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**Sustainable housing futures for a growing middle class:
a contextual study of Mysore, India**

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Abstract

Economic globalisation is enabling India to reinvent itself as a development crucible, providing previously unrealised opportunities for economic transformation. One crucial transformation of economic success is the rapidly growing middle class. Whilst the growth in the middle classes indicates improvement in the quality of life of many, the rate of consumption has also been increasing exponentially. If they, the middle classes consume resources at the same rate as the British and Americans, India will become the world's number one producer of carbon emissions.

The attitudes and aspirations of the growing middle classes are a major factor in the increased, and perhaps impulsive consumption patterns. It is therefore the aim of this research to consider the bottom-up approach, which validates this thesis by examining middle class homeowners' preferences in Mysore, a south Indian city. Mysore used to be recognised as having socially cohesive and inclusive housing typologies that were climate responsive and calibrated to local, social and economic needs. Changes in social conditions, cultural practices and lifestyle can be seen in the way homeowners use their homes to demonstrate affluence and status.

A key challenge is to research ways in which sustainable housing in an Indian context can both mitigate carbon emissions and at the same time address the material aspirations and desires of a fast-growing middle class. Baseline characteristics and homeowners' attitudes are established by means of literature research and fieldwork. The output of this stage is triangulated with further research to narrow the focus towards boundary conditions and transition spaces for an in-depth study of relevant factors contributing towards consumption, aspiration and sustainability. The second stage points to the importance of the external boundary of the site and the edge of buildings in terms of aligning meaningful, sustainable design strategies with the concerns and aspirations of the emergent middle-class.

This thesis argues that, in the domain of sustainable housing, both a qualitative approach and quantitative strategies are essential to the understanding of social and cultural dynamics as well as to measure and benchmark performance. Because of the nature of this multi-threaded approach, mixed method research practices have been followed using triangulation methodologies and grounded theory. This has resulted in the revisiting and refining of the research focus and objectives throughout the research. During the research process, spatial scenarios for housing were developed to harmonise preferences and different sustainability agendas. The research focused on identifying and testing the critical building characteristics of the boundary location. Homeowners' preferences were qualified by a multi-sorting task analysis and study model performance tested by sophisticated environmental simulation. This was triangulated with fieldwork studies to help propose sustainable housing strategies. The methodology adopted has been critical to supporting the architectural response to the cultural and economic condition on one hand (social methods) and the climate responsive, traditional design and simulation models (environmental design methods) on the other. Different sets of fieldwork were conducted at two stages that involved archival searches and detailed interaction with architects,

builders, users, academics and government agencies. In total, 240 respondents answered a questionnaire survey and 146 semi-structured interviews were conducted.

The outcome of this research demonstrates how, in the absence of any counterbalancing regulations, social perception and economic aspirations limit the acceptability of sustainable design and construction strategies. In India, middle class demographics and value systems are complex; where safety and security, and display of wealth have to go hand in hand. In this context, this research provides new insight into the way sustainability can be understood in the Indian context with qualitative values that are complemented by quantitative measurements. Finally, this research suggests ways of introducing sustainable practices through a negotiated understanding that balances aspirations with more responsive design.

India has identified housing as one of the eight national missions to reduce carbon emissions as part of its commitment to reduce people's vulnerability to the impact of climate change. In a geo-climatically, regionally and culturally diverse country like India, the top-down national policy can only be successfully implemented with an understanding of the local context. A bottom-up approach to identify sustainable strategies that acknowledge homeowners needs and aspirations should be a useful contribution to achieving carbon reduction and sustainable housing in Mysore. With minor adjustments, the methodology and research process could be adopted in other Indian cities.

Declaration

I hereby declare that I am the sole author of this thesis; that the following thesis is entirely my own work; and that no part of this thesis has been submitted for another degree or qualification.

(Satish Basavapatna Kumaraswamy)

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Glossary

Agrahara layouts: Agrahara (small Brahmin villages) that was prevalent 150–200 years ago was used as one of the prototypes for residential layouts adopted during the development plan prepared in 1904. They are row houses built around a park in a U shape. The central park area was used for community socialising and as a children's play area. Each two-room house with a shared party wall had a small veranda and back yard.

