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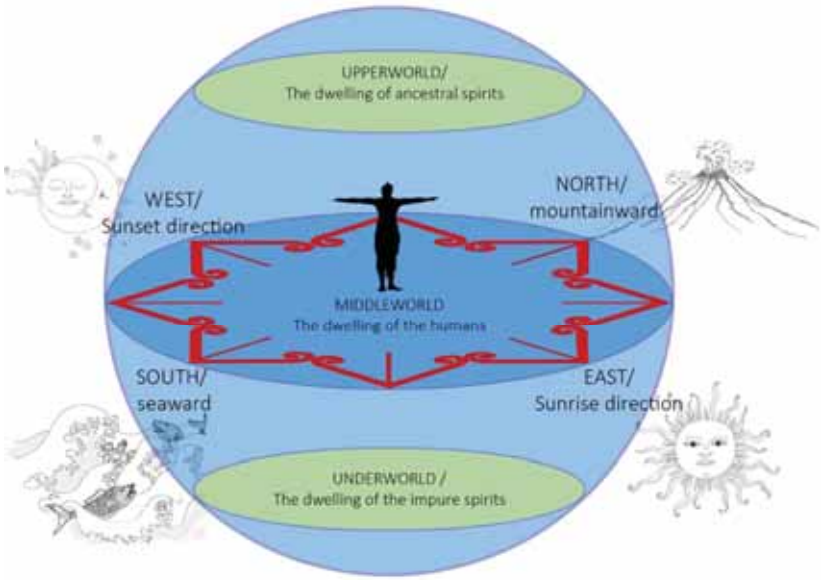

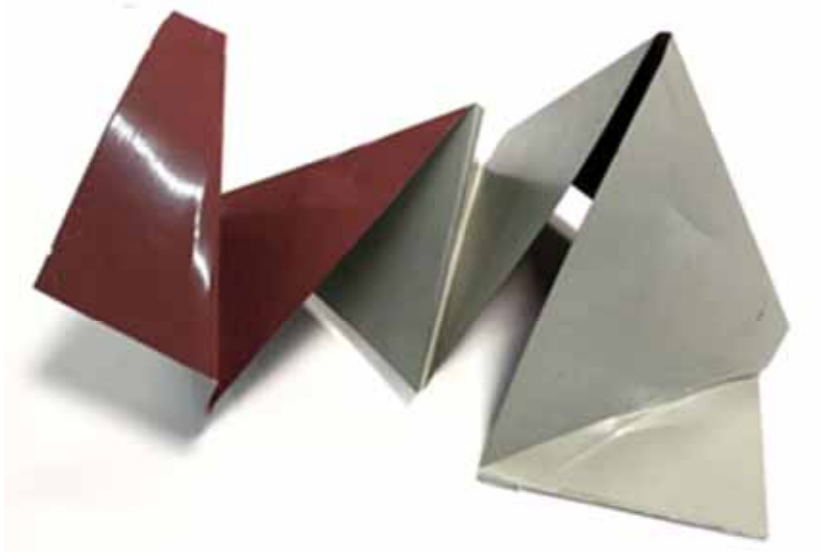

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Introduction

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 Conference of Urban and Regional Planning, 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. A post conference review is also undertaken for the selection of conference papers, before their publication. JRAP holds the privilege of being the first, and perhaps the only 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, a new 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 each issue 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 free access and available online on the Journal's official webpage: http://jrap.neduet.edu.pk/online_journal.html.

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

EDITORS' NOTE

The five research papers included in this volume cover themes related to solid waste management, housing, place identity and studio teaching within architectural schools. The first paper included here is based on author's personal experience of supporting innovation programmes in basic services across African countries between 2016 to date. The paper highlights the difference between innovation and traditional programming and the emerging expectations from the governments and donors. This is a review paper and was presented at the Third Conference of Urban and Regional Planning, having the theme, 'Innovation in Planning', organised by the Department of Architecture and Planning, NED University of Engineering and Technology, in March 2019.

The second paper included in this volume was also presented at the same conference, and reviews the transformation of place-identity of an area rooted in tradition in Bali, using urban morphology and qualitative interviews as means of gathering data, leading to the development of a negotiation between being rooted in tradition as well as being part of the global tourism industry.

The third paper documents and draws parallels between the land use of Machar Colony an informal settlement in Karachi, from the perspective of ownership of housing and the social values associated with it.

The fourth and fifth papers are based on architectural design studios conducted in University of Engineering and Technology Lahore, Department of Architecture and at the Department of Architecture at COMSATS University, Islamabad respectively. The objective of both these studios was to develop a teaching methodology which was out of the box and encouraged students to incorporate digital tools in the design process, and to take inspiration from nature for development of conceptual ideas.

This volume also includes a book review of 'The Timeless Way of Building', authored by Christopher Alexander. In this book the author searches for architecture which is inspired by an understanding of proportions in nature and incorporates building materials and context as an extension of nature. The emphasis is on how nature is stabilized and is made beautiful and poetic though incorporation of various natural processes.

Editorial Board

REVIEW PAPER

SUPPORTING INNOVATION PROGRAMMES IN AFRICA: LEARNING FROM EXPERIENCE

*Mansoor Ali**

ABSTRACT

This paper is based on the author's experience of supporting innovation programmes in basic services across African countries between 2016 to date. The paper's background explains the need for innovation programming and emerging expectations from the governments and donors. The paper explains how this type of programming is different from traditional practices. In delivery, innovation programmes require an approach to take risks, do things differently, try out new approaches, learn continuously and regularly accept failures to improve the next action. The innovation in planning and practice expects to work with a range of stakeholders, often called 'eco-system' actors (Erik and Michiel, 2008). It expects to build on collective effort and collaboration to deliver the results. This includes governments support for innovation and for creation of space for this. The private sector is expected to invest in risk taking and users should reflect back on their experience of working with innovation. Innovation is also dependent on many small sized and invisible actors who could make things happen. Designing innovation programmes is different from traditional programming, as these programmes are expected to learn, adapt and change. Innovation programmes embrace complexity and non-linearity (Ramalingam and Jones, 2008) in their project cycles and have regular feedback loops within the project cycle. These programmes are assessed on the basis of new thinking, ideas and enhanced confidence of the innovator as compared to the situation at the start of the programme. Exit strategies and closure of innovation programming are also different, as compared to traditional programming. Innovation programmes are expected to show sustainability and adaptation by stakeholders, especially by the market and business. Increased knowledge, learning and interest of the business are some of the key indicators to be tested at the programme closing stage. Author's own experience suggests that, the key to success of innovation programming is about learning and the ability to integrate innovation principles into the project selection, management and closures. Innovation programming is in early days and one of the main risks is that if innovation programming is managed as traditional programming it looses important principles. Based on author's overall experience, the paper makes recommendations on the preparation, selection and management of innovation programmes in low income industrializing countries.

Keyword: Innovative Programmes, Africa, Stakeholder, Community Traditional Programming.

INTRODUCTION

This paper is based on author's experience of advising on innovation programming in basic services, such as water, sanitation, hygiene improvement, health and solid waste management. Majority of these programmes, under discussion, were supported by the organisations based in the United Kingdom, including government, private sector and non-government organisations. The programmes were targeted for low income countries in the African region, where access to basic services is very low. The author was involved in planning, selection, supporting the management, technical support, reviews and evaluation of the projects. The premise of this paper is that innovation is a new way of doing things, and lessons can be learned for other developing countries.

Drivers of Innovation Programming;

There are many drivers for a need to do things differently i.e. programming innovatively. The main driver is the expectation that innovation programmes (IPs) have a greater chance to reach the poorest as compared to traditional programmes. There is an expectation that new approaches could be the game changer for hard to reach groups. The other driver is the critique and repeated failures of traditional

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programming, especially as evident from some recent evaluations (ICAI, 2016). There is increasing concern that traditional programming only benefits the better off groups and the project outcomes do not sustain beyond the project lives i.e. sustainability is a common concern in many recent evaluations. For example, schools shut down after some time due to absence of teachers, hospitals lack staff and supplies and infrastructure does not fully operate due to shortage of skills and lack of necessary maintenance. There is a growing concern that traditional projects do not change the systems, norms and behaviors, as the prime motivation is often the implementation. Hence their contribution to building institutions, develop systems and offer learning can be marginal. These are some of the important drivers to consider new ways of doing things, hence innovation programming should be encouraged globally.

Global efforts to support new ways of doing things are supported in a number of ways by United Nations (UN) due to emerging goals. One important pathway is the UN support of Principles of Digital Development (PDD). Recognising that digitalization is a reality, these principles are supported in policies and practice relevant to development programing. PDD is a set of nine principles which supports digitalisation and its contribution to development. A summary of these principles is given below;

1) **Design with the Users:** To develop context-appropriate solutions informed by user needs. To include all user groups in planning, development, implementation and assessment. Develop projects in an incremental and iterative manner.

2) **Understand the Ecosystem:** To participate in networks and communities of like-minded practitioners. Align to existing technological, legal and regulatory policies.

3) **Design for Scale:** Design for scale from the start and assess and mitigate dependencies that might limit ability to scale. Employ a "systems" approach to design, considering implications of design beyond an immediate project.

4) **Build for Sustainability:** Plan for sustainability from the start, including planning for long-term financial health, e.g., assessing total cost of ownership.

5) **Be Data Driven:** Design projects so that impact can be measured at discrete milestones with a focus on outcomes (i.e. expected change) rather than outputs

6) **Use Open Data:** Source and Innovation; Adopt and expand existing open standards. Open data and functionalities, and expose them in documented APIs (Application Programming Interfaces) where use by a larger community is possible.

7) **Reuse and Improve:** Use, modify and extend existing tools, platforms and frameworks when possible.

8) **Address Privacy and Security:** Assess and mitigate risks to the security of users and their data.

9) **Be Collaborative:** Engage diverse expertise across disciplines and industries at all stages. Work across sector silos to create coordinated and more holistic approaches.

Most of the UN organisations integrating the PDD in their programmes to maximise the benefits of digitalization. Globally, there are also other drivers for innovation programming, including low carbon economy, employment creation and urbanization.

Concerns over Traditional Programming

In this paper the term 'traditional programming' has been used for those projects, programmes or other similar arrangements when an external organization supports activities to achieve a development outcome. These external organizations can be United Nations offices, a bilateral or multi-lateral donor or a private industry. These programmes are delivered with the permission or invitation of the governments in host countries. Historically, such programmes have been considered as a necessary component of the development process in meeting the needs for health, education, improved agriculture, communication etc. However, there are recurring concerns over traditional programming. These include, inability of traditional programmes to reach the poorest. Even those programmes which are designed to reach the poorest, end up serving the better off population. The other concern about traditional programming is the lack of certainty to sustain beyond the project period. Success is often reported within the project duration and once the project is over, challenges start to appear. Governments and communities are not able to support the project, as expected in the plans. Resources are not generated, or poorly used and trained staff tend to move elsewhere. One of the common weaknesses within the traditional programming is the lack of internal learning, biased documentation, lack of flexibility to change paths and lack of sharing with the sector. These concerns are

Table 1: Expectation from Innovative Programming

Issues in Traditional Programming	Expectation from Innovation Programing
Inability to reach the poorest	Through connectivity poor people in remote regions can be reached.
Lack of internal learning and change	Through an approach of working with the entire eco-system, existing actors, market and private sector will be better placed to continue work.
Lack of internal learning and change	Real time reflections, change and learning is supported through behavior change.
Lack of external learning	Capturing learning and evidence can be better done and new and more exciting methods of knowledge sharing can take place.

repeatedly mentioned and come up in reviews and evaluations (ICAI, 2016). Traditional programming has also come under media pressure (Oxfam, 2018) in certain countries, leading to excessive checks and scrutiny. Table 1 shows the expectations from innovative programming which can help overcome the above concerns.

Opportunities Offered by Innovation Programming

Innovation builds on new opportunities, which were not present ten years ago in the form and scale available now. The innovation programming intends to build on those new opportunities available. These opportunities include:

Digitalization: Digital transfer of information and data make things easier and faster.

High Rates of Connectivity: Connectivity makes it easier to reach 'hard to reach' people, especially those where physical access is challenging.

Ease of Money Transfer: Payments and transfer of money is much faster, simpler and safer. Payments are made on-line and accountability and record keeping has enhanced as compared to manual handling of cash.

Real Time Feedback: Real time data and feedbacks help users with a choice. It informs the systems of the demand for the service at a particular time e.g. waste vehicles operating on fixed routes versus waste trucks follow the signals from the sensors.

Access to Recent Maps and Use of Maps: Many countries have a better access to maps and GIS locations. These maps come with applications (APPs) and are easy to access.

Introduction of Gaming and Fun: Rather un-intentionally, gamming is introduced into the system when information is available in a more fun and easier to access format.

These are some of the opportunities available to use for innovation. Innovation programming expect to use these opportunities to improve services, reduce cost and enhance reach. For example, teaching is made possible in remote villages of Africa (Internet Society, 2017) without schools and resident teachers due to better connectivity through internet and mobile phones. Similarly, payments are possible without physical bank branches or cash machines and certain type of health consultations are possible without physical presence of doctors and nurses.

While there are important opportunities available to enhance innovation, there is very little consensus available on how innovation should be nurtured and supported. There is very little understanding on the types of innovation and on how education and training should be provided for innovation. There is a school of thought suggesting that innovation and creativity must not be taught in the class room, as the class room space expected norms and structured approaches may counter the creativity and innovation. The discussions on innovation is often restricted to the discussion on new technologies. Nevertheless, some organisations have attempted to explain innovation and its typology. One of those is known as Doblin's Principles (Doblin, 2015).

These groups are mostly based on Doblin's group experience with the industry and commercial sector. But the application of the principles is not restricted to these groups. In summary Doblin (2015) classifies innovation into ten categories (adapted by the author for this paper):

Profit Models: The way in which one makes money, charges are assigned and fees are collected with a motive to increase revenue and profits.

Network: Connections and collaboration with others are established to create value.

Structure: Alignment of the talent and asset in an organizational context.

Process: Improved methods for doing work.

Product Performance: Distinguishing features and functionality of a product.

Product System: Complementary products and services.

Service: Regular support and enhancements that comes with your offerings.

Channels: Delivery of offerings to customers and user.

Brand: Representation of offerings and businesses.

Customer Engagement: Distinctive interactions that are fostered.

The above typology and their combination are what Doblin (2015) suggests for innovation.

With the above discussion in mind, the paper presents some examples of the innovation programming.

Examples of Innovation Programming

Below are some examples of the Innovation Programming, where the author has been involved.

Human Development Innovation Fund (HDIF)

HDIF calls itself a learning platform for innovation in Tanzania. This is a five years programme supported by the UK government. HDIF aims to support better understanding and knowledge around innovation in human development, and to use evidence from HDIF to support the transformation of the innovation space, through adoption and scale up of innovations in Tanzania. This programme closely works with the national government and uses commercial sector, youth led enterprises and research institutions to achieve common goals. The project works in many sectors, including health, education, water and sanitation.

UKAID -Uniliver TRANSFORM Programme

TRANSFORM is an exploratory programme that started in partnership between UK Government and Uniliver PLC in 2015. It aims to use and bring creativity used in private sector and commercial approaches to solve persistent global development challenges, such as water, sanitation and hygiene improvement. To date, it has supported nineteen projects across nine countries, which have already benefited over a quarter of a million people. The portfolio includes a mobile platform for shopkeepers in Kenya that encourages them to become change agents in their communities, and a portable handwashing station for low-income households in Bangladesh. This next phase will quadruple the size of the programme, from £10 million to £40 million, to support market-based solutions that meet low-income household needs in developing countries. Through financial and business support for social enterprises and behaviour-change interventions, TRANSFORM's aim is to enable one hundred million people in sub-Saharan Africa and Asia to gain access to products and services that have been shown to improve health, livelihoods, the environment or wellbeing by 2025.

Humanitarian Innovation Fund (HIF)

The Humanitarian Innovation Fund (HIF) supports organisations and individuals to identify, nurture and share innovative and scalable solutions to the challenges facing humanitarian sector (i.e. emergencies, relief and disasters). HIF was launched in 2010 and considers itself a leading actor in supporting the development and testing of approaches to innovation in the humanitarian system. HIF is an independent grant-making organisation focused on humanitarian innovation - uniquely open to the full diversity of actors working in the humanitarian system. HIF offers grants, help organisations to take ideas to scale, generate and disseminate knowledge.

It is worth highlighting here that the above three programmes use a different set of concepts in their funding calls, programme management and exit strategies, as compared to traditional programmes. Some of these also encourage applicants to think in terms of innovation programme typology, such as the stage of innovation, type of innovation and level of confidence they have. These programmes encourage applicants to develop business plans and not just a funding proposal, focused on the project delivery. The programme expects the applicants to understand and highlight the risks and predict failures. Most importantly, there is emphasis on learning and using the potential of entire eco-system to encourage sustainability of the project.

Lessons and Learning from Innovation Programming

Based on author's involvement in innovation programming certain lessons can be drawn.

1) Innovation programming opens up new opportunities to deliver development outcomes. This potential is currently being used and success has started to emerge. This is a stage, when more learning is to be explored about the reasons and the extent of the success. However, success and failure may be less important since innovation programming is to nurture new ways of working. It is more important to understand and report those areas within programming where innovation is making a difference, rather than declaring innovation as the panacea. This work is to be done and would benefit future programmes.

2) Innovation programming communicates very well across all the programmes reviewed for this paper. In the above three examples, there are user friendly systems in place, social media is fully used and the websites are user friendly. There are many places for knowledge sharing in different forms to suit different readers, human friendliness in presentations and many documents to learn about the processes, often in simple to understand format. In addition, all the programmes have fully used mobile phones and internet to communicate with the programme beneficiaries. This improves the flow of information, engagement and contributes to accountability.

3) Many programmes have used improved ways of engagement between different players. especially the use of eco-system analysis and promotion of Human Centered Design (or Users Centered Design) approaches in designing the interventions. This approach is originally started by commercial businesses to develop products and services. The application is used innovatively to empower the users and to design the interventions with them.

4) Furthermore, the current era of innovation programming is very exciting. Many new discoveries are taking place. Innovation programming is done to learn, share and scale-up interventions. Many programmes are based on knowledge and promoting learning. However, more research is needed to identify targets for knowledge and learning that is emerging from this type of programming, the users of learning and how and why these groups require learning, and what is expected from these groups?

5) Handing over and exit of innovative programming is another important area for research. Traditional programmes expect to handover to the government or community groups, and this may continue on the similar principles. For innovation programing the main purpose is to develop viable business models based on learning. The viable business models are expected to be taken up by businesses and necessary changes may be needed in policy support. This may mean a partnership of innovation programing, research institutions and governments. The handing over and exit phases are the most important parts of the programming, keeping in mind the main purpose of innovation programming.

6) More research is needed on the typology of contract management, risk taking and safeguards for innovation programming. Innovation programmes are expected to accept and embrace complexity. This needs to translate into the actual contract management, training and behaviours of the managers. Embracing complexity means change of plans, accepting failures, change of pathways and testing of ideas becomes a day to day practice. Traditional contract management, including the components of financial and human resources management are not designed as per complexity principles. A cross organizational campaign is needed to build awareness about complexity and its use in the innovation programming.

7) One of the potential risk of innovation programming is the control over technologies for large profit making organisations. While PDD expects more open source approaches and ownership of the local organisations, innovation programming can be a pathway for more profit making. This risk needs careful handling through short and long term contracts.

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ACTORS THAT AFFECT PLACE-IDENTITY TRANSFORMATION OF A TRADITIONAL SETTLEMENT IN THE AGE OF GLOBAL TOURISM THE CASE OF SANUR IN DENPASSAR-BALI

Nyoman Gede Maha Putra*
Georgia Butina Watson**
Regina Mapua Lim***

ABSTRACT

There are various arguments that revolve around the fact that place-identity influences aspects of human life: social, economic and political. A city with a strong place-identity is claimed to have stronger social cohesion among its population, better economic opportunities as well as stable political circumstances. The wave of globalisation which influences all parts of the world leads cities around the globe to adopt similar patterns of homogenisation. This makes cities look similar to one another and blurs their place-identity. In order to maintain their character, many local authorities have tried to find appropriate solutions, because the global forces can not be curbed. Moreover, as a living space, a city is always on the move in accordance with the dynamics of its inhabitants. Although it is unimaginable to see a city without any progress, the cities hold some values that form their place-identity, construct their characters as well as make them attractive. For its unique features, the values regularly fascinate tourists, creating economic opportunities. However, tourism businesses may also influence the place-identity construction of the cities. This paper analyses the transformation of place-identity of an area rooted in tradition in Bali. Urban morphology study and qualitative interviews were conducted to analyse the continuity and change of urban components. Today, physical development that supports tourism sector influences the vernacular processes of the place. Some values are maintained by the locals but they also need to adopt global phenomena as a negotiation between being rooted as well as being part of the global tourism industry needs development. The negotiation, however, should not compromise the preservation of natural resources and the rituals, because these factors are as the essence of tradition by the locals.

Keywords: Place-Identity, Tradition, Tourism, Urban Morphology, Bali

INTRODUCTION

In an age of globalization, it is claimed that place-identity is no longer important because the global sense of place is taking over. But, despite being interconnected and cross-influencing one to another, many places still maintain their unique characters and, therefore are still interesting for many. Visiting unique places has become an industry called tourism. It is supported by advancement in transportation and communication technology, with which one can visit places all around the world. Involving great amount of capital and producing considerable economic profit, tourism has been growing as global business. The more unique a place is in the eyes of the tourists, the more interesting it is to visit and, therefore, the better economic opportunities it has. Thus, place-identity is still relevant in a borderless world. However, tourism industry may bring drawbacks to local places. The increasing number of visitors necessitates great amount of lands which, in turn, changes the traditional cultural landscapes that were once serving only local inhabitants. Not only the physical, but also the perceptual components of the place may change. Parts of a place that are important and meaningful for locals but less attractive for tourists might be manipulated. This could transform the

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place-identity of a traditional place rooted in tradition. Traditionally, many places in Asian and African regions were once independent and managed by traditional leaders. During and after the colonialism those places were managed under one national system that weakened the role of the traditional administrations. Decisions made by higher government levels transformed the place-identity. Moreover, when it comes to global economic activities, place-identity might change more easily, because investment that backs development moves borderless.

