the fragility of middle-class status in Tanzania and demonstrates that upward social mobility is an uneasy journey through obstacles and uncertainties.

The book also furthers the larger political significance of suburbanization; it is, according to Mercer, a process which furthers existing sociospatial inequalities in Dar es Salaam: by moving further toward the periphery to find land prices that are within their budget, middle-class residents outcompete rural populations and exclude lower-income groups from desirable residential areas. This is a process of suburbanization that Mercer argues reflects patterns of exclusion and inequality typical of rapid urbanization in many other cities of the Global South; not surprisingly, her analysis calls for more inclusive policies in urban settings, addressing the needs of marginalized communities and supporting sustainable development. In this regard, Mercer's view on the social costs of urban expansion (and particularly the challenges of attaining equitable growth in African cities) are particularly relevant.

This is furthered by more serious targets, where the book engages with the colonial legacy that continues to shape urban development in Tanzania. As Mercer suggests, suburbanization originates from a time when colonial bureaucracies first arrived in Dar es Salaam and created residential zones that were strictly segregated by race. These colonial planning practices left an enduring stamp on the spatial organization of the city, from neighbourhood layouts to social composition. Mercer describes how these historical divisions influence identities and views of contemporary suburban residents as they distance themselves from informal settlers by adhering more closely with the aesthetic ideal of planned, orderly neighbourhoods. This exclusive focus on middle-class residents raises significant questions concerning

the peripheral positions of *lower-income* groups and displaced communities in processes of suburbanization which may present a missed opportunity in finding how different social strata are impacted by contemporary urban transformations. Others may go further, arguing that Mercer's suburban frontier risks eliding heterogeneity and internal conflict within suburban communities. These limitations suggest a more macro, panoramic view of urban inequality; this being said, Mercer's work forcefully embeds a historical perspective that is key in understanding how colonialist attitudes toward space, order, and identity are maintained to shape urban imaginaries in Tanzania.

In fact, another critical dimension of the book is the reflection it offers on the role of the state with regard to shaping urban development. For Mercer, the Tanzanian state stands in a somewhat ambivalent relationship with suburbanizationit enables and constrains growth at the same time. On one hand, liberalization of the land market has allowed more people to acquire property and build homes. On the other hand, the inability of the state to provide proper infrastructure and services within metropolises has forced suburban dwellers to refer to informal networks and community associations. She makes a strong argument for the role of local governance and community initiatives in addressing the difficulties of urban development when state capacity is insufficient.

Mercer supports her findings with theoretical frameworks; drawing on the works of Pierre Bourdieu, Max Weber, and E. P. Thompson, among others, she pursues her argument that class is not a category but a process, continuously produced by social practices, cultural norms, and material investments. This deconstruction of the suburban frontier confirms how class is constituted through everyday practices of land acquisition, house construction-retrofitting, and community involvement. It is this perspective that allows Mercer to capture class boundaries in motion, as people move across socioeconomic positions over time in Tanzania.

In a word, *The Suburban Frontier* is a detailed account of middle-class formation and urban transformation in Tanzania. Mercer's book is particularly critical for urban studies due to her ethnographic approach, complemented by her engagement with historical and theoretical perspectives. Her concern with the everyday actions of suburban residents resituates the process of urbanization and complicates typical narratives of large-scale development and formal development institutions. In promoting agency at the level of individuals and families shaping their futures, Mercer's work spotlights the need to understand urban change from below.

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JOURNAL OF RESEARCH IN ARCHITECTURE AND PLANNING

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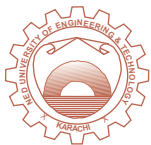
FORMAT

Article Size	5000 words to 7000 words (please consult the journal office in case you wish to send a longer article)
Page Size A-4	**Page Layout** Portrait
Font Style	Times New Roman
Font Size	11
Visuals	All visuals (photographs, direction maps, diagrams, Google maps etc.) shall be in Jpg/Tiff format with minimum 300 dpi resolution at actual print size, These shall be properly captioned and clearly referred in the text. Please do not insert them in the text.
Drawings	AutoCAD drawings shall be converted in tiff format with a readable size and legend.
Submission	Online submission may be done through the journal submission portal at www.onlinejrap.neduet.edu.pk.
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Urban Design Case Based: Theory and Practice(I)	Vol. 5, 2006
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- Building integrated renewable energy technologies
- Conservation led urban regeneration
- Eco-housing, Interactive architecture
- Land use planning
- Low carbon impact buildings
- Secondary cities
- Sustainable architecture
- Urban ecology/ Urban renewal / Urban sprawl
- Urban sustainablity / Urban transportation
- Urbanization

BOOK REVIEW: Contributions for our 'Book Review' section are welcome in the form of a brief summary and a sample of the publication related to the field of archiecture, planning and development.

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