Athithi devo bhava: This is the verse in the 'Taittiriya upanishad' that says 'Matru devo bhava, pitru devo bhava, acharya devo bhava, atithi devo bhava', which means one should worship mother, father, teacher and guests as God.

Jagali: Jagali is a semi-open raised space, which acts as a transition from the road to the inner part of the house. These places are always in the shade, it is a perfect space for socialising and acted as a meeting area for the inhabitants. They were actively used as interaction areas. People shared their leisure activities and entertainment with their neighbours in these informal spaces.

Joint family system: In the Indian subcontinent, the joint family is an extended family where many generations live under the same roof, usually the male members are blood relatives.

Pooja room: A small room exclusively used to keep God's idols and for praying. They are an important part of the Indian Hindu family. The location depends on the belief of an individual. Size varies between very small and located within the kitchen to an elaborately detailed room to accommodate four to six people.

Swadeshi movement: Swadeshi means 'indigenously manufactured'; it was the first of the four formally organised movements by Congress nationalists against the British Raj in 1905.

Vathara: Vatharas are a group of houses within a compound, where they have individual habitable spaces but share toilets and courtyard space.

Chapter 1: Introduction Research Objectives and Synopsis of chapters

1.1 Introduction

“The earth provides enough to satisfy every man’s needs, but not every man’s greed”. Mahatma Gandhi (1869 – 1948) (Khoshoo and Moolakkattu, 2009)

1.1.1 Global context:

Those nations in the developing south inevitably differ in their resources and economic development from developed nations. Both economic development and the available resources have an implication on the approach developing nations take to sustainable development (Skea and Nishioka, 2008). The imperative to reduce poverty and increase economic activity means that resource use will grow to meet the legitimate aspirations of both government and society and this has to be reconciled with transnational concerns to promote sustainable strategies for the future.

The cause and responsibility for climate change and mitigation strategies are debated with differing views among developed and developing countries. Though there is a consensus about the implication of climate change, the mitigation strategy and the process of reducing energy consumption are still debated. Another greater challenge we face today is relying more heavily on the quantitative measure of energy consumption and reduction. Recent data clearly suggests that developing countries are most vulnerable to these risks and for most of them, climate change would be a direct threat to people’s very survival (IPCC, 2007).

The concern of climate change and global warming was highlighted as early as 1969 when the think tank, the Club of Rome prepared a report entitled “The Limits to Growth”. Apart from predicting the scarcity of resources, this report projects the

sustenance of this world with different parameters. The report concludes that, although technology may extend the limits to growth of population and capital, it has no impact on the essential problems: resource depletion, pollution or food shortage. In the model generated, the optimistic estimate of the benefit of technology cannot postpone the collapse beyond the year 2100. Further, widening inequality has been identified as one of the major side effects in the case of developing countries (Meadows, 1974).

The significance of society and a social agenda became prominent after the Brundtland Report and the Rio Summit (UN, 1992), which supported the need for healthy communities and individual wellbeing in the ecological management of cities. While defining sustainable development, the International Union for the Conservation of Nature, has identified priorities as “sustainable development seeks to respond to five broad requirements: 1) integration of conservation and development, 2) satisfaction of basic human needs, 3) achievement of equity and social justice, 4) provision of social self-determination and cultural diversity, and 5) maintenance of ecological integrity” (Wheeler, 2004). In the process, focus of sustainability has moved on from primarily a concern for the environment to include also economic and social dimensions (Glen et al., 2009, Lang, 2002).

The Brundtland report underpins the significance of individual and society in the process of sustainable development. They have defined sustainable development as “the development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987). In his book “Planning for Sustainability: creating liveable, equitable, and ecological communities”, Wheeler defines it as “development that improves the long-term health of human and ecological systems” (Wheeler, 2004). According to William Rees, sustainable development is “any form of positive change which does not erode the ecological, social or political systems upon which society is dependent”

(William, 1992). Whilst Otto Soemarwoto defines sustainability as “the ability of a system to sustain the livelihood of the people who depend on that system for an indefinite period” (Skea and Nishioka, 2008).