An attractive place that invites tourists is in turn also attractive to people to seek jobs. The problems of population growth need to be addressed by developing more houses and facilities. To build more houses, more materials and better construction methods are needed. New resources and materials, transported from different places, are replacing the more traditional building materials. This is followed by the utilization of non-traditional building and construction technology. Moreover, in education curricula, the adoption of modern literature facilitates the transfer of ideas and overshadows the traditional transmission process of traditional knowledge (Watson and Bentley, 2007; Brislin, 2012; Pallasmaa, 2012).

The debates about place-identity today are focused on the issues of urban transformation where cities across the world, despite being situated in different locations, tend to be developed in similar ways presenting the processes of homogenization (King, 2012). Global network systems, where transfers of capital and resources on an international scale, influence the creation of local places. Moreover, the global information system has redefined the interaction between people and place (Sassen, 2011). Losing the sense of identity is very destructive. It can weaken the sense of stability, meanings and settings for face to face interaction between people and between people and places (Castells (b), 2009). What is more, it could also diminish the attractiveness of the place for visitors.

This paper explores the transformation of a traditional place, the Village of Sanur in Bali, that has turned into a touristic place. In order to serve the business, many components of the settlements have been developed. But some elements are sustained by the inhabitants for the value and meanings they hold. Nowadays, tourism outweighs agriculture, the original raison of the village, as the main source of income. Despite providing better job opportunities, the skyrocketing speed of tourism development threatens the society because it may loose its identity. The inhabitants are now in two minds, should they retain the traditional characters or accept the international trend in order to host more tourists? A negotiation platform that could bridge the gap is needed.

Background: Place-identity Transformation

The traditional people saw themselves as an inseparable part of nature, and of the context in which they lived. The elements of nature were taken into account when organizing living arrangements, arrange purpose, and giving meaning to their life by structuring them into a constructed symbol of the cosmos or the cosmology. As a part of nature, human beings should traditionally fit into this scheme and follow the principles of how nature works.

In the pre-industrial era, the traditional landscape was managed and developed in a way that gave local inhabitants full control over their territory. The cultural activities and economic means of these people were developed to serve local needs and were influenced by the distinctive characteristics of local natural resources (Bourdier and AlSayyad, 1989). Construction methods were transmitted from one generation to the next ensuring the continuity and stability of the traditional form-production processes (Oliver, 2006). Therefore, the traditional settlement fitted culturally and technically with the culture and local climate (Rapoport, 2005), blending in with the environment (Tuan, 1977; Oliver, 2006). In such situations, the relationship between a person and a place is not just between oneself and one's surroundings, but it has to do with a much deeper process of identification where people create a friendly association with a particular environment (Relph, 1976; Lynch, 1984; Watson and Bentley, 2007). By this identification, people are able to distinguish one place from another, yet this relationship builds a place-identity from which people can define who they are both as individuals and as community members (Southworth and Rugeri, 2010).

Socio-political transformation changes the way places are used and experienced. Colonialization channeled new ideas originating in the West to the vernacular landscape of the East. During the colonial era, many traditional cities in Asian and African regions were redeveloped with non-traditional ideas, to serve colonial motives of wealth creation. It influenced the concept of local cosmology, restructured traditional socio-political landscape, expanded local market, yet introduced local economy to international exposure. In turn, the physical arrangements of the traditional landscape of the East were transformed. The long span of colonialism guided the creation of a global economic system, which facilitated the transfer and adoption of dominant western ideas (King, 1991). As a result, homogenization emerged everywhere.

Issues of modernization versus tradition are also debated in Denpasar, Bali in the Republic of Indonesia, an area which was colonized by the Dutch for centuries (King, 1991; 2012). In order to create wealth, the colonial government constructed ports and expanded local markets to serve wider areas, which then transformed the configuration of the urban landscape. Whilst considerable and immediate changes occurred in the city center, the general cultural landscapes remained unchanged, because they were managed and controlled by the indigenous people possessing traditional knowledge. The tensions of power representation created dual-characteristics of the city in the colonial period (Colombijn, 2006). Later on, the distinct characteristics of the island, with thousands of temples, unique socio-cultural traditions, settlements and distinctive natural landscapes, were preserved and capitalized upon by the colonial government to promote tourism (Powell, 1982; Covarrubias, 1999; Picard, 2008). The economic motives of the colonial government both changed and preserved the island's local character.

Concerns regarding place-identity entered a new dimension of tensions of political representation, when the political power shifted from the colonial to a national government. In the post-colonial era, Sanur was managed under the political system of the new state. Denpasar was chosen as the capital of Bali Province, under the three governance levels of the Republic of Indonesia: national, provincial and municipal. Consequently, new city governance was introduced and new facilities were constructed. The dual-characteristics in the governance system continued, because the traditional people sustained their traditional administrative influence on the place-identity of the city. This dual-characteristics could also be seen in the physical development of the city as shown in (Figure 1).

Nowadays, changes that take place on a global scale occur more rapidly. The homogenizing impacts of these changes on local places are sometimes considerable. Some critics claim that the process of homogenization is about domination and resistance (Edward and Usher, 2000; Castells, 2009). On the other hand, dominant institutions may introduce their ideas of place-identity in order to extend and rationalize their domination. Meanwhile, those being stigmatized by the domination may build trenches of resistance (Castells, 2009). Tensions occur when modern and traditional ideas are not fused with one another. In contrast to the traditional period where the indigenous people held full control, a city in the contemporary context presented different contestations of power that influenced its form and transformation (Harvey,

Figure 1: New building typologies: the larger buildings in the middle of the image were built by higher level government, while the smaller buildings belong to the indigenous people.
Source: Fieldwork, 2014

1997).The sense of powerlessness may grow and cause anxiety and fear if the society cannot manage the city's transformation (Madanipour, 2013). It is also important to consider the society members in managing change and defining place-identity of the city.

Urban Morphology as a Method of Researching Place-identity

Tradition influences place-identity of cities as they progress. As a complex and dynamic system, a city comprises many dimensions and elements which are linked to one another, being created and recreated continuously by its inhabitants within its lifespan. Given that the interaction between people and place involves evaluative processes, changes in physical characteristics also influence the behavior of people and vice versa. Urban morphology study is capitalized upon in this research to analyze the evolving physical forms and socio-spatial structure of the city (Conzen, 1960; Whitehand, 1990; Kropf, 2009; Larkham and Conzen, 2014).

Firstly, it is important to evaluate meaningful traditional invariants of the city in order to understand the rooted values of the city. Secondly, the development phases of the city should be researched to evaluate the evolution of the socio-spatial and physical components of the city. Thirdly, in order to identify individual and social meanings as well as to formulate strategies to manage their transformation, local perceptions and the roles of different key urban actors in the form-production processes should also be analyzed. In order to develop an innovative negotiation platform where tradition and modern could be exchanged, an Inquiry by Design method is applied to test some prepositions with the local inhabitants of Sanur.

Discussion and Analysis: Transformation of Sanur from an Agricultural Traditional Village to a Cosmopolitan Tourist Destinatio: The Origin of Sanur

Orientation and identification are two elements that constitute 'the spirit of place' (Norberg-Schulz, 1980). In Bali, orientation and identification are important elements of the traditional cosmology (Eisemann, 2010). They are utilized in almost every single action of people, from arranging the public facilities of a village to their daily activities. To create a sense of orientation, the natural geographical characteristics and the path of the sun are used. For traditional people, the highlands of Bali possess practical and symbolic meaning. The colossal size of the mountains, particularly the highest peak of Mount Agung, makes them visible from all over the island. Four lakes that are located on the highlands stream continuous water to the rice-fields. Instead of posing a threat, the highlands provide a point of orientation and a source of water for agriculture. For this reason, the highlands are preserved and believed to be the dwellings of the ancestral spirits and gods. The sea surrounds the island from all directions and is embedded with negative meanings. Demons, evil spirits and impure soul dwell in the ocean and make it a haunted place. Moreover, areas close to the body of water of the sea are usually not fertile and less valuable for agriculture. But these areas are also preserved to protect the dwelling areas from the threat of the ocean.

People have developed a sense of orientation and live in various locations on the island, between the two contrasting geographical elements of the mountains and the sea. The mountainous areas, the plains and the ocean construct a division of three: north-center-south (Eisemann, 2010). Meanings embedded with these directions create a ritual axis. The path of the sun is also considered in the construction of the sense of direction and is utilized to arrange daily life. The direction where the sun rises is seen as a symbol of birth, in contrast with death which is symbolized by the direction where the sun sets. The direction where the sun rises and sets constructs the east to west axis. The time between these two opposing directions forms the third division consisting of morning-midday-afternoon. The superimposition of the highlands-sea and sunrise-sunset axes constructs a scheme of four and the central point, generates basic directions: north, south, east, west and centre. The intermediate directions add four more values, leading to eight directions and a centre. These eight directions and the centre are called the ***Nawasanga,*** a scheme of the nine powerful directions of the supreme God (Gelebet, 1986; Sularto, 1987; Eisemann, 2010).

It is believed that humans possess a small part of the god, called the spirit or atman which occupied the middle world during his/her life. An ***atman*** may travel to the under and upper-world. The atman will stop traveling once he/she achieves ***moksha***, a condition when the spirit merges with the universe, the ultimate goal of the Hindu-Balinese people. This belief system constructs the three world layers (Eisemann, 2010). Humans dwell in the middle between the upper and the underworld.

Figure 2 presents the perceived world of Bali. The middle world, the blue ellipse in the middle of the image, is where humans dwell, constructed from the mountain-sea axis and the path of the sun. The upper world is occupied by the purified spirits of ancestors and the underworld is occupied by the impure spirits. This scheme creates the value system

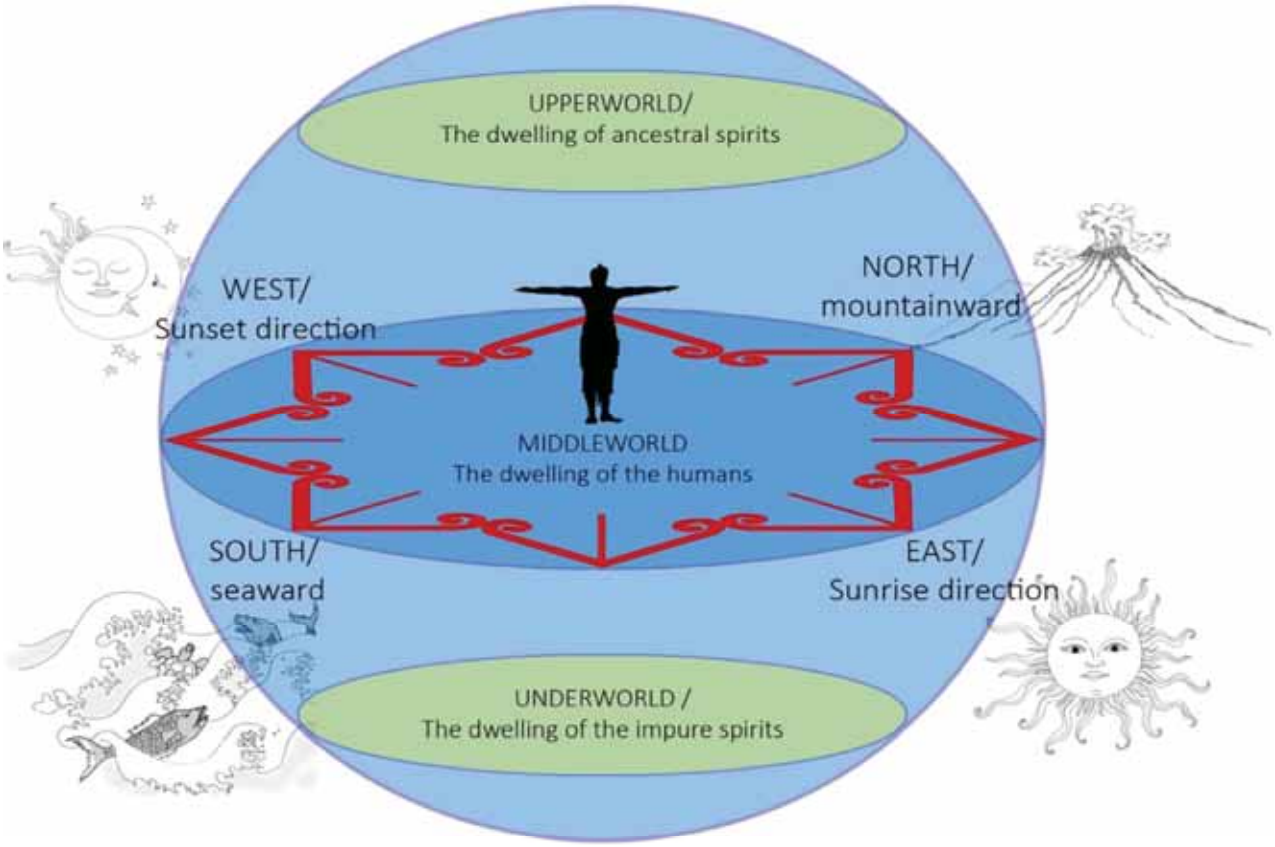

Figure 2: The scheme of the perceived world of Bali consists of eleven parts constructed from God-given elements
Source: Constructed by the author after Gelebet, 1986; Lansing; 2006, Howe L., 2006; Eisemann, 2010

that is used to guide the daily life of the Balinese people and it constructs meanings. It is implemented at different scales: from laying out a village to arranging daily life following the principle of 'small world' and 'big world'. A human is the small world in his house, the house is the small world of a settlement and the universe is the big world of the settlement.

A prosperous life can be achieved if all the elements of the perceived world are in harmony. In order to do so, the traditional society maintains the three different elements of a settlement, both physically and ritually.

Sanur is located on the eastern part of the City of Denpasar on the Island of Bali. The geographical characteristics of the area influence the construction of the local cosmology. Geographically, the area consists of: infertile sandy areas; less fertile areas; and the fertile areas located furthest from the beach. Water sources are respected for their importance in providing irrigation for the people working as traditional farmers. The settlement is arranged between the beach and the fertile lands, with respect to the upstream and downstream axis.

The traditional socio-political situation of the area is shaped by the old social structure of the society. The settlement was established by a group of traditional people led by a priest. To run the village's governance, the priest was assisted by the members of the society arranged in several ***banjars***. The political structure of the settlement consisted of the two levels, the village and ***banjar***. The priest led the decision-making process based on a democratic public participation mechanism at the ***banjar*** level. The majority of the traditional people worked on the farmland, and only went to the sea in their spare time. The infertile land on the beachfront was seen as containing less economic value because it could not be cultivated. Guided by cosmology, the overall area was divided into three different economic zones having different economic values: fertile farmland, dwelling areas and infertile sandy areas (Figures 3 and 4).

In terms of spatial and physical arrangements, the buildings were designed in human proportions in order to provide

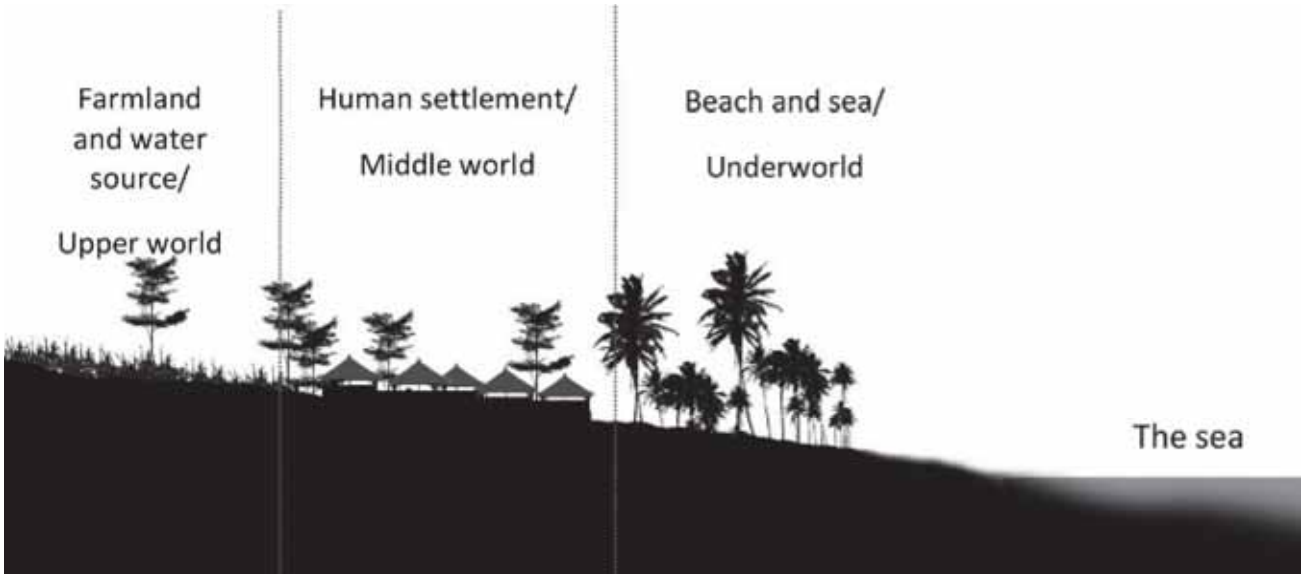

Figure 3: The settlement is sandwiched between fertile lands and infertile lands.
Source: Constructed from transect walks and observation

Figure 4: Distribution of three layers of perceived world and its relationship to site characteristics
Source: Constructed from Google Earth map, transect walks and interviews

structural stability as well as express symbolic meanings. The head, the body and the feet were represented by three building elements: the pyramidal roof, the space under the roof and the solid base. The overall proportions of traditional buildings gave a sense of stability and with the traditional carpentry and construction methods, they were resistant to earthquakes.

Local materials and construction methods all responded to the local climate and characteristics. The application of these principles created a pleasant environment for the inhabitants, yet was also culturally appropriate. Over the years the authenticity of the area has become the main attraction for foreign visitors. Moreover, the warm white-sandy beaches of Sanur, that were once seen as infertile land, today attract tourists in large numbers, especially from cold countries.

Sanur in the Age of Tourism

Tourism started to flourish since the colonial government exposed the island to international audience in the 1920's. Tourism sector was also capitalized upon by the new government of the Republic of Indonesia to increase economic benefit. This strategy, however was a top down policy led by the national government.

The socio-political structure of the area has changed under the Republic of Indonesia. It is managed as one of the administrative villages within the South Denpasar District. Consequently, the development of the area has been carried out in accordance with the plans of the upper level government. However, two governmental bodies exist and manage the area because the traditional administration continues.

The formal government capitalized tourism to support local and national income. For that reason, a study to manage this sector was conducted in 1969. The study suggested developing unproductive areas and protecting the fertile land on the island (SCETO, 1974). In this respect, it was recommended to develop areas on the beach that held less value for the indigenous people. To support this strategy, infrastructure works were carried out including the development of an international airport and a by-pass road. The airport and the roads facilitated the increasing number of tourists. This in turn improved the local economy, intensifying the new development dominated by provision of tourist facilities.

The economic growth seems to have become the ***lingua franca*** of the area in the tourism era, replacing the cosmological approach of the traditional era. Facilitated by the formal government, many investors are interested in building businesses in the area. Hotels and restaurants have developed in various locations. Over time facilities to support tourism have also been established on the fertile farmlands.

The increasing development trend to support tourism has boosted local economic development, and has potentially caused tensions among different users. The better economic opportunities offered by the new businesses have attracted local people to move from agricultural occupations to the tourism sector, as working in the tourism sector is perceived as more promising economically. As a result, the fertile land has been abandoned and agriculture as the root of local tradition is neglected. The tourism industry has modified the economic value of the land. Agriculture as an occupation is seen as outdated. In contrast, land on the beach is perceived as more valuable (Figure 5).

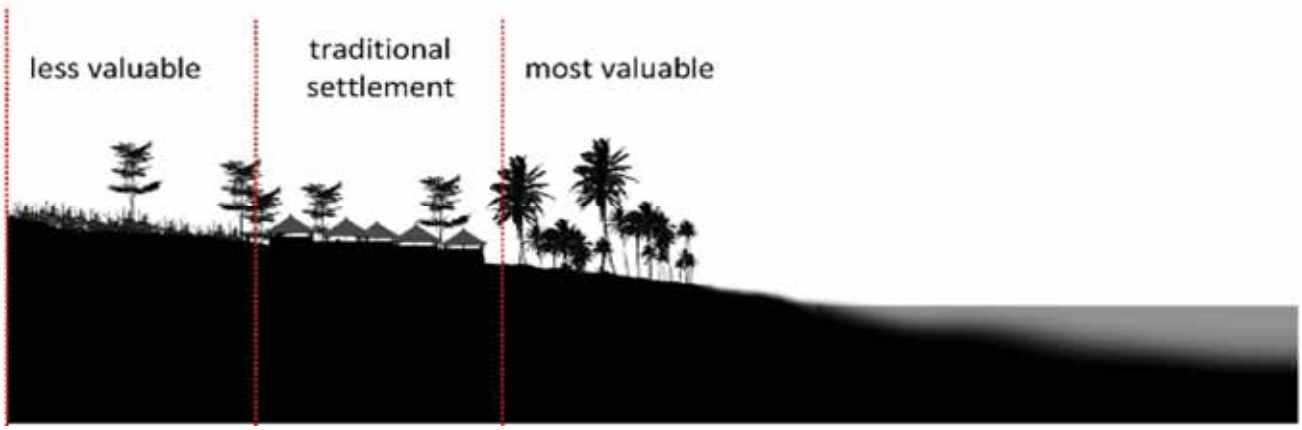

Figure 5: The changing economic value of land in Sanur
Source: Constructed from transect walks, Observation and interviews

The increasing appeal of the area has also invited migrants, generating urbanization. Statistical data show that, in sixteen years, from 1993 to 2009, the amount of agricultural land use has dropped from eighty one hectares to twenty two hectares (Bappeda, 2011). Annually, 1.38 hectares of farming sites are transformed into built forms. If the trend continues, all farmland may vanish by 2025 (Bappeda, 2011a).

The new economic means have provided the locals with better economic income. However, it is also impacting local place-identity, based on agriculture. Four maps in figure 6 show the morphological development pattern of Sanur and should be read from the bottom to the top. The bottom map shows the original linear pattern of the settlement. It is located within an adequate distance from the beach and close to the farmland. In the second map, the road construction, which has taken place to support tourism development divides the area into two distinct areas, where the waterfront is packed with commercial facilities for tourists. The growth of tourism has increased the economic attraction of the settlement and, as shown in the third map, a ribbon development of commercial facilities has emerged on both sides of the road. These economic activities have brought migrants into the area. Today, the area has become a mix of a traditional settlement and an area characterized by tourism and commercial facilities, as well as new residential neighborhoods for the migrants. The introduction of tourism has changed the economic base of the settlement, which in turn has impacted the traditional settlement patterns based on cosmology. Some local people have maintained the local beliefs which have been in place for centuries. The convergent shape of the original dwellings is now merging with the organic patterns formed by the new economic-based activities. The next section analyses how this transformation is perceived by the locals.

Local perceptions on the development of Sanur

The sustainability of traditional characteristics of the area and the increasing economic growth are appreciated by the respondents. The locals embrace new economic activities on the beach. They claim that new investment supports local businesses and enlivens the settlement. With the money, the locals can conduct traditional rituals periodically. The long-established traditional rituals maintain the sense of rootedness of the indigenous people and the resilience of the traditional cosmology, and therefore, strengthen the identity of the place.

However, the rapid development on the former rice fields and the shrinking number of open spaces were criticized. It was argued that the spatial and physical developments should be managed in a better way. The growing numbers of new settlements on the farming sites not only reduced the sense of rootedness of the area, but also diminished open spaces. The overcrowding and the limited open spaces decreased the opportunities for the community members to create shared positive experiences and memories of their place of residence. Moreover, it was also pointed out that the new development patterns were not respecting the natural geographical characteristics of the area. This resulted in the imbalance of the cosmological order of the area. The complaints and criticisms regarding the development trends signified that the locals and the traditional government had no means of influencing the decision-making process. The locals were powerless because the development was dominated by powerful urban actors focusing on producing economic benefits. These powerful actors were the investors and the formal government who set up the economic policy. In order to transfer adequate power to local inhabitants organized in traditional society, a better decision-making process is required to be constructed.

A Negotiation Platform for Negotiating Tradition and Modern

From the analysis, it was clear that the transformations of Sanur were respected for the economic benefits it bought. But it was criticised as giving less opportunities for locals to involve themselves in the development of the area. Therefore, although the locals enjoyed better income, they also complained about certain development patterns that were abandoning traditional cosmology. Based on the appreciation and criticism by the locals, key urban design principles as negotiation platform were formulated. These principles were constructed on four dimensions of cosmology, socio-political and economic, spatial and physical, and socio-cultural dimensions. The principles of the platform are:

1. Negotiating traditional cosmology with the contemporary ways of life

Place-identity in the city is rarely a single interpretation. It tends to be open to multiple interpretations because it not only resides in the physical components and observable activities, but also in human perceptions (Carmona, Heath, and Tiesdell, 2010; Southworth & Rugerri, 2010; Hague and Jenkins, 2004).

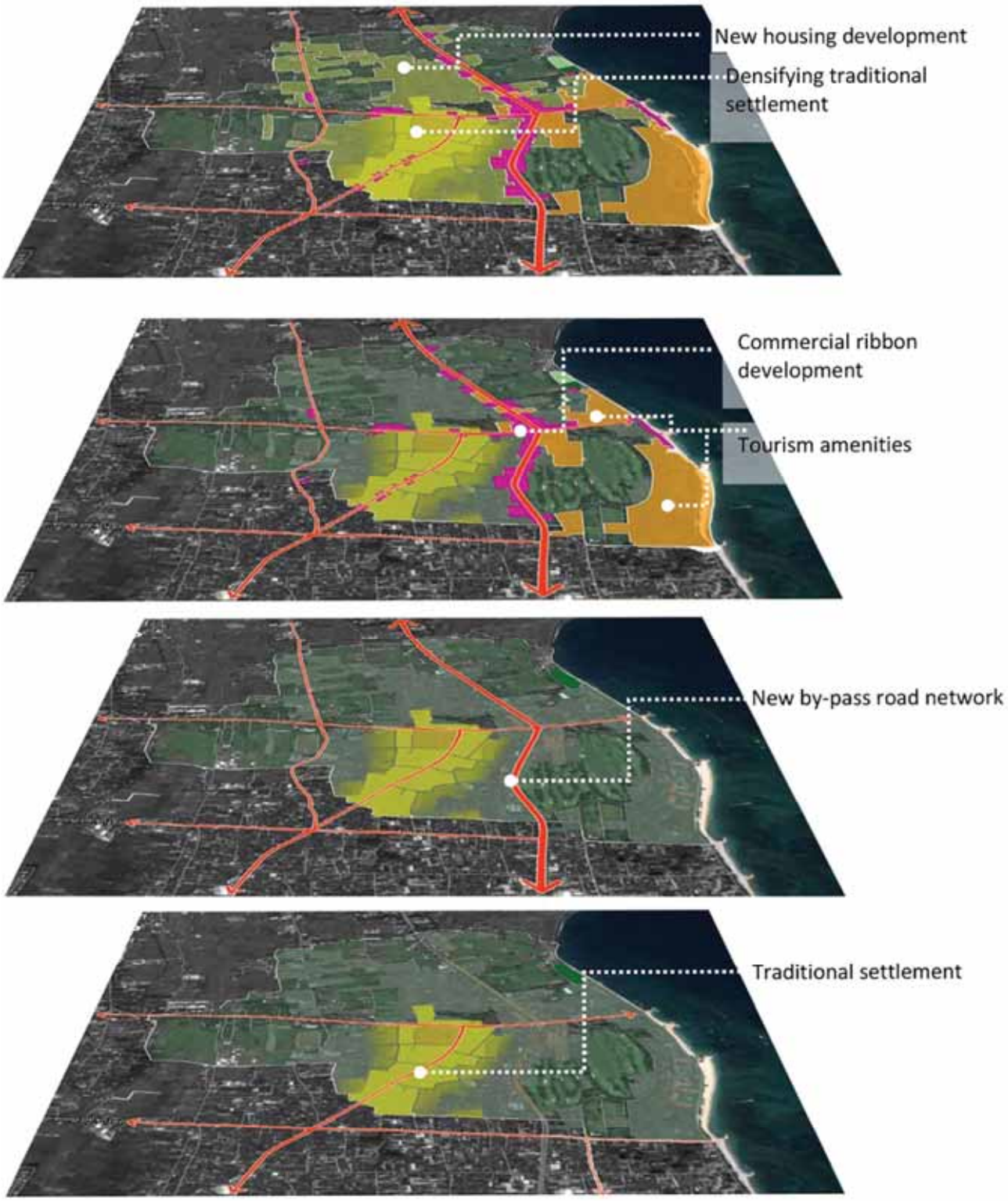

Figure 6: Morphological development layers of Sanur
Source: Constructed by the author based on Google Earth image, fieldworks and interviews

In the contemporary city of Denpasar, the perceptive component that constructs place-identity is more complex because it is influenced by the mixed demographic composition of the society: indigenous groups and non-indigenous; older and younger generations. Each individual and group may develop different ideas, experiences and memories which influence their perceptions. This situation is different from the traditional period when the area was home to and used by traditional people from a homogenous cultural background and who had limited choices. Nowadays, the local cosmology, which was once the supreme value used to validate choices, is challenged by the contemporary way of life because it is embedded only with the indigenous people. However, the cosmology, which is based on traditional ways of perceiving the elements of nature and the way they work, is still relevant because it assists the diverse inhabitants to live in harmony with nature. Therefore, the traditional cosmology should be translated to incorporate a wider audience. It could be used as the new supreme value to validate the different choices of the diverse demographic compositions of the city in the contemporary context, because all society members are part of the city's universe, regardless of their differences. All individuals and groups need to be encouraged to live in harmony with the wider ecosystem called 'nature'.

2. Negotiating the traditional socio-political and economic structure with the contemporary urban governance and commercial activities

In the construction of place-identity, a democratic and open process is suggested because access to shared meanings is political (Hague & Jenkins, 2004; Madanipour, 2013). The democratic process gives wider access to community members to participate in the construction of their individual and collective identity. Participating in the construction of place-identity may strengthen the sense of belonging and attachment that people have to the place where they live.

Therefore, it is suggested to formulate an open planning framework where all actors can participate in the form-production processes of the area. In order to develop a shared vision, this planning platform should incorporate: the members of the society, the traditional administration, traders and farmers, the formal government, and investors and developers. This shared vision will provide a platform for all actors to participate in without being excluded; feeling excluded may increase a sense of powerlessness.

3. Negotiating the traditional spatial and physical arrangement with the new spatial and physical development.

Place-identity will be stronger if meaningful activities and strong visual forms are combined (Southworth and Rugerri, 2010). Modern neighborhood developments which devalue existing traditional forms have often been blamed for the production of meaningless places (Norberg-Schulz, 1980; Oliver, 2006; Pallasmaa, 2012). In order to avoid this, the existence of the traditional settlement and the need for new physical development should be negotiated.

The preservation of the traditional spatial configuration, however, should not limit opportunities to develop new dwelling units in order to provide a wider choice of housing. In developing new housing units, traditional value systems should be referred.

4. The socio-cultural dimension and the promotion of the creation of positive experiences and shared memories.

Socio-cultural activities occur in public spaces. In the traditional society, these activities were sustained by the traditional people; therefore, places for rituals and traditional ceremonies were preserved. In the contemporary context, these activities still only include the indigenous people. In order to involve the non-indigenous members of the society, more public spaces and social occasions should be promoted.

The provision of public open spaces with adequate facilities and events should be encouraged. Secondly, because place is not just a physical setting, but it is also about what it means to people, the provision of public spaces should be followed with the promotion of social activities. The availability of adequate open spaces with communal activities that involve all community members regardless of their different backgrounds and age groups could support the construction of positive shared experiences and memories.

Conclusions

The paper explores the concept of place-identity in the context of a traditional yet rapidly developing city and has linked theoretical concepts, methodological frameworks and empirical evidence in the contemporary context of Sanur area in Bali, Indonesia. The study has also sought to know how place-identity can be sustained in the contemporary context whence flows of ideas and resources at global scale threaten local places.

Global flow of ideas could not be curbed in the age of globalization. This may change place-identity of many places across the globe. However, places that offer unique place-identity attract tourists. Therefore, place identity is still

relevant. Maintaining the place-identity of a touristy place is not an easy task. A traditional place that once was developed and managed by small group of people is nowadays packed inhabitants of diverse backgrounds, managed by multi-level government bodies and developed by non-traditional investors. Because place-identity is structured not only from physical forms but also human perceptions, new ideas, social structure and demographic composition, and social relation influences place-identity of a traditional yet rapidly developing place. In order to maintain and sustain the place-identity of the place, this paper suggests a negotiation platform consists of four components. Firstly, is the negotiation of the traditional cosmology with the contemporary ways of life. The second component is the negotiation between different socio-political and economic actors. While the third negotiation is encouraged between the old and new physical development, the promotion of social activities to shape shared memories and experiences is suggested as the fourth negotiation.

The components that construct place identity is in a state of constant revision, therefore, place-identity is dynamic. In order to get benefits from place-identity, it should be constantly researched and strategies to maintain it should also be periodically revised. This will keep place-identity of a rapidly developing city up to date.

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DOCUMENTATION AND ANALYSIS OF THE CURRENT HOUSING TRENDS IN MACHAR COLONY IN KARACHI, PAKISTAN

*Mansoor Raza**

ABSTRACT

The population growth rate of Karachi is way beyond average national growth rate. Keeping aside the reasons for this extravagant growth, the phenomenon puts high demand on all aspects of civic life, and housing is no exception. The supply for housing for poor is not coming from formal sectors, which results in the creation of squatter settlements. Some of the theorists view these squatters as an indicator of poor's desire for self improvement. The informality in Karachi is tacitly promoted by state institutions to value-tag land for future formal commercial enterprises. The resulting uncertainty is an impediment to the freedom of poor and hence human development.

This paper documents and analyses the land use of Karachi, from the perspective of housing in an informal settlement, by taking Machar Colony as a case study. Literature review, stakeholders' interviews, on-site observations and pictorial documentation are the prime characteristics of the research methodology.

Keyword: Informality, housing, fear, freedom, commodification, Karachi, Machar Colony

INTRODUCTION

Reasons for Choosing Machar Colony

The reasons for selecting Machar Colony as a case study are as follows:

a) Machar Colony is the largest ***katchi abadi*** (informal settlement) of Karachi with an estimated population between 700,000 to 1.2 million.

b) It is one of the oldest ***katchi abadi*** of Karachi as well and over the years several distinct communities (from rituals, culture and language, attire and dietary habits perspective) have established themselves in the area.

c) The area is abode to migrant population. The Karachi Fisheries Harbour is a centripetal and binding force for majority of the residents living in Machar Colony for livelihood opportunities.

d) Despite being an old settlement, Machar Colony's land use and housing is still evolving. It is expanding, going through densification and consolidation and has a distinctive demographic characteristic of the inhabiting population. These aspects are discussed in detail in this paper.

Moreover, in 2016-17, the author of this study used to visit Machar Colony for another research entitled "Drivers of climate change vulnerability at different scales in Karachi', as a Senior Research Team Member, funded by International Institute of Environment and Development and supervised by Urban Planner and Architect Mr. Arif Hasan. The previous experience of the area, knowing the gatekeepers and earlier held notions about various socio-economic issues came to an advantage for the researcher, in enhanced understanding of the dynamics of housing for this study.

Area Location, History and Demography

Machar Colony or ***Machera*** (Fishermen) Colony, located in district South of Karachi in Kemari Town, has a spread of three hundred fifty two acres with approximately 88.6 acres encroached upon mangroves forests towards the sea (area calculated by the author using google map). Machar Colony has an elevation of two metres with the railway track of Wazir Mansion bordering its north eastern side. It is home to dwindling mangrove forests, and the Arabian Sea lies on its south side. The entitlement of the land of Machar Colony is with Karachi Port Trust (KPT) (Figures 1-5).

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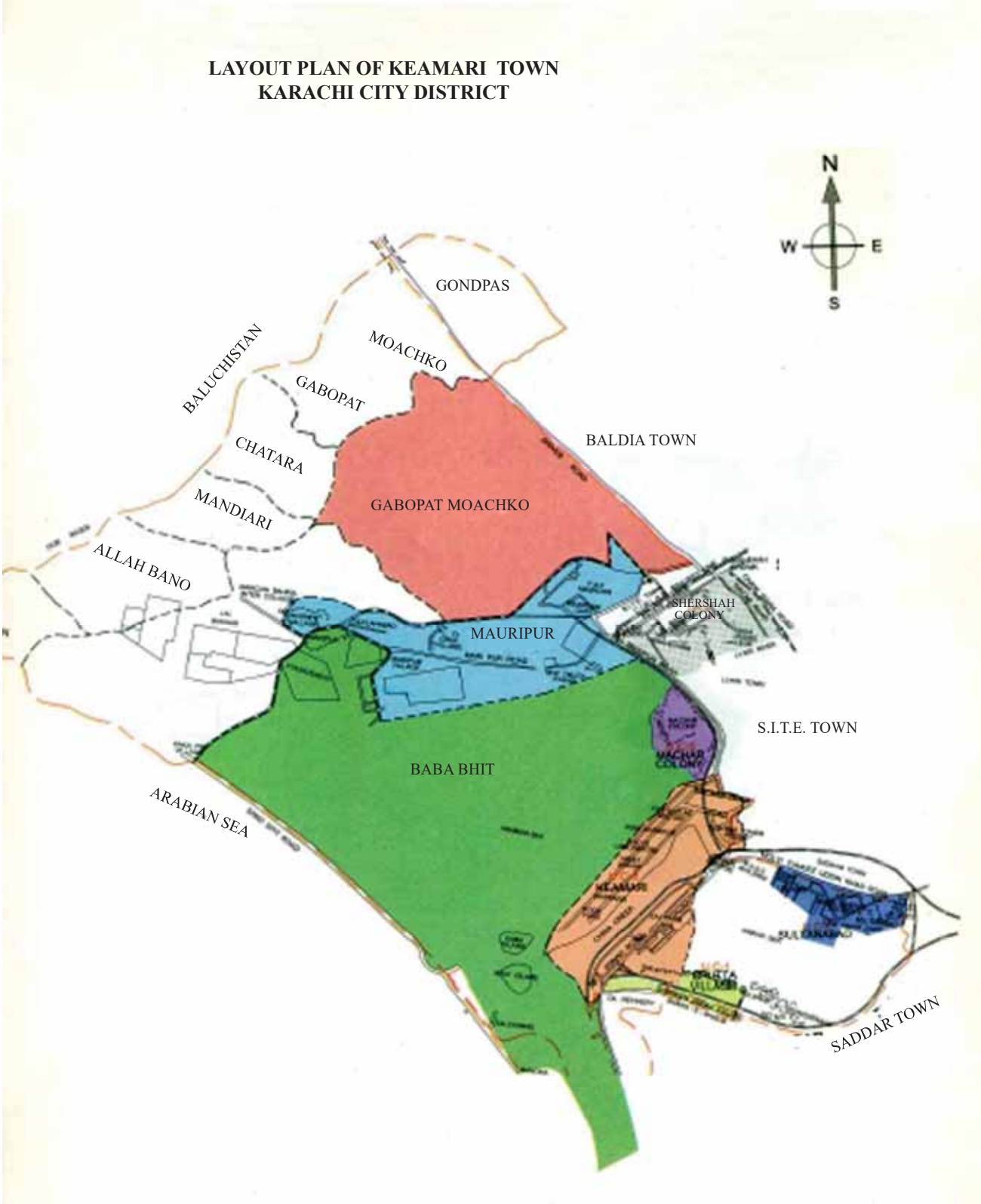


Figures 1: Location Map of Machar Colony

Figures 2: Mangrove Forest Area

*Figures 3:*Demarcation of Houses in new location

*Figures 4:*Typical Street in an area under development

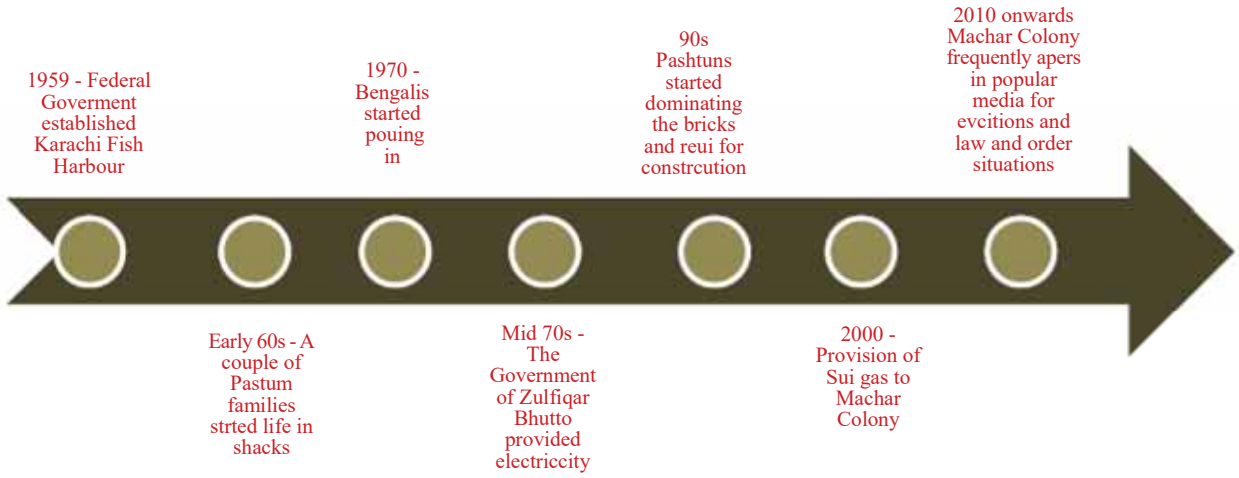
*Figures 5:*Typical Street of a newly developed area

Back in the mid sixties around ten to twelve Pashtun households migrated from Northern part of the country (Swat) to the land now known as Machar Colony to earn livelihood from Karachi Port as unskilled labourers. Bengalis came after 1970, followed by Swatis, Mianwalis, Punjabis and Sindhis. These communities prefered Machar Colony as their area of residence because of its proximity to the Karachi Fish Harbour, which is a centre for low skilled job provision. In the seventies Mr. Zulfiqar Ali Bhutto (Prime Minister of Pakistan, 1972-1977) provided electricity connection to the area.

Figure 6 gives a rough chronological development of Machar Colony. It was then, under the patronage of government officials, that the land patronization started. Though Machar Colony is the biggest and oldest settlement of Karachi, its land entitlement is yet to be regulated. Media and research reports cite various figures about the population of Machar Colony and the bandwidth of the quoted figures is from 700,000 persons to 1.2 million (The News, 2006).

Currently the locality is experiencing both horizontal and vertical expansion and has densified over the years. The apparent reason for densification is the desire by different ethnic groups to live within the respective clan based neighbourhoods. The construction for new houses is happening more towards the sea.

The Bengali and Burmese population residing in the area are involved in shrimp and fish cleaning and packing and allied businesses of ice slabs, net making and net repairing. To handle the low incomes in off seasons some households have opened up small scale grocery shops in their homes. The landscape is marked with plenty of ***Chai khanas*** (road side tea shops) mostly run by men of Pashtun ethnicity. Rickshaws, motorbikes and ***chingqis*** are the most used modes of transport. Most of the residents of the locality are employed in fisheries so walking to the place of livelihood is preferred.



Figures 6: Chronological Development of Machar Colony

Conservative and educated guess estimates are made to establish linkages of ethnicity and professions and are summarized in Figure 7.

Research Questions

The focus of the current study was to understand how the community obtains land and build houses in Machar Colony. The objective was to document the housing process and the challenges faced, while understanding the broader socio-economic context of the residents.

Some of the querries addressed were:

a) What factors converge to shape up community choice of making Machar Colony as choice of residence?

b) Who are the actors (formal and informal) involved in the process of obtaining land and making houses and the typology of interactions?

c) And once the shelter is secured, what are the challenges of living in Machar Colony and how do communities navigate through those?