The significance of the social dimension in India’s history is well-established. The importance of culture and social perspective is well-articulated by Mahatma Gandhi, who strongly believed in socially centred development. “A technological society has two choices. First it can wait until catastrophic failures expose systemic deficiencies, distortion and self-deceptions... Secondly, a culture can provide social checks and balances to correct for systemic distortion prior to catastrophic failures.” Mahatma Gandhi (Khoshoo and Moolakkattu, 2009).

The issue of sustainable development has global consequences that require policy commitments at a national level, which must then be addressed in local development plans (Hawkes and Forster, 2002). India is currently the fifth greatest producer of carbon (the key component of greenhouse gases) in the world. Though India’s per capita emission is lower than the world average, what is alarming is the per capita consumption by rich Indians that is far higher than the world average. Middle class Indians’ consumption has been increasing exponentially. Economic empowerment is enabling them to consume resources as in the developed world. In this context, if we project the consumption of Indian middle classes to that of the UK and the USA, India would be the number one carbon emitter in the world (Figure 1-1, Figure 1-2).

This not only affects the country but will have adverse effects on the whole world (Williamson et al., 2003). In this context, Agenda 21 has stressed the need for the reduction of carbon dioxide emissions by means of a specific strategy to be adopted by each of the member countries (UN, 1992).

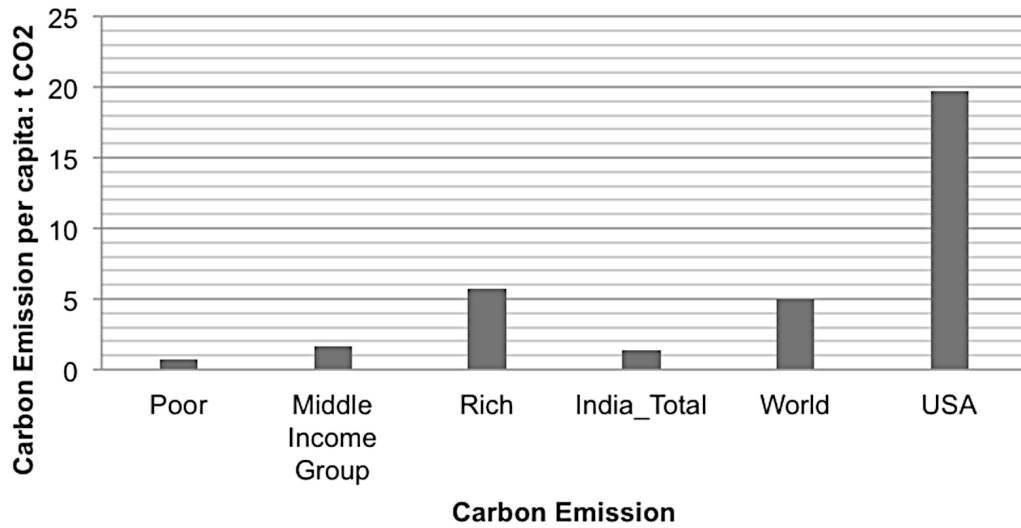


Figure 1-1. Per capita carbon emission comparison (Worldbank, 2013, Warran and Patwardhan, 2002, Ananthapadmanabhan et al., 2007)