Research Methodology

The research methodology for the study was set in accordance with the above-stated research objectives. A case study method approach was adopted for the simple reason that it is a method intensive approach and brings forth many dimensions of an issue in a shorter span of time. Secondary sources were consulted for informal housing and theories related to the phenomenon were reviewed. Media articles, as published in English dailies and YouTube videos, were reviewed to figure out the popular press perception of issues and causes of the issues related to Machar Colony. Those journalistic pieces were triangulated in the field. For this study, eleven in-depth qualitative interviews spreading a little over twenty hours, from January 24 to March 08 2018, were conducted, in the field. Snow ball sampling method was applied for the identification of key informants.

It is important to mention that to fill the gaps of the conducted primary research; the author has resorted to two other major sources of information on which the author had worked on in year 2016. One was the study on local impact of global climatic changes for International Institute of Environment and Development (IIED). Machar Colony was one of the localities selected for IIED funded research and the author was a senior team member of that particular research venture (Please visit http://pubs.iied.org/10805IIED). Second is a socio-economic survey conducted by an NGO in 2016 (Imkaan – working on civic issues of Machar Colony) which was analysed by the author. These two studies enhanced understanding of the dynamics of the area.

S.No	Ethniccity/Community	Occupuaion/Profession
1	Mianwali	Roaming vendors of fish and shrimps
2	Bengalis	Fish and shrimp cleaning, workers at fisheries and businessmen (Fishing related)
3	Pashtuns	Thallewallas and businessmen (Fishing related)
4	Punjabis	Transporters and laboures
5	Sindhis	Transporters and clraring and forwarding agents
6	Katchis	Construction workers, masons, labourers and shuttering experts
7	Burmese	Fish and shrimp cleaning and workers at fisheries
8	Baloch	Sailors, mostly
9	Afghanis	Transporters, dumper drivers and debris providers

Figures 7: The Ethnic Groups and their Professional Affiliations
Source: Based on various interviews conducted by the author between 2016-2018

Research Challenges

Like most of the researches, the study had its limitations with some associated challenges. Majority of the respondents were available after office timings and many of the probable respondents declined to meet on Sundays, for obvious reasons. At the time of this study rumors were strife about the possible land use changes and change (apparently forcible) of hands of the some parts of Machar Colony. Some of the respondents mentioned that land will go the Malik Riaz of Bahria Town with incumbents acting as conduit. A couple of others mentioned that Karachi Port Trust (KPT) will build infrastructural facilities for the China Pakistan Economic Corridor (CPEC). As a result any question about land entitlement and sale procedure were met with skepticism by the community members. In some instances the researcher braved aggression of young community members. No one from KPT was willing to talk on the subject; hence official view point could not be accommodated in this study.

Structure of the paper

The study is an attempt to understand and place the housing dynamics of Machar Colony in the socio-economic context of the area. The guiding framework for investigation in the field was that housing is more than mortar and bricks and what meets the eyes. This premise not only set the direction for the exploration, it also defined the format of the report as well. The first section introduces the objectives of the research, the ways to meet the objectives and the difficulties associated with the opted path of investigation. Section two is a brief of what is written about informal housing internationally and locally. Section three narrates the primary findings from Machar Colony and convergence towards the housing dynamics. Sections four and five are conclusions and recommendations for further studies and probable models of housing.

Literature Review

As mentioned by Zárate, 2016 and other authors, lack of services is the key feature of an informal settlement and Machar Colony is no exception to that. According to UN-Habitat, 2015 at least one third of the global urban population suffers from inadequate living conditions. Lack of access to basic services like drinking water and/or sanitation, not to mention energy, waste recollection, and transportation, low structural quality of shelters, overcrowding, dangerous locations and insecure tenure are the main characteristics normally included in the definitions of so-called informal settlements (Zárate, 2016).

The debates about informal housing swing between two extreme positions of Neo-Liberal and Neo-Marxist approaches to housing Neo-Liberals emphasize on its use value whereas Neo-Marxist point towards the commodification of housing (Omenya, 2007). Neo-Marxists criticism is both in terms of social struggle in reproduction (place of residence) and in relation to production (work place). Social struggle in reproduction is best exemplified in class stratified housing for the poor living in slums and squatter settlements (Omenya, 2007).

This is still largely relevant to Pakistan where ethnicity and class-based segregation determines reproduction and production.

Oscar Lewis is of the opinion that urban poor has a fatalistic tendency of being contended with their living conditions and this has a bearing on their housing as well: incapacity to self-initiate and sustain decent living conditions (Fegue, 2007). Lewis was opposed by Charles Abram, who articulated his experiences with Third Word Countries (TWCs) by maintaining that 'shanty towns', 'bidonvilles' and 'favelas' are not the epicenter of urban ills. In fact they are a rational step on the path of self-improvement (Fegue, 2007). Taking Abraham's iconoclastic proposition further, John Turner declared tenure security as a prerequisite in facilitating poor's commitment to the progressive transformation of their respective shelter (Fegue, 2007). William Mangin flagged the necessity for creating access to social infrastructure in squatter settlements, as unplanned physical environment remains an obstacle to access or enjoy social benefits (Fegue, 2007). Amrita Sen correlated freedom with development: defining substance of freedom as 'general capability of a person or people to live more freely'. Sen appears to be supportive (in an indirect manner) to the notions of development for informal settlements as put forward by Abram Turner and Mangin through his concepts of capacity building for urban poor (Fegue, 2007). Quoting Hernando De Soto, Ananya Roy termed the Hernando framework as heroic. As mentioned and interpreted by Roy, Soto in his book "The Other Path" (1989), wrote that an informal economy is the people's spontaneous and creative response to the state's incapacity to satisfy the basic needs of the impoverished masses (Roy, 2005).

Ahmed (2016) explains that Marxist theorist correlates informal development with capitalist driven processes of urbanisation and globalisation, linking these to Neo-Liberal and capitalist development policies. As per Ahmed this highlights how capitalist development creates spaces of injustice in which the urban poor are excluded socially and spatially from the benefits of urban life (Ahmed, 2016).

In Pakistan, in cities like Karachi, Lahore, Quetta and Faisalabad, there is a considerable increase in the number of ***katchi abadi.*** There is a backlog of about 6.2 million houses in the country with an incremental demand of about 0.25 million units per year (Siddiqui, 2015) fifty per cent of the families live in one-room tenements, their family members ranging between eight to fifteen (Siddiqui, 2015). Urban centers are growing at a rate of nearly five per cent as against the national growth rate of 2.7 per cent (Siddiqui, 2015). Both rural and urban areas are badly deficient in basic infrastructure

Low income group constitutes sixty eight percent of Karachi's population (Siddiqui, 2015). The average population density is six thousand persons per square kilometer (Siddiqui, 2015). Between 1998 and 2011, average house hold size has increased from 6.7 percent to 7.3 percent (Siddiqui, 2015). This is due to the shortage of housing and not because of any increase in fertility rates. Eighty eight percent of the houses are built on One hundred twenty and less square yards (Hasan, 2011). Houses built on four hundred to eight hundred square yards are two percent of the total houses and they occupy twenty one percent of the total thirty six percent of the residential land of Karachi (Hasan, 2011).

According to Hasan (2017) Machar Colony covers about four and a half square kilometres with a density which is four to seven times higher than the average for Karachi. In his view the congested settlement is not planned properly is under serviced and yet continues to expand. Unofficial and haphazard land reclamation that involves informal developers and som community members (mostly migrants), through dumping solid waste takes place unchecked, is large parts of the settlement are situated on what used to be mangrove forest and marshland, hence subsidence is an issue (Hasan, 2017).

PRIMARY FINDINGS

Methods to Obtain Land for Construction

Land in Machar Colony is reclaimed by first marking the boundaries by wires and bamboos and then clearing mangroves and dumping construction waste and debris. Respondents mentioned that an area in marshes covering two hundred square yards costs three hundred thousand Pakistani Rupees. A dumper of waste costs four thousand Pakistani Rupees and a two hundred and forty square yards plot needs seven to ten dumpers for filling.

Once the land is reclaimed and entitled, the sale and purchase of lot or house continues as per the local business norms, except that most of the dealings are bilateral and the involvement of a middle man or real estate agent is minimal. A stamp paper, father's or neighbour's Computerized National Identity Card (CNIC) and Karachi Electric (KE) meter number is required for sale or purchase of land. Earlier there was less sale and purchase of land and more of grabbing. Now since almost all the land is grabbed except the area towards mangrove bushes) so more sale and purchase business is prevalent.

Figures 8: Thallewala courtyard at Machar Colony

Figures 9: Thallewala yard at Machar Colony

Role of *Thallewalla* (block-makers)

It is estimated that the number of ***thallewallas*** operative in Machar Colony are around sixty and they are mostly Pashto speaking people. Cash and blocks-on-credit are the two mechanisms of transactions. The repayment time varies but four months is the average time period and the repayment is done monthly. Almost all agreements are verbal and a ***khata*** (register) is maintained by the lender. On an average seven hundred blocks are required to make one room. Those who have more money at their disposal prefer to use four inch block, otherwise three and half inches block is more popular. Four inches blocks are used mostly in pillars. Bengalis prefer three and half inches blocks more than four inch block. The cost of one block is sixteen Pakistani Rupees. One cement bag costs five hundred Pakistani Rupees and three donkey carts of gravel can make one hundred and ten to one hundred and thirty blocks. A ***thallewalla*** can provide mason and, if required can act as an architect as well (Figures 8-10).

Because of security concerns tenants are required to have a guarantor who is responsible to the landlord if any breach of agreement takes place. At times, ***thallewala*** act as a guarantor for the would-be-tenant, as he knows everybody and also the people of the locality know him. He is also the fulcrum for all construction purposes, as after obtaining a plot one has to be at good terms with him for the construction of the house. The social network is also advantageous to him as well as to the potential landlords and tenants in the offing.

Over the years the institution of the ***thallewalla*** has also transformed. Earlier the blocks were made manually and now this system is mechanized. The mode of transportation

Figures 10: Another construction yard at Machar Colony

of block has also gone through changes, as earlier the blocks were transferred on donkey carts and now they are transported via mechanized modes.

Construction and the Changes Over the Years

Pacca (RCC roof tops) houses are more in vogue now. Earlier the houses were made of mud, bamboos and plastic sheets. Manually mixing is time consuming and with the advent of motor operated mixture machine per day production of blocks could is enhanced and hence the daily sales. Similarly, to transport the blocks on donkey is time consuming and numbers with limited transportation capacity whereas if Suzuki pick up is available with those ***thallewallas*** they are able to transport more blocks in less time.

With the community getting more educated and style conscious, the houses are getting fancier in their outlook. Previously, the washrooms were simple, made of cement and mortar but now most of the people want tiles.

Figures 11: Interior of a Jheenga wara

Figures 12: A house foundation sinking in Machar Colony

Earlier, the construction of the house was a community venture and hence there was on associated feeling of ownership. The owner before starting the construction used to serve the neighborhood with a ***daig*** (large bowl for cooking) of ***biryani*** (cooked spicy rice mixed with meat) and labour for construction was provided by the community. With the advent of education and accompanying individualistic culture, this practice has changed and now the labour is hired on daily wages.

There is no standard design for a house, as they are purpose built and incremental. Streets are encroached, staircases are extended and protruding ***chajjas*** could be observed in the street. To save space and cost, earlier built houses had common walls on which the roofs of the adjourning houses rested. But with the growing demand of privacy this practice is now discontinued. Since Bengalis are a less privileged community, construction and façade of their houses do not exhibit opulence and are less showy, as compared to houses owned by Pashtuns and Balochs of the area.

The Gender Grant

The role of women in the house construction has enhanced over the years. Earlier the making of house was an entirely male rather masculine issue. Two factors are pivotal for the increasing say of women in making of a shelter. One is enhanced education of women of the area and an accompanied desire to demonstrate 'taste' in the built environment, and more importantly enhanced role as an income-generating partner. Women mostly are employed in ***'jheenga bara',*** in which they are supposed to peel the ***jheengas*** (shrimps) for further processing (Figure 11). Each women gets twenty Pakistani Rupees to peel one small bucket of ***'jheenga'***. A portion of the daily income is saved for incremental construction of the house. As one of the respondents mentioned "Singhar aurtoun ka shauq hae" (Beautification is women's passion).

Besides, women are perceived as good money managers. As Machar Colony is not leased, hence the community is not eligible for bank loans. For construction and for modification of houses women take part in committee system (Beesi system), in which twenty or less people pool money on monthly or fortnightly basis and one of the twenty members gets eligible for the accumulated money on her turn. The monthly contribution of the members varies from anywhere between two to ten thousand Rupees per month per contributor.

Challenges of Built Space

The sinking of settlement is an issue. As mentioned before, Machar Colony is a reclaimed land from mangroves' marshes and the sea itself. Though people spend quite an amount on soil refilling by purchasing debris and waste, still the soil is not cured properly and as a result one can see houses sinking. The windows of some of the houses have come down to the level of the lane. This is a common site. Every new house construction is one level up as compared to his/her neighbour's house, as a result in monsoons, the aged house get marooned and water stalled (Figure 12).

Moreover, the construction has become expensive as well. In year 2000, an eighty square yard single storied house could be constructed with an investment of Pakistani Rupees one hundred thousand. Now with the rising cost of construction, the cost of construction of the same can go upto Pakistani Rupees five hundred thousand.

Figures 13: Aerial view of a relatively developed part of Machar Colony

Figures 14: A typical street of Machar Colony

In Machar Colony, because of small plot sizes, parking of vehicles is an issue to reckon with. Though motorbikes are used by majority of the male community members, some do have motor cars as well. During day time, motorbikes are parked in the streets, making them narrower for traffic. The car owners hire spaces away from their house at a cost of Pakistani Rupees thirty per day for parking their vehicles after dusk in a secure area (Figures 13-14).

The Real Estate Market

Professional real estate agent is a rare commodity in Machar Colony and the real estate market functions through 'acquaintances' and within people of defined communities. Machar Colony has a different mechanism prevailing for the commission on real estate rent. Here, the landlord pays commission to the middleman and that usually does not go beyond one percent of the total monthly rental. In some cases the landlord requests the middleman to reduce the commission further. From the interviews conducted it may be safely concluded that the rental dynamics in Machar Colony is dictated more by social connectivity than the hard core financial considerations.

As mentioned in earlier sections, at the time of this study rumors were strife about the possible land use change of Machar Colony and forcible change of hands. Some of the respondents mentioned that land will go the Malik Riaz of Bahria Town (a private development) with incumbents acting as conduit. A couple of others mentioned that KPT will build infrastructural facilities for the China Pakistan Economic Corridor (CPEC) on the land where Machar Colony exists fight now. These stories had linkages to the reported and alleged displacement of people along the railway tracks which pass from the Colony. As one of the respondents mentioned that "Hum maren ge, magar yahan se utthen ge nahee" (we will die but will not move out from here). As a consequence, the housing prices are stabilized and the boom of real estate prices that happened due to gang war in Lyari is now busted. Earlier a one hundred and twenty square yard house with multi story construction could have gone to Rs. five million Pakistani Rupees. Hence the uncertainty related to development projects has lead to stability in real estate prices.

It is feared that, in the years to come, the population living in Machar Colony will be removed forcefully. Keeping in view the exponential rise of land prices in the city, KPT certainly wish to make the most of it by removing the inhabitants and selling the land to the commercial sector. The sporadic eviction drives by authorities are not uncommon and the fear of the community is not unfounded. That was exhibited in the conducted interviews and triangulated through media reports (Shah, 2017).

The deteriorating law and order situation in the adjourning Lyari neighborhoods has caused an influx of Baloch ethnic population to rent houses in Machar Colony. As many Baloch traditionally are associated with fishing business, the proximity of Machar colony with Fisheries act as a catalyst in pro-displacement decision making process. This coming in of a new ethnicity has a bearing on both the culture and rental business in Machar Colony. The rent for a single room is two thousand Pakistani Rupees per month with one community toilet and a bathing place. Such arrangement is mostly availed by bachelors and not families. Rent for a floor is three thousand Pakistani Rupees per floor with the privacy of a washroom. Usually one floor has two to three rooms on it.

Gender and Public Space

The residential facility varies anywhere from forty square yards to one thousand square yards. However, majority of the houses are built on eighty square yards with two to three rooms in a house.

The males use streets, hotels, mosque and shops as places for socialization and entertainment, as most of the hotels have a cable TV or USB facility to show movies. Women use places of work, besides homes, for social interaction with other women.

Women movement is dogged by the wandering youth. The corners of the streets are the hotspots and or at ***chai khanas*** (tea serving small hotels), those frequently pass comments on the young girls. In the past (before Karachi Operation - 2013) women were abused both physically and sexually.

Fisheries is a blessing for females as it provides job opportunities close to their dwellings, and because of this proximity women have no hesitation in accepting night shifts as well. The number of women earing has increased over time.

Majority of the girls in the area are deprived of educational opportunities because of two reasons: they don't have computerised National identity cards (CNIC) and they don't see any future opportunities after getting educated. Despite these setbacks, it was observed that girls' education is on the rise. This is because of the sporadic occurrence of private schools in the vicinity that are catering to the rising demands of education.

The CNIC and Land Entitlement

While for Pashtuns and other bonafide citizens of Pakistan lack of provision of civic amenities is the biggest problem, the priority of Bengali community is the recognition of their citizenship by the state institutions: denial of CNICs renders those stateless. People are living there since ages but are called and recognized as Bengali (citizens of former East Pakistan and current Bangladesh) by the state institutions, but they face a serious identity crisis.

This grave issue has a domino effect. For instance police personnel can pick up any boy from anywhere. They do it on a regular basis and later release them by taking any amount from ranging Pakistani Rupees five to ten thousand. As a result the community lives in perpetual fear. Those Bengali immigrants who entered the country after 1974 are still not entitled to citizenship, but they can get informal temporary registration and permission to work. According to the rules of the defunct The National Alien Registration Authority (NARA), all those illegal immigrants who entered the country after July 10, 2000, have no right to work or do business and are, in fact, they are supposed to be deported (Dharejo, 2010)

As per the law of the land CNIC is an absolute requirement for land entitlement. Those who have CNICs can easily become the land owner irrespective of their share in the purchase or other necessities for inheritance.

The Commercial Spaces

It was observed in Machar Colony that there is no clear demarcation or segregation of commercial and residential land uses. Small shops are carved out from houses and mosques. ***Jheenga bara*** and fish drying spaces are located right in the heart of the residential spaces. A typical street, hence could be a combination of shops, tea shops, places of worship small shops, ***jheenga bara,*** fish drying godowns and in some instances small cattle farms can be seen on a regular sheet as well.

Commercial spaces are dominated mostly by males, though customers could be of both genders. However, little girls are found in the streets selling homemade food stuff to other children and at times to adults as well. Gender insensitivity could also be observed, as foul language in public spaces is more a norm than exception. This male domination has a bearing on the construction style as well. Unlike designing of houses, women have least say in commercial spaces and hence those places display a blatant gender disparity.

Because of lack of open spaces, children have fewer opportunities for outdoor sports. Moreover because of vehicular traffic (dumpers, water tankers, commercial vehicles and trucks), they are cannot play in adjoining lanes and streets. Number of motorbikes has increased tremendously over time. In the absence of footpaths and encroached streets by commercial ventures walking becomes quite a task. (Figures 15-18).

Figures 15: Children playing in the streets in Machar Colony

Figures 16: Children selling home cooked snacks in Machar Colony

Figures 17: A grocery shop in Machar Colony

Figures 18: Entrance to the jheenga wara

Civic Services, Social Dimensions and Impact on LandUse and Housing

Electricity

After submitting application for a Karachi Electric (KE) meter, it usually takes fifteen days to two months to get the meter installed. The bribe rates could vary from Pakistani Rupees five hundred to five thousand. Once a house gets electric connection, the household gets confidence about the land ownership. Load shedding, irrespective of the weather, is common for two to three hours at a stretch and happens three times in a day. In case of technical fault, maintenance of electric lines (after pole mounted transformer (PMT) is achieved by pooling funds and on self-help basis. Many houses have installed ***kundas*** (illegal direct connections) for getting electricity. To penalize the community for non-payment and perceived threat of electricity, KE is used to switching off electric breaker at the PMT. In such a scenario a Community Based Organization (CBO) called Sher-e-Bengal plays a role as it collects money from households and gets electricity restored on half of the due payment.

Potable Water

For Machar Colony dwellers getting potable water is an issue to deal with. People have to purchase potable water and that too is not fit for drinking purposes. Potable water is available through small or big tankers and for other utilities one has to get boring done in the house. The boring goes thirty five to forty feet below the ground and costs Pakistani Rupees twelve to fourteen thousand. Almost every house has dug up for 'boring', but the sub soil water is brackish. So people use brackish water for cleaning and washing, while they have to purchase potable water. The private contractors provide them through tankers, truck and donkey carts.

The prices for Suzuki water bowser are Pakistani Rupees twelve hundred per bowser and a Shahzore truck costs Pakistani Rupees two thousand per bowser. This browser is usually shared between three to four households and lasts three hundred and twenty days. Majority of the community uses mixed water. The supply of water to bowser is from hydrants located at the Hub River Road and also from Safoora Goth hydrant in District East of Karachi. To make water available for twenty four hours new house constructions have small underground water tanks constructed. Readymade fiber overhead tanks are also installed for overhead water collection.

Sewerage

Majority of the households rely on pit latrine systems. All the human excreta goes down and when the sea levels are up especially on full moon days, the waste washes away with the tides.

This contributes to the existing elevated water table of the settlement. Water is available at a depth of ten to twelve feet. This in turn contributes to the sinking of the settlement. When the street elevation gets low the community makes it higher by land filling, but the house level cannot be raised. To increase the level of the house a further elevation is required. Therefore the cycle continues.

Fuel for Cooking

Once a person has an electric meter installed by KE it is then easy to get the gas connection. Two years ago this costed Pakistani Rupees five thousand for a forty square feet pipe to get the gas connection. Now this cost has risen by three folds. Sui Southern Gas Company officials (SSGC) usually roam in the streets and one just has to request them for a connection and rest is taken care of by them. The monthly amount of the gas bill is Pakistani Rupees three hundred to four hundred per month. A wide spread impact of the availability of the gas connection has been that the ***Pashtun*** wood sellers (wood was used for coking purpose, method still prevalent in some parts of the settlement) went out of business and had to change their profession to block making. They got support from those who were already in the business.

Health Services

The provision of health service is mostly in the hands of private practitioners and quacks, where homeopaths are practicing allopathy. The most prevalent health issue is Hepatitis C, dermal infections, diarrhoea, eye infections, cataract and diabetes in old agers are other prevalent health risks. Birth attendants are not properly trained and they either learn by hit and miss, or claim to have that skill through ancestral lineage. Since the roads are not paved, dust and the accompanying allergies are common. As majority of the population is associated with fishing and allied industry, skin related ailments are an associated professional hazard. Because of poor solid waste management Dengue and Chicken Gonia are frequent epidemics in the area. It was also cited that because of increased human activities and associated waste, pollution has increased over the years. That was also held responsible for the unsatisfactory health situation in the area. To address the health related issues, a considerable number of NGOs have made Machar Colony their abode. They hire residential units on relatively higher rents to open up a clinic. Those NGOs also run awareness campaigns which result in some limited attitudinal change of the community members, regarding health and hygiene, and their method of operation has an impact on gender.

Solid Waste Disposal

Solid waste is not disposed through an agency driven system. Door to door service of waste collection is provided by young Afghan boys on a monthly payment of Pakistani Rupees fifty by each house in the locality. They collect, sort and dump the rest of the waste across the railway lines. In monsoons, the spread of the solid waste in the lanes and the presence of mud result in accumulated rain water (the rain water usually remains there for two to three months) and stinking sludge that accrues to the disadvantage of the residents and pedestrians with prevalent foul smells. Furthermore, the vacant plots in the area are used to dump wastes, making living conditions difficult for adjoining houses and across small lanes.

Education

There are two government schools in the area which are located at a considerable distance. Students have to travel a considerable distance, and in some instances, face sexual harassment by socially deviant elements of Machar Colony A considerable number of private indigenous English medium schools also cater to the children of the area. They are usually dark, dingy Dickensian style buildings with no facilities of play grounds or open spaces for physical activity. To tackle this issue, an NGO Imkaan, provides space for physical training, though to a limited number of students. Though there is an increase in educational attainment, but still a lot of children do not attend school. The reasons for parents

not sending children to school is inflation and associated unaffordability (government schools are far away and this appears as a particular problem for female students). One other reason for not sending children to schools is that fishing is a family enterprise and every member of the household gets involved in this business to maximize earning. It is to be noted that payments are made on per unit or as commonly referred to 'per piece' basis. As discussed above, families with better educational attainment have a different taste for living and decoration of houses. Some very educated families in search of 'gentry', prefer to move out of the fishing business and of the locality as well. Hence education is a means of upward social mobility resulting within city migration as well.

Credit Provides a Reason to Stay

Grocery is provided on credit by the neighborhood shopkeepers. Men go to the sea for livelihood and women are left behind to take care of the household. The credit basis is by and large extended on ethnicity as Bengali shopkeepers prefer to give credit to their own community, in all probabilities because of location of the shop within community and because of social network. It is interesting to note that the shopkeepers also act as a source of information for the interested tenants, as the community has a daily interaction with shopkeepers for grocery items and other necessities of life.

The monthly salary usually ends by the last week of the month and then onward grocery is procured on credit from the grocery shops in the neighborhood. Here the history, credibility and the pay back capacity of the person who takes the loan are the qualifying factors for credit. A long tenure of living in the neighborhood also helps to establish the required credibility. Hence people are hesitant to leave their neighborhood.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The above-mentioned discussion brings forth many issues that confronts a resident of Machar Colony starting from the decision to make Machar Colony his/her abode to finding a dwelling for daily living there. Most of these are contextual, portraying specific realities (proximity to Mangrove forests, almost zero ground elevation and being without CNIC) and others are a more specific reflection on how the city is governed and by whom.

In Figure 19, some of the important factors are summarized. It is important to mention that these are extracted from the authors' previous work and the eleven interviews for this study. For more authenticity, the sample needs to be scaled up. Those factors that frequented most of the interviews (between eight and elven interviews) are ranked as high factors, and those factors that were continuously reported in five to seven interviews were ranked as medium and less than five were ranked as low.

Besides the above analysis, the findings from secondary literature and the primary investigation could be summarized as follows:

a) Government owned land is easy to occupy not because of the lack of institutional capacity to protect the land but because of the tactical approvals of respective government officials for monetary interest.

b) The community is compelled to take risk of squatting on government lands because the price of land is high in the centre of the city, and it happens because of the comodification of land and housing. As a result it has become a struggle for the poor to locate themselves in the housing circuit of Karachi.

c) The informal sector provides land for housing and this causes to increase the land value. The market then eyes the value tagged land for high end commercial ventures.

d) Because of the uncertain legal status of both the land and the house, services of low quality are secured by paying high prices.

e) Social bondage solidifies with the presence of a homogenous ethnicity. In rental and ownership transactions that 'knowingness of each other' plays a considerable role for providing guarantees.

f) Public spaces for sports and entertainment (cinemas, parks and playgrounds) are not a priority in informal and indigenous land use plans.

g) Spaces for interaction evolve as the settlement defines its commercial, religious and cultural rituals, with a difference in typology of use for genders and age cohorts.

It is evident from the above-stated theoretical discussion that the current day mode of production of capitalism under the theoretical ambit of Neo-Liberalism has commodified the housing (Youth for Human Rights, 2002). This commodification accrues to the benefit of those who have a substantial purchasing power resulting in marginalizing of a large populace to fringes

S. No.	Factors	Low	Medium	High
1.	Comparative Low land cost (because of informality)			✓
2.	No commmpulsive building codes			✓
3.	Size of the house		✓	
4.	Easy concersions of residential spaces to commercial ones		✓	
5.	Land entitlement based secondary document (***parachi*** and KE meter number)		✓	✓
6.	Blocks on loan ny ***thallewalla***		✓	
7.	Proximity to place of livelihood			✓
8.	Neighbourhoods inhabited on ethnicity basis		✓	
9.	Grocery available on credit		✓	
10.	In adequate provision of civic services		✓	
11.	Fears of probable displacement	✓		
12.	Law and order situation	✓		
13.	Lack of parks, playground etc	✓		

Figures 19: Scale of Factors Affecting Housing as Deducted from Interviews by Author

of the city. The poor struggle for shelter and in the process create hope in despair by making houses, organizing lanes, procuring services (both formally and informally) and establishing commercial places of their own and yet face vilification of their neighbourhoods by the elite. Their efforts bring price premium to otherwise neglected land and then state and the market comes in action to make value out of marginality...and the process of marginalization continues.

4.2 Recommendations

a) The land ownership issue needs to the clarified between the institutions. Once the management of the land gets clear, it would be easier for the people to lobby for regularisation with political parties and relevant agencies.

b) It is recommended that the citizenship status of Bengali population be articulated in definite terms. It is observed from the interviews that they are not going anywhere. Once this has been established, they need to be supported for entrepreneurship in the fishing sector.

c) As suggested by experts for other ***Kaatchi Abadis*** (Ahmed, 2018), a housing needs assessment survey needs to be initiated in Machar Colony.

d. Low cost technologies must be promoted, subsidized and if needed provided through government sponsored micro-finance schemes to make housing affordable for the residents of Machar Colony.

e) To protect the mangroves forest from fading away, a densification plan with the help of local CBOs and NGOs needs to be initiated and popularized.

f) The planners and decision makers of the city need to change their standpoint on informal settlements and any plan for evictions should define the compensation package on the basis of the prevalent market rates and should encompass all aspects of dwelling investments.

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BIOMIMICRY PERMEATED ARCHITECTURE PEDAGOGY A METHOD OF INVESTIGATING BIO-MIMICRY AND DIGITAL TECHNIQUES IN TEH ARCHITECTUREAL DESGIN STUDIOS

*Quratulain Asghar**
*Syed Muhammad Zille Ali Naqvi***

ABSTRACT

In the emerging era of technology, the architectural world is taking inspiration from nature for solutions to its problems, which involve the study of natural design systems and various processes. This research investigation, carried out in the fourth year architecture design studio, aims to investigate bio-mimicry as a development process, involving it for architectural design. It also attempts to study innovation by integrating the digital tools like Rhino, Grasshopper, Ladybug and Para Cloud Gem. A new understanding of solving design issues with the help of natural processes and phenomena is the basic aim.

Natural systems offer design strategies to improve design thinking due to the availability of extensive repertoire; which makes incorporating multi-functional and self-organized biomimetic principles into the design process a requirement. This discusses an undergraduate design studio titled "Digital Design through Bio-mimicry" which was taught by the author in an architectural degree program at the University of Engineering and Technology Lahore, Department of Architecture in Spring 2018. Following the exploration of individual research topics, the findings were implemented into design solutions. It has been a critical challenge for the author to increase the skill of students about biomimetic thinking, making them learn about how to handle digital tool's performance issues, as well as making them work on the development of interesting form generation. The challenges encountered in the teaching process and future lines of the work are discussed in this paper.

Keywords: Biomimetic processes, Architectural education, Digital Techniques, Vertical Landscape, Computer-Aided Architectural Design.

INTRODUCTION

The bio-mimicry approach to education includes conducting short-term research on any selected phenomena in nature by the students themselves. The goal of the biomimicry-based studio was to develop innovative structures strongly inspired by a certain phenomenon in nature. The students' work helped to devise a framework for the studio teaching with bio-mimicry and digital tools.

The main aim of the studio was to conduct research based on the relationship between a natural phenomenon, processes, and CAAD (Computer Aided Architectural Design). The knowledge gained through studying a natural phenomenon or process was then used to interpret architectural solutions.

According to Oxman, 2007, processes are becoming far more interesting than ideas. Processes of generation are synthesized as a kind of accelerated motion, adding information integrally to the construction. This sequential, integrative addition produces more ambiguous effects, more capable of resonating on different levels than straightforward ideological statements, metaphors, allegories or reproductions.

Students were given well-defined and focused studio instructions that served as a reference. Through this exercise, a new working methodology was introduced in academia which was a fusion of traditional research practices and explorations in technology in architecture. The study area was demarcated and based on three basic components; namely, study of natural processes, study of working principles natural processes and study of natural phenomena. Nature is the cradle for some very interesting processes and phenomena. The attempt here was to learn from these and draw useful inferences in architecture. The objective of the project was to study the working principles underlying digital

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systems, such as information handling, visual programming, and modeling techniques. Each student explored these disciplines in their own way to develop an architectural form.

In the architectural curriculum, currently architectural design and learning how to handle digital tools are not taught separately. The strong categorical interactions between the two have become obligatory. In this exercise, the students were mostly considered to bring logic in the two fields by themselves. This exercise also intended to explore the computer models of various types and how the manner in which basic issues in design development can change with time, for example, space generation, assessment and eventually the role of the architect in the building design process.

The combination of all three components helped the instructor to explore various aspects of using digital tools in the studio. The approach and results of three best explorations are presented in this paper.

Literature Review

The search for new educational frameworks is due to the pedagogically unique impacts of digital design. Various researchers and educators have begun to address the need to integrate digital design in architectural design education, investigating various forms of pedagogical agenda. Design computation and digital design has an influence on the development of theoretical computational and cognitive approaches by various researchers as a foundation for design education and pedagogy (Oxman, 2007).

The researchers and academians all over the world have started to look into this matter with concern, as it has multifaceted outcomes. Contemporary software tools for form generation are partially being used to aid architectural design processes within the early concept and development phases in a studio (Rogers, 2018). However, these are limited to one or two techniques throughout the duration of architectural design projects. Enhancing this simple process with evolving techniques in a generative process and implementing interconnectivity will stimulate a new excitement and era (Arida, 2004), introducing innovative opportunities within all aspects of the architectural realm.

This first wave of practice-driven educational models has brought professional education in architecture to a new frontier. This condition now demands a process of redefinition of the intellectual and cultural frameworks of architecture, as well as for the theoretical foundations for architectural and design education. The need to accommodate the scale of change in professional practice with its new demands of requisite knowledge and skills, presents the design pioneers with a challenge to create theory of architectural education and design pedagogy that acknowledges the scale and qualities of theoretical, professional and technological changes. In the case of such a broad cultural shift, there is a need, first of all, to reconsider the theoretical basis, its related knowledge and its design methods in relation to emergent digital technologies (Oxman, 2007). The foundations of this research are also based on the relationship and connection between architecture and nature. The way the design process is approached is that designers look at nature, specifically organisms or ecosystems, to solve a particular human need; and by doing so, these types of behavioral processes are converted into man-made design solutions. This is imagined as a combination of biology, nature and architecture into one composition (Yazici, 2015).

The biomimicry debate has brought fourth many questions, criticisms and solutions. It almost seems unethical to use architecture to separate man from nature. Today there is a new form of design, has been introduced some time ago which requires a modern man to look to nature for solutions for to architectural and sustainable problems that exist today. These solutions have been around for decades but only recently have their true potential begun to emerge. The question is; can the philosophy behind living organisms be taken and used to aid the development of mankind? Is the process of applying biological principles to understand structures and functionality of biological entities and its connection to man-made design logical. It is “an engineering discipline that emulates nature’s design and processes to create a healthier, more sustainable planet” (Amer, 2018: 16). This studio work is based on a methodology that imitates nature and, as we all know that nature is a complex cradle of knowledge, so digital tools have been used to pursue the process to bring in the innovation in architecture’s form development process.

Teaching Methodology

The studio consisted of forth year undergraduate architecture students. Their architectural education and the knowledge of design are more or less at a similar level. In terms of technical skills, although some participants attained better skills related to the advanced 3D-Modeling, a majority of them had no experience with digital tools in the past. Introduction to the basic digital tools like Grass Hopper, Rhino and Para Cloud Gem was piloted through lectures in initial classes.

Rhinoceros is a 3D modeling software that supports its user to precisely model their designs. It is known to be surface modeler for a free-form NURBS. Rhino today is being used for all types of architectural rendering and analysis. Grasshopper is a special plugin integrated with Rhinoceros modeling tool. It is a visual graphical algorithm editor. It is not a programming or scripting tool but still allows architects to visually program their design. While Para Cloud Gem is a tool which deals with different meshes to produce a generative 3D design. It populates all kinds of geometrical modules or component over different meshes, resulting in the production of complex 3D and parametric models.

There was a total of thirty students in the studio. Three different projects were introduced to the students. Students were divided into three groups, each group comprising of ten students. The basic aim was to bring variation and variety in the projects. Three projects which are discussed here were to design a vertical scape in Lahore. The major reasons for selecting these three projects for this research study were:

- These projects were completed with maximum details and illustrated step by step research and design process, will in the majority of other projects process was missing.
- To critically analyze and compare the process of design, projects from the same group were selected.
- All these depicted are depicting the abstract transformation of biological research into architecture which illustrated entreat thinking in architecture.
- Lastly, extensive use of digital software and the plugins could be clearly seen in these three cases, as compared to other projects.

The major issue with the methodology used was that the students started using newly learned population techniques randomly on the facades without linking it to the research. Majority of them were so excited to use these newly learned digital techniques in their project that they started to ignore the fact that they have to connect it to the research. The other major problem was the lack of background knowledge of the subject. This method of designing was introduced to the students for the first time during their four years in the Department. There was a varied type of anxiety, fear, and lack of self- confidence that instructors had to witness. Majority of them were confused about both the research-based design process as well as the implementation of the newly learned digital techniques. Introducing this method in fourth-year design studios was intentional: instructors thought that students at this level would not be rigid and will captivate the misunderstandings and apprehensions associated with the use of technologies to design. But it turned out that this approach's rigor, depth, and extensiveness lead to quite a bit of misperception in the student's mind that could be witnessed in their projects. To resolve this major issue it was decided to introduce the theory on the subject in the early stages of undergraduate studies from next year onwards which will hopefully bring a major improvement to the overall learning experience.

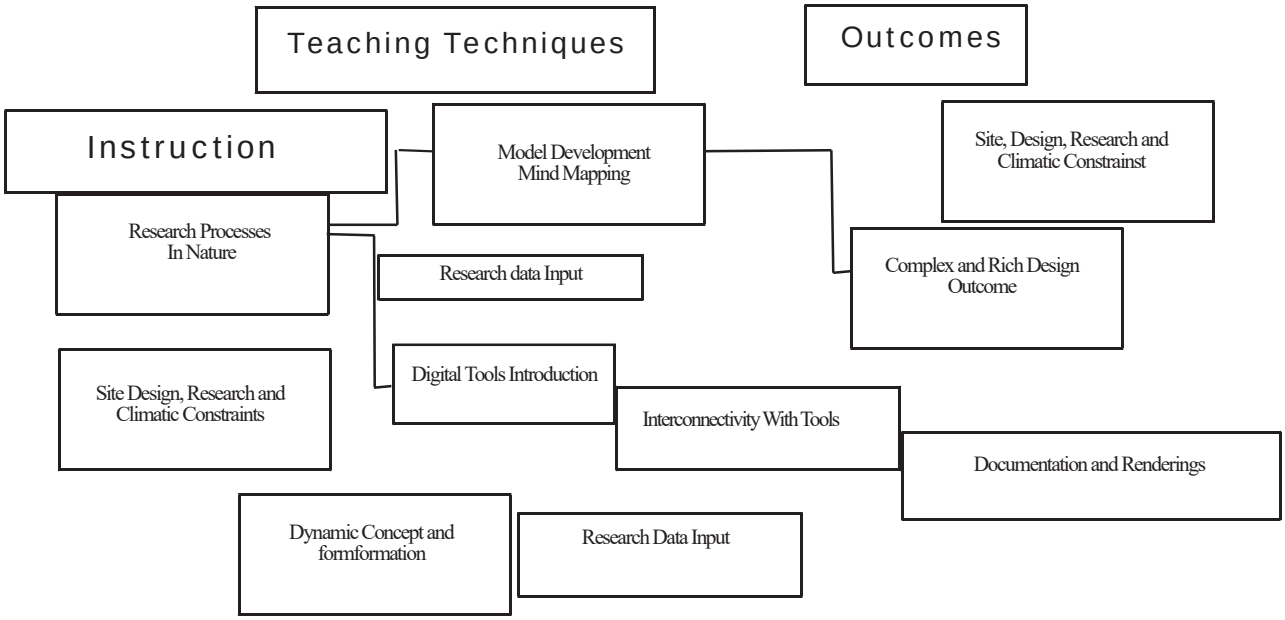
Although this approach blatantly put emphasis on process over final results, it was not very well attuned with the students and they kept on focusing on the materialization of architecture, which was purposely not discouraged by the instructors.

It was also felt that investigation of new design vocabularies may require different stages of exploration. This synchronization could be achieved only by liberating the student from prospects that they had learned from the conventional design approach, which was not fully possible to achieve during this short four-month semester.

Students were provided with the following four sets of instructions to work on as part of the course:

1. For the first three weeks, the students were told to explore and research on the natural processes or phenomena of their interest. They were supposed to study in detail each aspect of the various phenomena in detail.
2. Then they were instructed to design an architectural module by narrowing down the research and were taught to mind map their research.
3. Next the student were asked to enlist and specify site research and identify environmental constraints.
4. To further develop their design and incorporate the enlisted constraints in their architectural design, they were then directed into using their research and find solutions to the defined problems.

To help them do the above, it was made obligatory to use digital tools including Rhino, Grasshopper and Para Cloud Gem. Majority of the students preferred Para Cloud over



Fiure 1: Proposed framework for the design studio.
Source: Author

Grasshopper, but few did a great job exploring it. Figure 1 shows the framework for this studio with inputs as instructions, teaching methodology and the outputs as the final project. The proposed methodology diagram treated the tools as a central component of interaction, as the design cannot be complete without them. This framework focused on implementing innovative procedures singularly and collaboratively to invoke new experiences and definitions of architectural designs.

Limitations and Challenges

Design studios are a vital learning experience for students. The aim of this particular design studio was to explore the concept of Bio-Mimicry to produce varied innovative results and to analyze various techniques that the students adopted to reach a final product. This studio's working methodology additionally included enhanced courses and seminars, based on digital tools handling, which was fed into the studio. This studio experimentation went beyond teaching pure skills and necessitated reflection upon the creation of knowledge, which was analyzed and studied by the instructor to develop a framework for digital architectural pedagogy. However, a gap was witnessed between skills training and the application of knowledge within this studio environment.

During the final presentation some of the students were not able to identify how they arrived at their solution and there was visual imprecision in the design connectivity. Another concern was to make sure that students transformed the research knowledge that they had gained and apply it accurately to the final product, as most of them were not keen in using the knowledge and skills they had gained earlier. Majority of the students had a tendency to change their learning foci to the previous semesters' learning. This issue was addressed by linking the design decisions with research attributes and inquiring about how to take informed design decisions. The assimilation of research knowledge allowed participants to understand the impact of each decision taken on the design of their project. This helped in clear documentation of the design process and research findings. The participants also developed and communicated their understanding of architectural design by utilizing their skills within the design-studio environment, which was aided by regular discussions with the instructor and enabled the students to think about design solutions in alternate ways.

Although the studio instructions were the same for every student, yet, the outcomes were varied, different and unique. Two major approaches were distinct, where one approach considered the relationship between nature and architecture, and was based on the inspiration of architectural form through natural forms and imitation of its properties, such as patterns. The other approach was based on learning's from natural forms, by trying to understand the systems and processes in the environment.

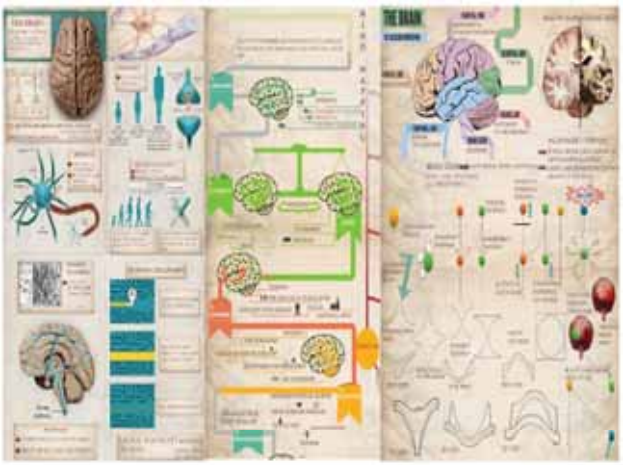


Figure 2: Presentation panel site constraints.