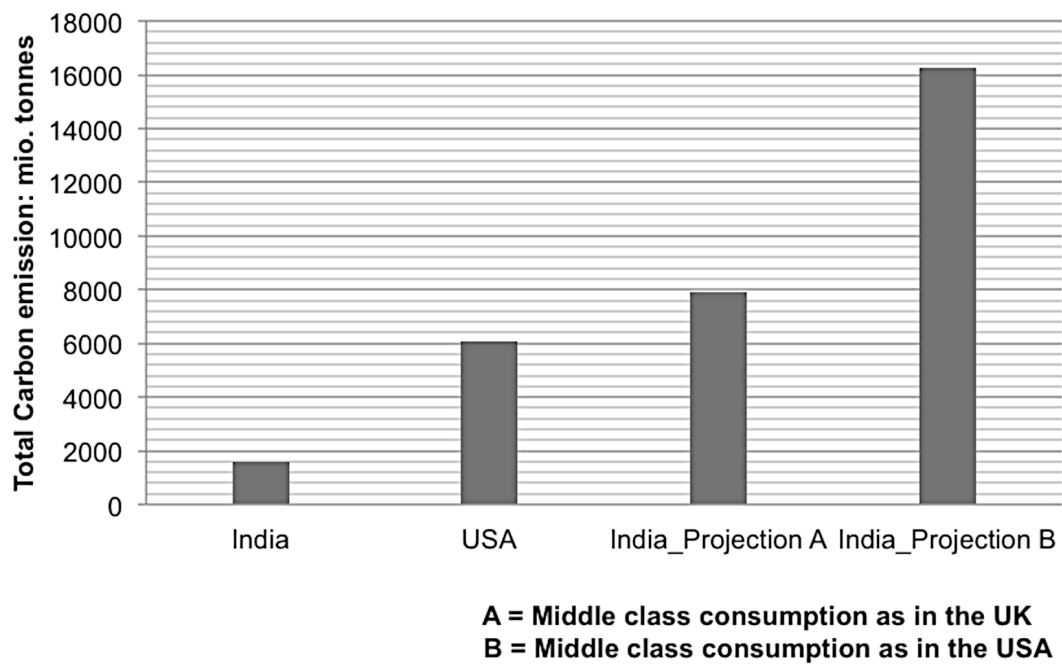


Figure 1-2. Middle class consumption and projection (Ananthapadmanabhan et al., 2007, Sankhe et al., 2010)

India's argument throughout the IPCC debate has been that they are not the cause, rather the affected party of climate change. In response to Agenda 21, it has committed itself to ensuring that its emission per capita will not exceed the emission per capita agreed by the Organisation for Economic Co-operation and Development (OECD).

This is well-reflected in the Government of India's position articulated by Dr Manamohan Singh, the Prime Minister of India:

“Our people have a right to economic and social development and to discard the ignominy of widespread poverty. For this we need rapid economic growth. But I also believe that ecologically sustainable development need not be in contradiction to achieving our growth objectives. In fact, we must have a broader perspective on development. It must include the quality of life, not merely the quantitative accretion of goods and services. Our people want higher standards of living, but they also want clean water to drink, fresh air to breathe and a green earth to walk on” (Singh, 2008b).

India's position on climate change has changed since 2008 and the Indian Government is working towards carbon reduction. Post independent India's priority was to improve everyone's quality of life, whereas now India acknowledges the need to reduce carbon emissions while improving the standard of life. India, in its response to the global challenges, has always positioned itself as part of the solution rather than the problem (India, 2009a). India is of the opinion that problems we are facing are due to the cumulative impact of emissions which form 'greenhouse gases' (GHGs) in the planetary atmosphere.

The government's decision influence the development strategies which will have direct impact on energy consumption and carbon emissions. Illustrative examples could be the production of Nano Cars by the TATA Group. The New Project of

Nano cars by TATA (one of the major industrial backbones of India since independence) involves planning to sell cars (minis) for just one hundred thousand rupees (approx: ₹ 1185). The concern is not just the development of a huge 2000-acre area with new industries adding more CO₂ emissions; it is more of a concern from the point of view of urban infrastructure planning. With the huge amount of traffic on the road, will the Indian infrastructure, like roads be able to handle the millions of cars that pass through it every day? (Smith, 2007)

As per the World Energy Outlook, published by the International Energy Agency (IEA), energy needs will be almost 80% higher in 2030 (Nobuo, 2008). As of now, more than 190 governments have agreed to work out a new U.N. climate treaty by the end of 2009 to succeed the Kyoto Protocol, which binds 37 industrialised nations to make cuts in emissions of an average of 5 per cent below 1990 levels by 2012. Further, governments had convergent views on the key issues proposed in the Copenhagen Climate Change Conference 2009. One of the key elements agreed was to limit the maximum global average temperature increase to no more than 2 degrees Celsius above pre-industrial level (UN, 2009). As a remedial measure, the British government has taken on a major initiative to target a reduction of 80% of greenhouse gas emission by 2050 (Smith, 2007). On the contrary, India, which has the lowest per capita carbon emissions, is looking forward to national development. The existing practices and improved economic condition (increased per capita consumption) will result in an increase in the per capita carbon emissions.