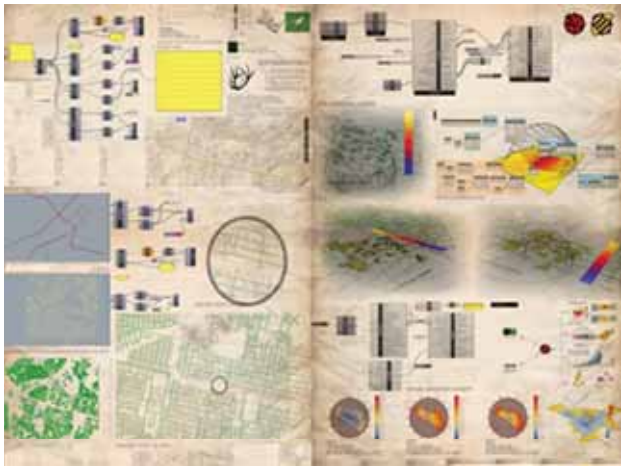


Figure 3: Detailed environmental analysis presentation.

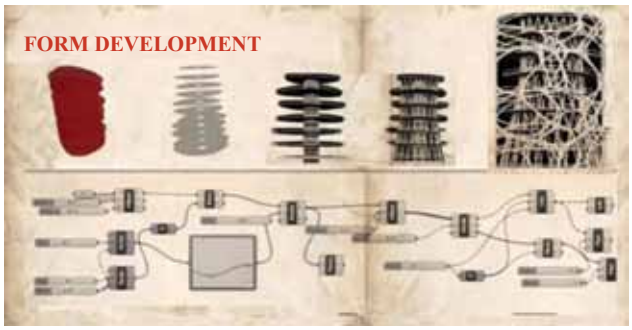


Figure 4: Development process presented using Grasshopper function.

The students were instructed to propose design of vertical landscape in the city of Lahore. The processes which the students investigated varied from neuro-plasticity to the structure of glass sponge, to process of pollination. Students with different technical skills used different mediums to present their ideas, by specifying constraints, rules and relationships of the system with architectural needs on site. The result achieved outputs were grouped into two different categories; a) generation of morphological and organizational relationships and b) mimicking of properties and processes in nature.

Exploration 1: Neuro-Plasticity

In the chosen project the student researched the interesting process of neuroplasticity and attempted to design a vertical landscape tower inspired by the process of neuron morphology. Neuroplasticity can be defined as the brain's ability to change, remodel and reorganize for the purpose of attaining better ability to adapt to new situations. Neural networks are not fixed and they occur and disappear dynamically throughout life, depending on experiences. While one repeatedly practices one activity such as a sequence of movements or a mathematical problem, neuronal circuits are being formed, leading to better able to perform the practiced task, with less waste of energy. Once one stops practicing a certain activity, the brain will redirect these neuronal circuits by a much known 'use it or lose it' principle (Demarin, 2014).

The phenomenon of architectural interpretations of nature was studied and then its architectural interpretation was evolved by applying it to real site constraints. The initial research was narrowed down to designing an architectural module based on the basic principles of neuroplasticity. The environmental, structural and social constraints on the site were also analyzed (Figure 2). This particular student worked on the lady bug and honey bee models (Grasshopper Plugins for Environment Analysis) as inspiration using Grasshopper Plugins for Environmental Analysis. The student performed the detail environmental analysis (Figures 3). The selected site was located at Phase V Defense Housing Authority Lahore's commercial area, as the weather of Lahore is hot and humid for almost eight months, the façade was designed in a way that it reduces solar gain. The double skin façade was inspired by neurons connectivity and linkages and architecture solutions were provided to avoid direct sun and to provide a dynamic play of shadows. As the site was located in one of the posh residential communities of Lahore the provision for privacy for residents was important and a buffer space was provided in the design. The project resulted in vertical tower design, optimal size structural columns and reduced floor size. The structure was specifically designed to handle the wind pressure at the top for structural stability (Figures 4). The floors were designed with the computer programme called Grasshopper so that the model could be rotated and reduced according to the needs and constraints of the project.

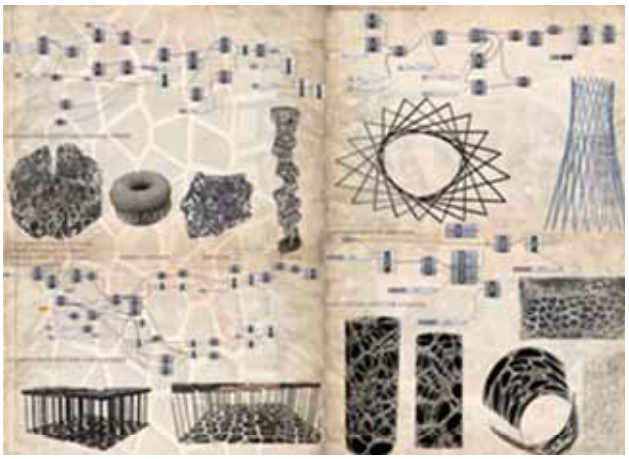


Figure 5: Structure and Facade development process using Voronoi Technique in Rhino

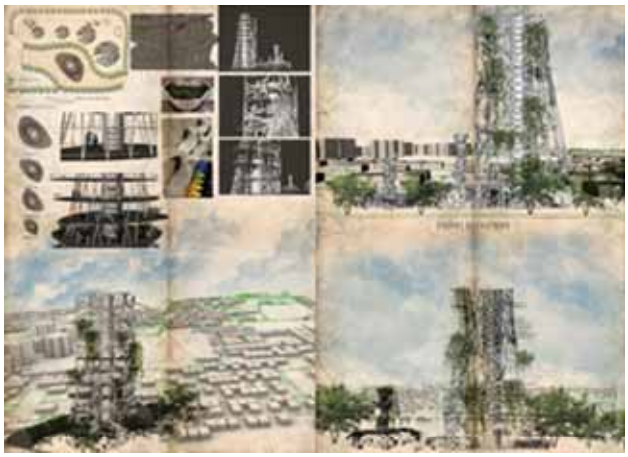


Figure 6: Final Visualizations of the project.

The main concepts of this process investigated were neural changes and morphosis, which could be applied on design variables, and which could be altered according to the studied constraints, programmatic requirements and structural needs, to satisfy the design criteria.

The method adopted resolved around the problem of distributing a given amount of material in a design domain, subject to load and support conditions, by maximizing the stiffness of the structure. It calculated stresses affecting the geometry, based on specific boundary conditions and loads, and organize efficient structural arrangements. The students also investigated neuronal migration, which is a process in which neurons travel from their 'place of birth' in fetal ventricles, towards their final position in the cortex and the process was used for the development of the skin, with the use of Voronoi (Voronoi diagram is a partitioning of a plane into regions based on distance to point in a specific subset of the plan) (Figure 5). The tower form was then shaped according to the forces of pressure and forces existing on the site.

In the process, CAD and visual programming tools like Grasshopper, KARAMBA, (Karambais is an interactive, parametric finite element program which lets one analyze the response of 3-dimensional beam and shell structures under arbitrary loads) Elk, (Elk is a set of tools to generate a map and topographical surfaces using open source data from Open Street Map.org) USGS Heron, (Heron is an add-on which enables the import of GIS data from various sources into the Rhino/Grasshopper environment, located, scaled and cropped based on an Earth Anchor Point and a clipping polygon) and Lady Bug were used for environmental analysis. The boundary conditions, including loads and support regions of the tower, were defined. During the process, a series of iterations were also developed.

Grasshopper -a plugin for Rhinoceros software- was used in the process as a parametric modeling tool to develop drawings of student concepts. The plugin is mainly an algorithmic modeling tool for Rhinoceros which provides a visual scripting interface, allowing users to build their three dimensional models without prior knowledge of complex programming languages or scripting experience. It is worth mentioning that Grasshopper was used as a tool in the design process; it can be an extension of the process, which enables architects to create innovative new possibilities and to test a variety of new ideas in a quick and easy way. The final visualizations of the project can be seen in Figure 6.

Exploration 2: Glass Sponge

The second significant exploration was based on the concept of a glass sponge. The glass sponge is a deep water animal identified for its convoluted glass-like skeletal structure. This student studied the structure of a glass sponge, its morphology and movement and then interpreted the architectural design for a vertical landscape in the city. Sponges are interesting deep sea creatures, their unique characteristic begins with their mineral skeleton that is composed of silica (glass) spicules and continues with their extraordinary capacity to create astonishing glass structures. The morphology of these creatures is also incredibly different from other species due to the structure of their cells and the three-dimensional symmetry (Barbanera, 2017).The architectural module was derived by narrowing down the research on sponges with the help of mind mapping shown

Figure 7: Mind Mapping to develop the module.

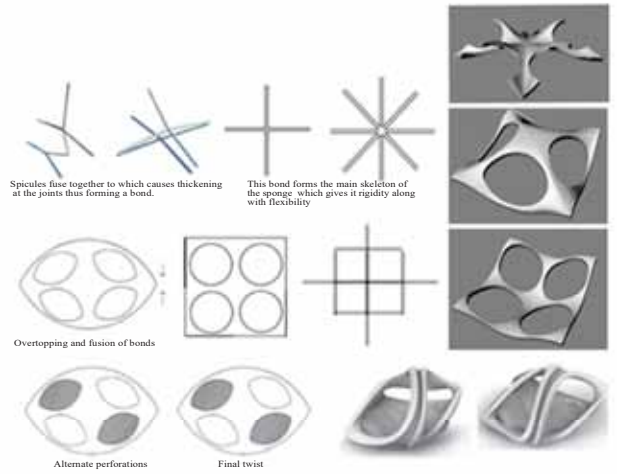


Figure 8: Development of the module.

in Figure 6. Glass sponges spicules interwined together to form a very fine mesh which gives it's body a firmness which is usually not found in other sponge species, and allows glass sponge to survive at greater depths in the water column. Learning from the sponge's structure which is a thin-walled, cylindrical, vase-shaped tube with a large central atrium, architecturally, this detail was adapted to design the module (Figure 7). A detailed study and site survey was conducted by the student for user analysis, traffic, and climatic analysis to chalk down the constraints (Figure 8).

The body structure of glass sponges is a thin-walled and tubular form with a large central atrium. These creatures reach larger heights, turning and twisting and forming bends. The base of the sponge is usually narrower than the top. It is also seen that the glass sponge has a diagrid structure (Chu, 2010). To interpret this in design, full-length columns were designed at the periphery of the tower with cross diagrid enclosing the structure. Structure of the fiber in the glass sponge shows layers that give it rigidity and prevent it from buckling. This method was applied to the building structure by using various layers to ensure stability in design. Column bracing was proposed in the design which had alternate reinforcement, and used less material but offered the same amount of strength as that of a fully braced column. The shape of the architectural and structural form used the Voronoi Diagram, which is one of the most important trends in seeking new forms of expression in architectural design. In shaping contemporary architecture, the Voronoi Diagram is a synergetic solution for a new generation in architecture (Nowak, 2015). This tessellation was used to design the architectural façade of this tower (Figure 9). The use of Voronoi diagrams was visible in the design. Open spaces, gardens, theaters, and other similar space were placed in the individual cells of the Voronoi diagram. These diagrams were used in searching the immediate neighborhood, determining the function of the position (vertices), finding the largest empty circle (cell), and path planning (edges). These diagrams were also used in determining the optimal deployment of infrastructure or functional separation (Nowak, 2015).

Here the Voronoi technique was used to design the double mesh skin that helped in filtering direct sunlight. When viewed from the top of the glass sponge it was composed of the Voronoi pattern. This pattern contained many nodal points which enhanced the connectivity, hence it was used to design the master plan and pathways. The glass sponges are usually found clustered in nature. They cluster around in such a manner that they usually have a common center point. Inspired by this phenomena the three towers were placed in a way that they depicted clusters and had a common attraction in the center (Figure 10). The module was also designed in a pod-like form with a double envelope to control the direct sun. Their cells were fused together, resulting in one large multi-nucleated cell that is folded around a mineral skeleton.

Glass sponges can use this fusion to spread electrical impulses to regulate their filtering actions.The triatomic symmetry is made of three axes that are perpendicular to one another, creating a three dimensional structure (Chu, 2010). The same principle was adopted here to design the structural core and façade of this landscape tower.

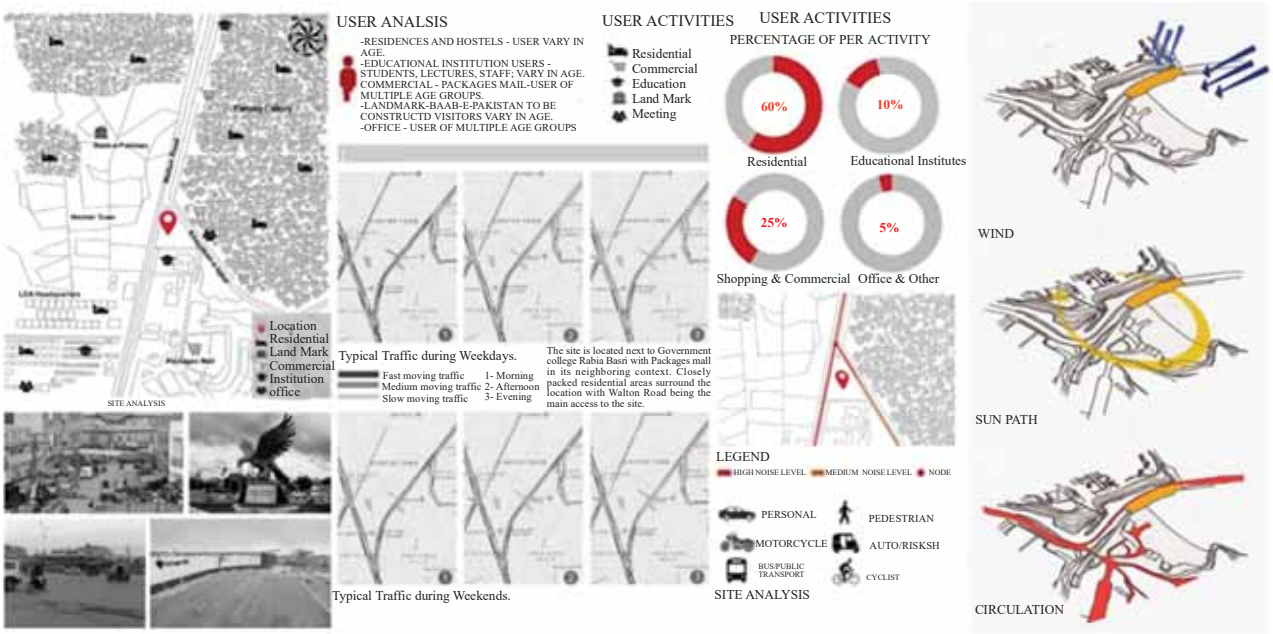


Figure 9: Details of site analysis to study various constraints.

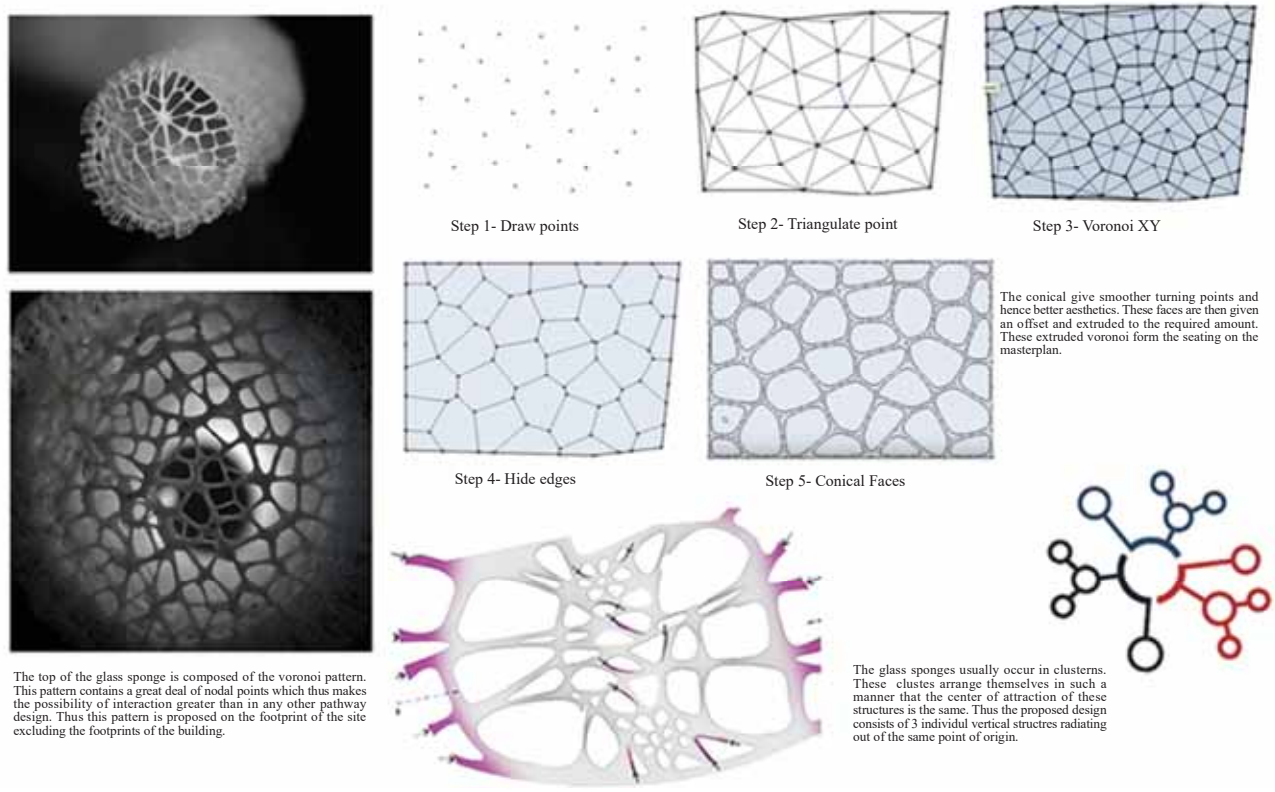


Figure 10: Details of using Voronoi Technique to develop the façade of the tower as a top of a glass sponge, composed of Voronoi pattern in nature.

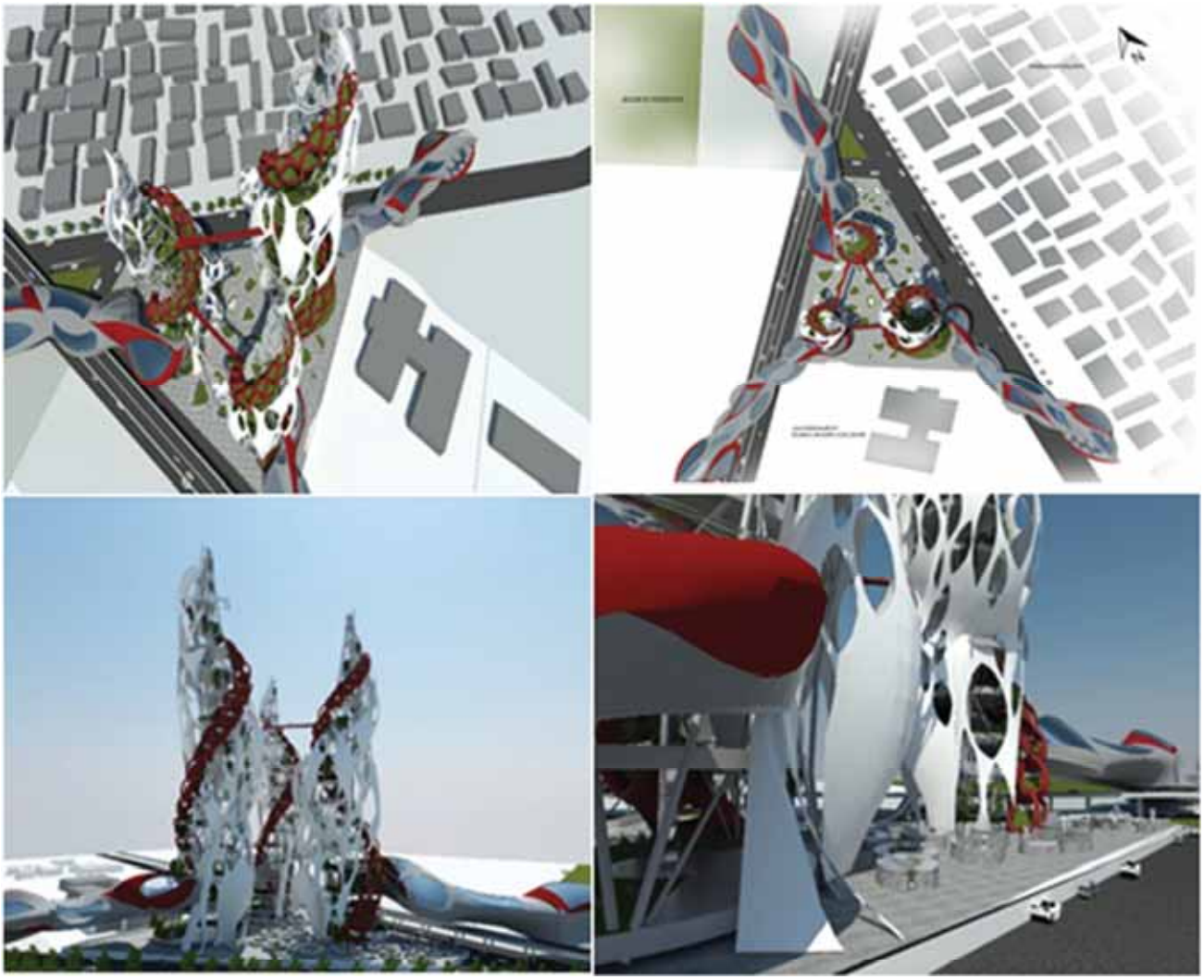


Figure 11: Architectural Visualizations of the landscape towers inspired by the Glass Sponge Morphology.

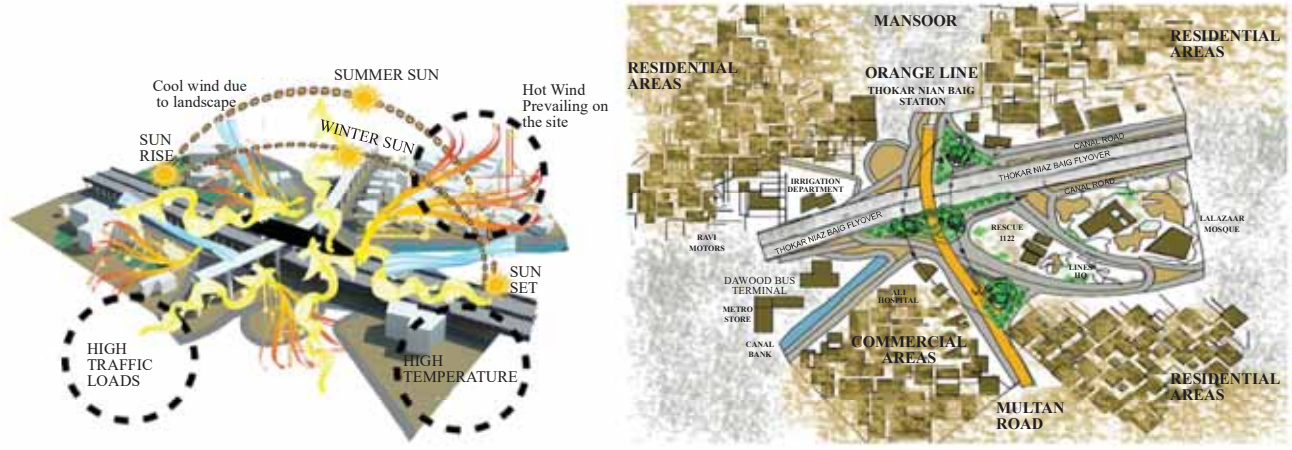


Figure 12: Climatic analysis for site constraints.

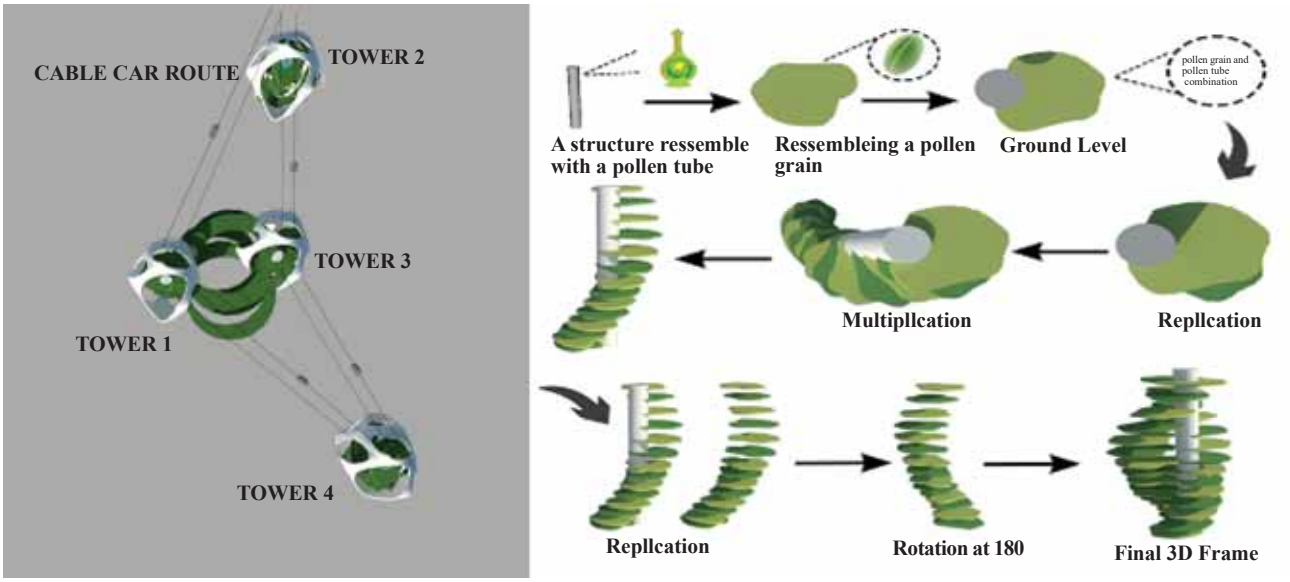


Figure 13: Step by step process of Evolution of the form for the landscape tower.

Exploration 3: Pollination

The research for the next project was conducted on the process of pollination. After exploring different phenomena linked with pollination and studying its types, a mind map was drawn to design an architectural module. The design challenge was to solve the problems associated with urbanization, such as pollution and global warming, by designing a vertical landscape. The student selected the site of Thokar Niaz Baig in Lahore to design vertical landscapes. This site was a highly urbanized area, had a high level of noise pollution and heavy traffic loads, and badly needed some green breathing space. Different issues were identified regarding the site, which were related to climate and social life (Figures 11 and 12).

The process of pollination involves a pollen grain being transported to the stigma, where it germinates and its pollen tube moves down the style to the ovary. The gametes are held within the carpel and later produce the embryo. Different types of animals are responsible for this pollen transfer and act as part of the pollination process. Some of these include bats, birds and even land mammals, but the most common pollinators are insects (Dar et.al., 2017).

The captured pollen initiate a complex series of events that can lead to the hydration and germination of the pollen grains, and ultimately to a dispersion of the pollen tube and fertilization. The master plan of this project was inspired by the process of hydration of pollen grains (Figure 12). According to the site constraints, there was too much noise,

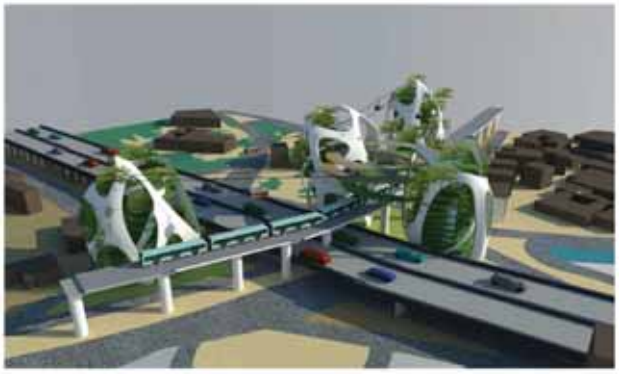


Figure 14: Architectural visualization of the three vertical landscape towers on the site.

pollution, traffic load, dust and urbanization on the site so one structure couldn't address all the issues. Thus, four vertical landscape towers were designed on the site in the near vicinity. The hydration cycle of pollen grains helped the student to vary the sizes of the four towers designed on 2n formula, because of the availability of unequal land pieces. Inspired by this cycle, size variations in these structures were calculated that resulted in interesting forms of the towers (Figure 13). An architectural module was designed, based on the concept of morphological characteristics of pollen grains, which were categorized into different groups (Figure 14). The three dimensional form accommodated the different attributes of the tower taken from the process of pollination and the process was interpreted by using terms like repetition, reproduction, copy, deflection, alteration, shift and replication. Exposure to the outer environment and feeling of grandeur and

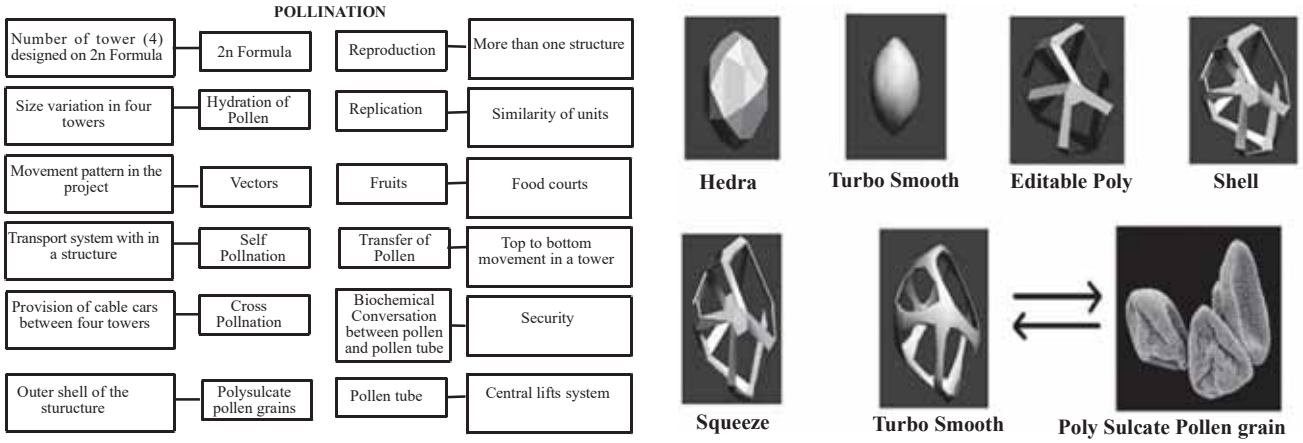


Figure 15: : Relationship diagram showing research and evolution of the module inspired by PolySulcate Pollen grains

openness at the same time provided the feeling of security, surveillance and sense of territory in the design. Huge perforations in the outer skin of the building allowed proper sunlight to come inside for enabling the plants to grow green. The master plan mimicked the process of pollination. These four towers were linked together through bridges and cable cars for easy transportation. This student limited herself to the use of 3D Studio Max and Paracloud Gem softwares.

Discussion and Analysis

This studio was initiated with the objective to explore organisms and nature with a particular characteristic and processes, which the students found intriguing through a process of discovery. When the students were given freedom to choose and select the domain of their study area, they automatically took the responsibility for maintaining the veracity of nature's designs. When the students began to understand the selected organism and then process, it made their process of abstraction more trustworthy. Use of abstraction and mind mapping and an open-ended process of interpretation, helped students in translating the biological characteristics into a unique design approach. The strength of this studio's approach was based upon this process of abstraction and perception with the help of nature's lens. The students were guided to emulate nature not only from different perspectives, but also at different scales. The focus was on the process of discovery and design rooted in fundamental respect and understanding of nature's design.

The objective of the studio was to define a research-based design framework, hybridizing both the digital and the biological approach to design. The idea was to discover a higher consciousness of digital tools and indulge the possibilities of this fusion to obtain creative methodology for architectural design. This was attained through a series of steps and the process was recorded with the help of architectural diagrams.

The teaching started by introducing different components of the digital theory. Students were introduced to all three tools with detail visual demonstration. Related literature on digital architecture and biomimicry was provided for better understanding of the subject.

Researching and selecting about natural processes and organisms leads to the necessity for having a critical approach towards abstraction for design, in the sense that in-depth knowledge can be acquired to create a link for producing a module first and then building on it later on. The drawing of architectural drawings was emphasized for a clear understanding of whether the solution proposed provides solution for the constraints in an optimum way, or could there be other alternatives. To produce this, the students were given small exercises whit a critical approach, ranging from mind mapping and morphological diagrams of the module. The students were also asked to produce module variation diagrams on different meshes and with different tools to select the best ones for their final product. Nature inspired thinking has been very fascinating as it can be witnessed by the creativity and variety present in student's projects. Both students and instructors found this way of thinking attuned with the nature of architecture design process. It was an exclusive experience to work with students throughout the studio using this methodology to design as it helped in developing their analytical thinking which at the same time appraised the use of digital design tools.

When students had developed a fully detailed virtual model it provided them the freedom to experiment with a variety of options. With the help of this exercise it was also established that these tools can reduce the time to explore the variation in design. Students also learned to create and handle the relations between different components of design because of the availability of many options. These variations were not only present during the form-finding stage, but also at the research level. These digital tools and techniques opened up new possibilities for the student. Thus, there is an urgent need to explore studios like these to propose a new framework for architectural pedagogy. Studios structured in this way can reduce the gap between digital architecture education and its practice.

These projects also taught students about how to handle the real constraints, challenges and potentials of site digitally. One advantage of the approach introduced here was that it did not rely on specific knowledge and skills to be able to produce the design; using this method also provided myriad solutions for the same problem. The pedagogy adopted help raise a number of question.

- Does the field of architecture need a prominent engagement with research and experimentation in this digital era?
- How does one define the role of Computer Aided Architectural Design (CAAD) and its link to architectural pedagogy?
- How can research findings from architectural studios find their way to practice?

One of the primary outcomes of this experimentation was the creation of awareness of the very important fact that technological advancement in architectural studios are getting overpowering with time. Innumerable members of the public outside of an architectural education remain somewhat unaware of the various technological advancements available, which can be implemented collaboratively within an architectural design methodology. Hence, the new framework for design education should make these tools an important component. Learning outcomes of this studio also included an introduction to the philosophy of biomimicry to architecture, introduction to new digital tools and a methodology to conduct research with the help of mind mapping and translating it into architecture that resolves real-life problems. It must however be highlighted that digital tools were not explored to their fullest and ideas could have been developed further. This method of designing was introduced to the students for the first time during their four years in the department. There was a varied type of anxiety, fear, and lack of self-confidence that instructors had to witness. Majority of them were confused about both the research-based design process as well as the implementation of the newly learned digital techniques. Contemporary software tools for form generation were partially used to aid architectural design processes within the early concept and development phases in the studio. However, these were limited to one or two techniques throughout the duration of architectural design projects. Enhancing this simple process with evolving techniques, in a generative process, implementing interconnectivity can stimulate a new exciting era, introducing innovative opportunities within all aspects of the architectural realm (Rogers, 2018). On the other hand, the importance of learning from nature should also be given importance in any recent design pedagogy as natural processes are very complex and a great reservoir of knowledge. When students studied a process in nature, they were intrigued by the amount of information they gathered about connectivity, interaction of formations with in a system.

The major issue with the methodology used was that the students started using newly learned population techniques randomly on the facades without linking it to the research. Majority of them were so excited to use these newly learned digital techniques in their project that they started to ignore the fact that they have to connect it to the research.

The other major problem was the lack of background knowledge of the subject. Introducing this method in fourth-year design studios was intentional as the instructors thought that students at this level would not be rigid and can captivate the misunderstandings and apprehensions associated with the use of technologies to design. But it turned out that this approach's rigor, depth and extensiveness lead to some misperceptions in the student's mind's which was witnessed in their projects. To resolve this major issue it was decided to introduce the theory on the subject in the early stages of undergraduate studies from next year onwards, which will hopefully bring a major improvement to the overall learning experience.

Also, investigation of new design vocabularies may require different stages of exploration. This synchronization can be achieved only by liberating the student from prospects that they have learned from the conventional design approach, which was not fully possible to achieve during this short four-month semester.

Conclusions:

The projects produced as a result of this studio were very creative and unique in their own way. This exercise in the studio asserted that biomorphic principles should be considered in the design process and incorporated in architectural design education, along with the help of modern design tools. Based on the results, it can be concluded that students learn from natural systems in three different ways which include, generation of morphological and organizational relationships, translation of processes in nature followed by the process of adapting to the design. The results also showed that this technique and methodology had abiding effect on developing skills. Student developed their self-reflection, critical and creative thinking and problem-solving techniques. The recommendation included the need to consider this topic as a basis of the design education system. The major struggle encountered in the process was embracing Bio-mimicry and use of digital tools together, which was a novel concept for the students and they had some level of difficulty in working with it.

For the upcoming studios, the intent will be to teach this method in a more elaborate and challenging way, by giving students real site projects and encouraging them to work with multidisciplinary groups of people and to keep the focus on research interpretations. It was noticed that little or no research is present that examines or validates the claim that framing of design development using digital methods enhances this process. This studio, therefore, attempted to combine digital design methodologies within the conception of architectural design, to analyze and reframe methods of design thinking. The inspiration with nature is an important aspect in the design of architecture. It is particularly important when designing bionic structures based on the formation of biological structures. The contemporary line of thought is to understand the processes occurring in nature and describe them appropriately in order to apply these models in technology, including architecture. The development of digital tools currently used in architecture allow for the portability of designs found in nature to the spatial and structural surface shaping. New methods change the way people work in architectural design. This exercise provided students with a deeper understanding of the processes in nature and to come up with solutions that are unique. In order to build up a theoretical discourse around digital and natural processes and their relationships, the partakers used digital tools that allowed them to create and express their designs. With these tools, users could develop the expertise to engage creatively in design. Digital applications allowed the study of architectural conditions in a three-dimensional environment, rather than the commonly used two-dimensional or layering techniques, which made the studio more intriguing and interesting, as the underlying concept of digital modeling was based on data, variables and their relationship to other entities, which then produced variations in design.

This research paper's methodology allowed the students to work side by side with digital tools to interpret the research they had conducted. Within the framework the student could always revert back to a singular point within the system and change the design direction as desired, as the interconnectivity and dynamic style of the methodology allowed this flexibility. The dynamic implementation of the digital tools created the desired complexity and richness of the design.

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DESIGNING WITH NATURE
LATERAL THINKINGE AS A DESIGN STRATEGY FOR FOUNDATION YEAR STUDIO IN BACHELOR OF ARCHITECTURE

*Muhammad Waqas**
*Uzma Kabir***
*Dr. Shahida Mansoor****

ABSTRACT

The role of educationists is to help students develop quality thinking through self-reflection and discovering. Nature is on top of the index of discovery. This study contains measures for enhancing sensitivity towards nature, with the basic assumption that nature is the primary guide that generates diverse empirical and creative design processes in architecture education. Understanding the importance of nature and environment at beginner level is more effective, as working with nature will become intrinsic part of students' design thinking. Foundation studio at the Department of Architecture at COMSATS University, Islamabad, serves as junction of art, architecture and nature, which works towards developing the critical thinking process.

In order to bring students closer to the goal of inclusion of nature in the core design thinking "Impulsive" teaching methodology was adopted. Lateral thinking, one of the tools of impulsive system of teaching, was carried through in three stages: observation of nature, recording observations in variety of media and correlating observed natural phenomena to solve a given design problem. In this case the design problem was a piece of furniture, using a very thin sheet of steel that had a thickness of sixteen to twenty gauge.

The study highlights a studio model by describing one of the experimental processes that was designed to augment originality in architectural design thinking. A specific natural phenomenon that is wind, was focused upon as a natural parameter of this study. The objective of the studio model was to offer students an organic tool for exploring new design possibilities. This helped students to visit and revisit the central idea for multiple interpretations, in order to relate it with architectural design process at any stage of design development.

Keywords: Architecture Education, Design Process, Natural Phenomena, Wind, Impulsive System

INTRODUCTION

In the modern globalized world, the role of an educationist is to help students in quality thinking through self-reflection and self-education. Sensitivity towards nature however should be taught as a fundamental of diverse empirical and creative design process, that is followed in architectural education. Understanding the importance of nature and the environment at earlier stages could prove to be more effective, as working with nature could become an intrinsic part of students' design thinking.

The study began with various approaches to creative learning and led to some practical implications. Students were asked to explore ephemeral qualities of nature, as they were exposed to a variety of methods and creative design processes. In order to bring students closer to the goal of inclusion of nature in structural presence of architecture, an experimental teaching methodology was adopted. Students gained confidence to comprehend and represent nature in unfamiliar, abstract and subjective manners. As their decision making in representing nature improved, so did the ability to extend imagination and innovation. During the process of making, the role of perception, materiality and unknown was addressed, by respecting instinctive response to the natural beauty of materials and making it part of the preconceived ideas.

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This paper elucidates on an experimental process that was designed to augment flexibility in architectural design thinking. The study proposes that this experimental design process can inculcate in students the aptitude to observe nature, which is ever changing, and can also prepare students to visit and revisit central ideas in new ways, in an architectural design process at any stage of design development.

The research objective was to recommend a trans-disciplinary design method in foundation studio, that brought students closer to the goal of transforming everyday experiences of surrounding into a meaningful design activity, by immersing them in the observation of and interaction with nature.

Research

This study was planned in an empirical manner. Relevant instruction concepts were analyzed to form a roadmap and referential ground for practical implications. Impulsive teaching methodology was adopted for the purpose. Lateral thinking, one of the tools of impulsive system of teaching was carried out in three stages; observation of nature, recording observations in variety of mediums and correlating observed natural phenomena to solve a given design problem, i.e. a practical piece of furniture to be designed and justified by its use.

The studio was designed with multidisciplinary ethos. The content, studio method and instruction model was designed by a group of instructors belonging to multiple disciplines. The studio team comprised of a sculptor, painter and an architect. The design of a piece of furniture as the end product was considered to be more convincing in terms of practicality and aesthetics as it covered both the dimensions i.e. functional and formal. The projects that are presented as examples in this paper were graded highest by a multidisciplinary jury panel.

Literature Review

Nature has played a vital role in the development of man's psychological and physical landscape. Human beings have always appropriated forms, processes and mechanisms from nature. There is a very clear primordial link between human race's meteoric cognitive development and adaptation to harsh habitats through observation/learning from nature. Nature has awed and inspired man's creative endeavors since time immemorial. The evidence is splashed across different-cultures and crafts across the globe (Fletcher, 2001; Kellert, 1997).

However, the relationship of architectural practice with nature is replete with inherent dichotomies and contradictions. On one hand nature has been and will be a treasure trove of ideas and synthesis of knowledge for architects, on the other hand whenever man builds, the basic intent is to push nature away to pave way for a safe and progressive life.

Architectural theory has however long taken cues from nature. The concepts of growth and integration have come directly from nature. The observation and interaction with nature has played a vital role in shaping aesthetic preferences for what is termed as beautiful or ugly, safe or dangerous (Fletcher, 2001; Bayley, 2012). Man's urge to depict the beautiful, benign nature and worship horrific, cruel nature has led to innumerable artistic expressions on cave walls as paintings/drawings, as totem poles and as ziggurats or pyramids. With particular reference to architecture, builders have always taken their cues from nature, either as direct inspiration or as translation of natural processes into their buildings and structures.

Apart from being a source of inspiration, a teacher and a therapist, nature in all its beauty and ugliness is an intrinsic part of the environment and life as we know it. However, the anthropocentricity of man has led to a world view held by many today, that nature is some kind of an inexhaustible resource bank in service of mankind. The scientific research over the last five decades has proven that unless consumed with responsibility and a sense of stewardship, this resource bank is not renewable (Stern 2006; Raouf, Fuentes and Thomas 2007; Wines, 2008).

Consequently, the architectural community has appropriated myriad of design ideologies and etymologies from across different domains to practice sustainability in use of materials and resources. Where on one hand consumerism, pursuit of temporality has dug its claws into the profession, at the same time a parallel sustainable sensibility has always been practiced side by side. The problem is that despite architectural practitioner's considerable efforts, the construction industry remains the major plunderer and polluter of world resources (Global Status Report, 2017). Designers build spaces devoid of pleasure and fascination through technological and virtual means for humans that are in total disconnect from ecology of the natural world (Wines, 2008).

To bring about a change in the thinking processes of architects, a change is needed in the architectural curricula and in mindsets. Pedagogues and andragogues cannot shirk away from the dire need to connect the students to their

surrounding environment on a subliminally intrinsic level. Understanding the importance and appreciation of nature and environment at earlier stages can prove to be more effective, in the sense that working with nature can become intrinsic part of students' design thinking.

Bailey (1904), an eminent scholar on nature study, described the study of nature as a process that encourages observation of nature and consequently drawing of sound conclusions. He goes on to explain the advantage of nature study as an endeavor that frees the imagination from systematic order and relational sequences of objects. As a result, one learns by developing sympathetic intrinsic understanding of concepts of nature and life itself. Also there has been significant research done to establish the link between exposure to nature and positive effects on creativity. Environmental psychology deals with the restorative effects of nature on human creative experience. Kaplan in 1989 proposed that restoration from fatigue and stress is achieved by "soft fascination" provided by exposure to nature. This soft fascination reduces stress and enhances creativity or problem solving abilities by augmenting the ability to focus (Kaplan and Kaplan, 1989). Ulrich further established that nature reduces both psychological and physical stress in individuals with increasing abilities to perform cognitive tasks (Ulrich, 1983).

Different scholars have established design thinking as distinct from merely problem solving. Design thinking makes use of the brain's capacity to synthesize and holistically grasp the answer to a problem. Design thinking process is not a linear and sequential process, but as identified by Lawson, is a cyclic and iterative process (Lawson, 1990). Cross and Nathenson (1981) identify four opposing thinking modes namely; convergent vs divergent, reflective vs impulsive, field dependent vs independent and socialistic vs holistic. Designers mostly employ divergent, impulsive, independent and holistic modes of thinking. Design thinking incorporates developing multiple iterations of designs to tentatively and explanatively address the design problems. Designers approach problems by challenging the basic assumptions and provoking the basic premises. Their approach is freer and encourages new ways of looking at problems. They particularly make use of visual thinking that essentially liberates them from the rules of grammar and language.

Most design students are conversant in convergent thinking, where all patterns are analyzed to form solutions that are right or wrong. They have difficulty adjusting to design thinking mode where there is no right or wrong design. As Lawson observes (1993: 10), "the need to think about the whole problem, or at least a great number of issues at once, is another of the features that make designing so challenging". It is imperative that foundation year of architecture should focus on developing creative and visual thinking abilities. Lateral thinking can work quite effectively as a design thinking tool. Lateral thinking makes use of considering a problem from multiple perspectives to shun the preconceived pattern of thoughts. The techniques can be classified into three themes. The first theme is to do away with any hindering pattern that blocks one from looking at a problem from a new perspective. De Bono calls it "challenging assumptions". The second theme of techniques enables the designer to step away from the problem to gain a broader view owing to the distance. This enables the person to come up with alternative routes to designing, this is termed as "generating alternatives" (De Bono, 1970). The third theme deliberately questions the logical patterns that our mind creates for efficiency and reroute its working with "provocation" (De Bono, 1970).

Conclusively, it can be established that nature can be a source of inspiration and design, generating impulse for human beings. By tossing constraints and opportunities it teaches the art of observation, improvisation and design. Moreover, studying nature imparts certain design thinking skills. It has been established that studying nature enables us to hone our observational skills. Studying nature also augments the abilities of the brain to look beyond the obvious and discover new patterns and linkages. Impulsive and lateral thinking modes deliberately induce the same qualities in the designer's thinking skills.

For a foundation year studio, studying nature can work on many levels. The core values of lateral thinking, namely challenging assumptions and provocation, woven smoothly into the design challenge can help students think out of the box. Nature provides no fixed answers and compelled the students to think of alternative interpretations of natural phenomenon and convert them into a coherent source of inspiration for a given design challenge.

Foundation Studio Intent

Ephemeral qualities of nature were explored in the studio as students were exposed to a variety of techniques and methods and creative processes. Starting from observation of nature and by recording those observations in variety of mediums, students gained confidence to comprehend and represent nature and natural phenomena later in their design exercises; as their decision-making in realistic representation of nature improved, so did the ability to extend imagination and innovation.

The students at B.Arch. program of COMSAT University were expected to learn to be patient in observing and absorbing their surroundings. Starting from seeing, they moved on to the next step of noticing and then representing nature in a realistic manner in a variety of mediums. Using observation of nature as a spring board for leaping into the unknown world of imagination, lead to the next stage where abstraction was introduced (Figure 1).

More often than not artists develop design gradually during the process. Preconceived ideas change several times. In order to bring an invigorating energy in design one has to be open to chance effects and fresh possibilities of spontaneity. In architecture, this flexibility in design thinking might not happen exactly in this way, but while being close to the central idea, one should be open for new ways of looking. It is learning by doing, thinking through making and making through thinking and seeing. Presence of a practicing visual artist and architect in the studio helped develop a constant habit of self-reflection. Empowering students in defining their own questions and directions was an important part of self-education. As a team of teachers with diverse professional back grounds, the role was to stimulate interest in the design process not only by preparing handouts which clearly defined objectives and directions,but also by encouraging design personalization process through lateral thinking.

Figure 1: Study models of student experiments with wind

Studio Instruction Model and Design Outputs

General Assumptions and Studio Summary

The abstract idea of lateral thinking, as elaborated by De Bono, (1970) is about restructuring previously derived and commonly established patterns and systems of thinking and designing, by consulting the core. The core in this case was assumed to be nature. Wind is the most usual natural phenomenon and abundant form of gas that one comes across in our day-to-day life. An obvious attribute of wind is abrupt and unexpected movement, which may cause the emergence of uneven and unforeseen pressure on surfaces, apart from sound and mixing of colors to generate other colors.

The teaching and learning model adapted for this studio exercise was 'lateral thinking', which was applied through designing studio instructions that lead students to explore and experiment design possibilities by imagining and interpreting the uneven blows of wind on surfaces.

Instruction System

Resource for idea generation in this exercise was identified wind in nature as the driving force. The studio task was titled as working with wind. Students were introduced to the very basic natural phenomenon and were asked to observe the qualities of wind. Students were then instructed to analyze their personal observations and were asked to reinterpret qualities of wind in another comparatively stable material (Figures 1 and 2).

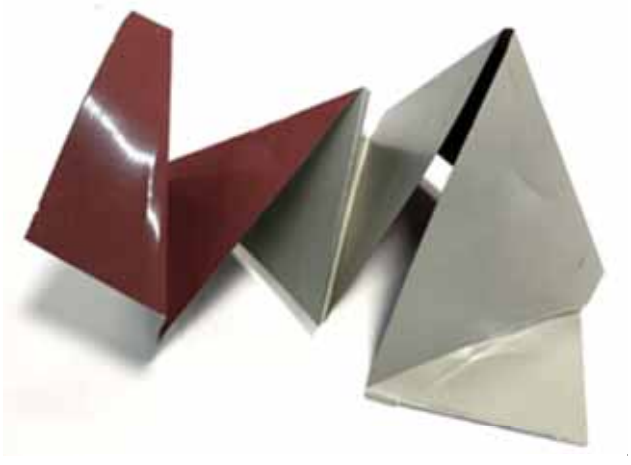

Figure 2: Study models of student experiments with wind

Figure 3: Student working with wind and focusing on balancing study models

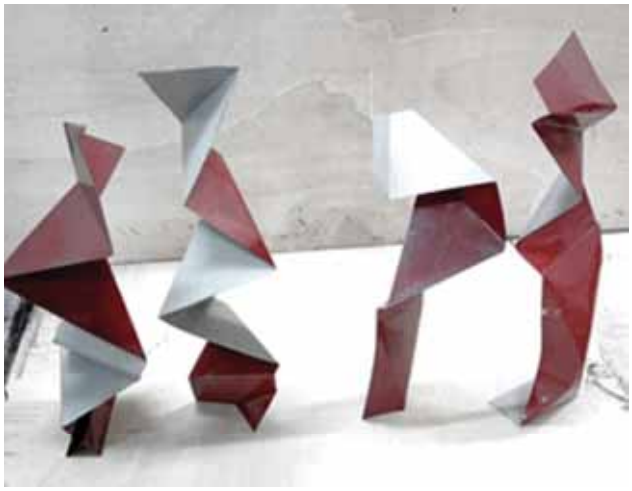

Figure 4: Resultant balanced models

Design discourses were initiated by indulging students in observing the phenomenon of wind movement. The students were given the task to observe the effect of wind on formal transformations of lightweight matter. After observing constant pushes and pulls of the invisible natural force they were asked to design structures that could withstand arbitrary blows of wind. Students experimented with a soft material i.e. colored tin sheet, to vividly express different potential formations as resultant occurrences of the physical natural phenomenon. An additional challenge of balancing steel strips for anticipated utility was also given (Figures 3 and 4).

Stepwise Design Applications

The students finally selected one object out of four iterations (Figure 4) and were instructed to modify the scale as well as the form to give it function of a working piece of furniture. On a scaled drawing of previously worked out forms, technical drawings (plan and elevations) were then drafted (Figure 5).

Tin Model Multiuse Furniture

Using the previous model as an impression, a concept of furniture was introduced (Figure 6). The approach to the first project was multidimensional; based on the anthropological studies of a youth sitting on the ground cross-legged and studying, a rocking chair was designed, based on the thinking process behind hospital beds. All these points went together, and a simple tin sheet of 18" to 5'-9" was bent five times to form a legless chair, using the weight of a person for stability, so that the back tin area could

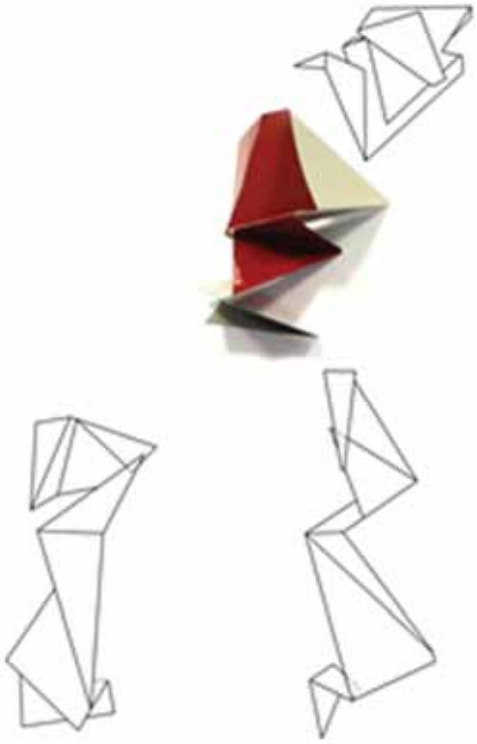

*Figure: **5*** Life size drafting of the selected model.

support the weight of the person. The front was used as a study table to hold a book or an electronic gadget. The person could rest by placing his or her legs on the study table, and the back could be rested on the back seat which functioned as a rocking chair (Figures 6 and 7).

Figure 6: Furniture model on final display
Medium: 18" X 5'-9", 16 gauge tin sheet

Figure 7: Multiuse furniture - student while explaining multiple utilities of the product

Figure 8: Magazine rack furniture model on final display

Figure 9: Furniture model on final display

Magazine Rack

The second project was the design of a magazine rack. It was made out of another previously developed impulsive design. The exercise was instrumental to bring ideas and designs to life. According to the student this process helped understand the importance of observation and the idea of balance (Figure 8).

Coffee Table

In the third project the fabrication of furniture was done and a piece of furniture was designed using minimum cutting, support and relying on only folding techniques to support the furniture itself and the live load that was to be carried by the table (Figures 9 and 10).

Figure 10: Furniture model on final display

Conclusions

The meta objective of connecting the students to a conscious realization of experiencing, observing and rethinking the role of nature in their creative process was achieved. The design assignment was based on the idea of lateral thinking in foundation studio, bringing students closer to the goal of flexibility in architectural design thinking, so as to transform everyday experiences of surrounding into a meaningful design activity.

Furniture design project in the above case proved to be instrumental in changing prototypical perception of design. Students experimented with diverse materials; scaling up from concept models taught them the importance of studying intrinsic nature of materials, as some of the materials chosen for small scale models were not fit for larger versions. Looking at the same situation and idea from various perspectives taught them to re-examine their own work with fresh eyes.

Conclusively, foundation studio on a very basic level teaches multifaceted analysis process where different people perceive same things differently, and thus they can design more creatively. Students practically learn that unexpected solutions can emerge when a different pair of eyes observes the same phenomena of nature.

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BOOK REVIEW

THE TIMELESS WAY OF BUILDING

Christopher Alexander

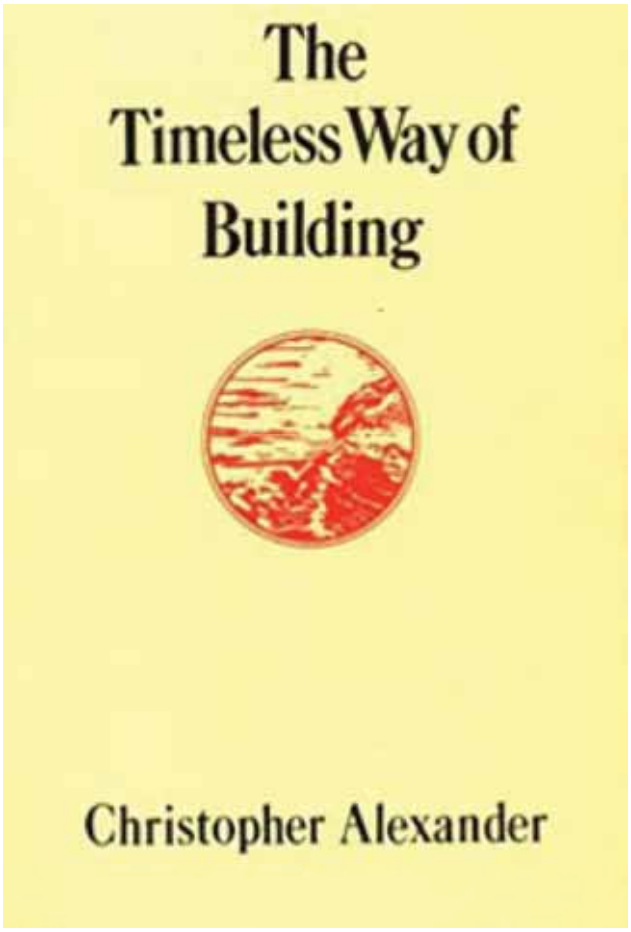
Reviewed by Ar. Humaira Nazir*

One of the most interesting treatise authored by Christopher Alexander is "The Timeless way of Building" that was first published in 1979 by Oxford University Press. The author of the book Christopher Alexander is an architect. Besides an architect, he is a lover of mathematics and science. He got his childhood education in sciences and after earning Bachelor's degree in Architecture, he pursued his education and got Master's degree in Mathematics and then PhD in Architecture from Harvard University. As an architect he searched for beauty and tried to look for a "view of design", how to design, what to design and how science and mathematics can contribute to design. He felt the need for theory to support the "view of design" which can help obtain a product. His search for theory is presented in his book "Timeless way of building".

Christopher searched for architecture which is extracted from an understanding of the proportions in nature, building materials and context and which is an extension of nature. He talks about how nature is stabilized in beautiful and poetic way thoug natural processes. Alexander emphasizes on how building can be extensions of nature.

He suggests that buildings should grow like nature and growth of the buildings should depend on the "life of inhabitants" and not on the principles of construction. When this "life" is happy, free and at peace then it leads to humans becoming a part of the place as much as the place becomes a part of humans.

The book is framed in an unusual architectural text in which Alexander describes his concept in the headings that provide an overview of his whole theory, followed by detailed description of each theory. It provides a poetic viewpoint of the built environment in a precise and concrete way. His theory is based on the language patterns that are used to discuss and create architecture. This language pattern is the main core of the book and is outlined in ten chapters, supported with specific examples for better understanding.



Black and white illustrations and thumbnail sketches are used throughout the book, some of which are given references while some are just visual representation to support the text.

The book is arranged in "three parts" and each part explores many theories. One part of the book consists of the "complexity theory", another part is related to the "architectural and city planning theory", and yet another part is a "spiritual treatise". In the introductory part of the book Alexander states that there is only one way of building that is "timeless" and this is essential and indispensable, as

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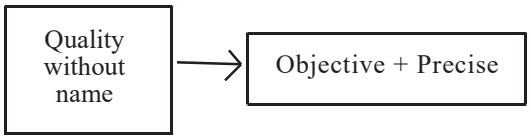
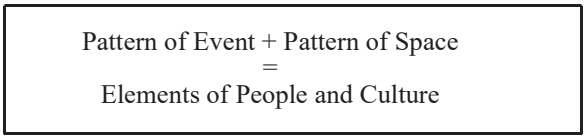
a timeless building never gets old with the passage of time, and the more it ages the more value is added to it.

Next three sections of the book are named as “The Quality”, “The Gate” and “The Way”. In the first part Alexander defines the quality that is nameless and undefinable, but exists and is recognizable. This quality is self-generated and cannot be made. The building with this nameless quality can not be separable from nature, but is a part of it. Qulaity without name does not mean that it is ambiguous or not specific but this quality gives the feeling of liveliness,



as a whole, as comfortable, as egoless, as eternal and free. The quality is dependent on inner feelings and emotions. Some places adhere to this quality and some do not. The key to recognizing this quality is the “pattern of events” which are happening at a particular place. These patterns define the character of towns, buildings or places and are influenced by the inhabitants. These events are not specifically human events but include events like wind blowing, water flowing and weather patterns. Pattern of events are also created by culture and transferred by it. Pattern of events are linked with the pattern of spaces. When these interrelate with each other, a slightly different arrangement is made at everyplace. It is defined as:

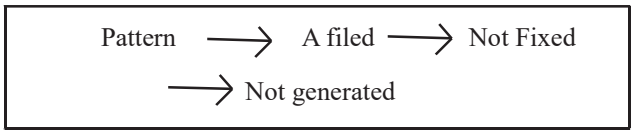
According to Alexander patterns are either dead or alive. Alive patterns help resolve the inner conflicts of people



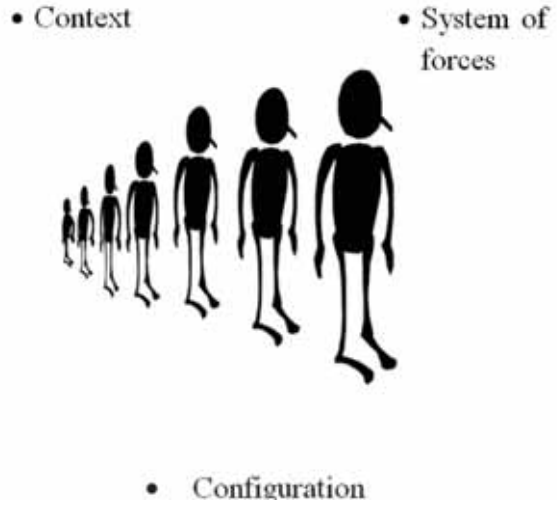
while dead patterns make the inner conflicts and feelings alive. Patterns are also repeated but repetition is dependent on the context. In every context these patterns possess unique characters. The same character is also possessed by nature.

The second part of the book entitled “The Gate” is the heart of Alexander’s proposed theory. It is the most convincing part that defines the pattern language. It illustrates the use of pattern language by giving the example of barns. This pattern language is obtained through existing examples of patterns that are required to discover, and is used with some modifications feasible in different context. Alexander states, “pattern language are finite system of patterns that allow us to make infinite system of unique patterns appropriate to different context”.

According to Alexander the function of patterns is to identify the problems and provide solutions that fit in the specific



context. Pattern language provides a framework in which patterns enable to solve a specific problem by balancing two conflicting forces. It has the following generic form. Patterns create relationship between the context and the system of forces that arise into that context, and suggest configurations



that allow these forces to resolve themselves.

In the last part Alexander describes the use of pattern language in the architectural participatory design. He explains how people can share pattern language to design towns, cities and the neighborhoods. He suggests that it is not necessary to draw buildings on paper, but they can be built by multiple language patterns from marks on ground.

Overall, this publication is about how the built environment that must be an extension of the natural environment. Alexander successfully generates a vocabulary to design spaces, focused on human architecture that does not lack scale and proportion and is inspired by nature. The people who occupy these spaces do not feel isolated.

This book itself is a timeless classic. Generally, the holistic language of this book makes it timeless. The tone used by

Alexander is easily understandable but it is also self-congratulatory at times. The writing style of the book gives a feeling of reading a religious book of architecture and reads meditative centering than as a practical exercise. This is not a practical book of architecture but is an exploration of human life. Every concept is summarized in short sentences, as well as discussed in detailed paragraphs because the author wants to give an overview of his ideas initially before going into the details. It is a good idea to give an overview of the concept first but it is at times disturbing as well because the tone changes in every heading, which distracts the flow of the reader. On the other hand, the spiritual terminologies used to frame the concept are alien to many readers, but at the same time this is also the strength of book. Furthermore, some positioning patterns are discussed in the center of the book, which it raises questions about how a transition is to be made to the ideal state and the answer of this question is not found in the book. It also feels that Alexander speaks to the reader as a "believer" rather than as a theorist. Despite these lackings it is nonetheless an essential publication that every planner, architect and designer must read because it is one of the most fascinating books on space design.

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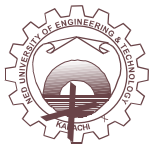

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