India has declared that in spite of its development objectives, it will not allow its per capita GHG emissions to exceed the average per capita emissions of developed countries (India, 2009b). To combat the challenges of climate change and to address the emerging pressure for the action at the international level, the Prime Minister of India has set up a council on climate change, which has outlined the “National action plan on climate change” (NAPCC) (NAPCC, 2008a). In the objectives and principles

of the national action plan, the emphasis is clearly on protecting the poor and vulnerable sections of the society and achieving national growth objectives. The NAPCC has identified eight national missions to promote the understanding of climate change, adaptation and mitigation, energy efficiency and natural resource conservation. This addresses the urgent and critical concerns of India and proposes a directional shift in the development pathway.

One of the national missions which has a direct bearing on sustainable built environment is the 'National Mission on Sustainable Habitat' (NAPCC, 2008b). These top-down policy guidelines emphasise energy efficiency in buildings, management of solid waste and a modal shift to public transport. The NAPCC has laid out various initiatives to achieve these goals including the energy conservation Building Code, recycling of material and urban waste management. In all these initiatives the emphasis is at macro level and the building code specifically targets large commercial buildings to optimise their energy demand.

Arguably, India has to focus on the majority of the population and engage in poverty eradication. India is the fifth top carbon emitter in the world and lower per capita emissions are attributed to the lower emissions by the majority of the population that constitutes the poor (Ananthapadmanabhan et al., 2007).

Recent studies reflect the concern that the carbon footprint of the people with a higher income is 4.5 times more than that of people in the lower income group (Ananthapadmanabhan et al., 2007, Greenpeace, 2012). The average footprint of the upper class is nearly twice the world's sustainable per capita average consumption. According to Greenpeace India, these wealthy people are about 1% of the total population. The remaining demographics of India, between these two extremes, which could be identified as the middle class and who constitute nearly 35% of the population (Ananthapadmanabhan et al., 2007).

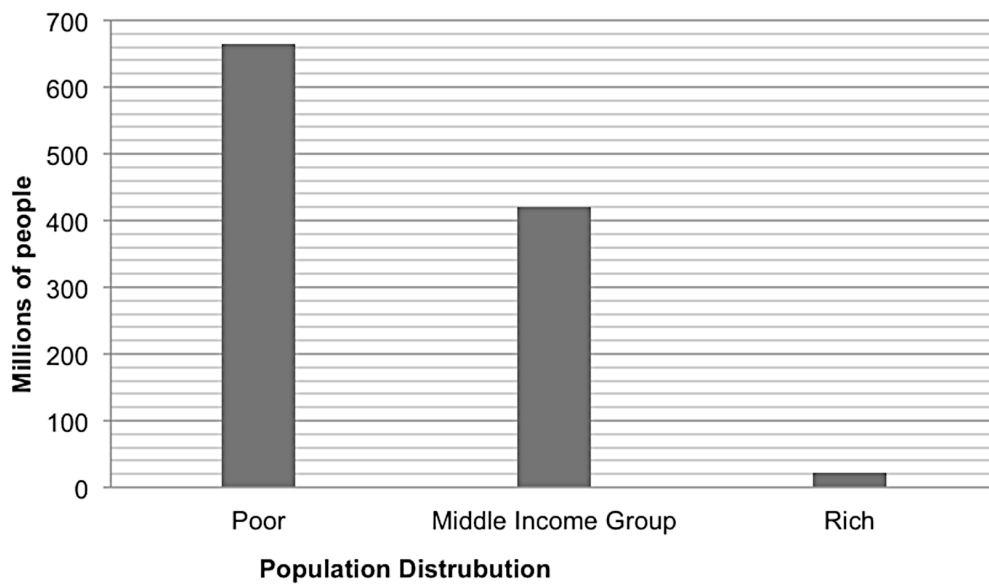


Figure 1-3. Population Distribution: India 2005 (Sankhe et al., 2010)

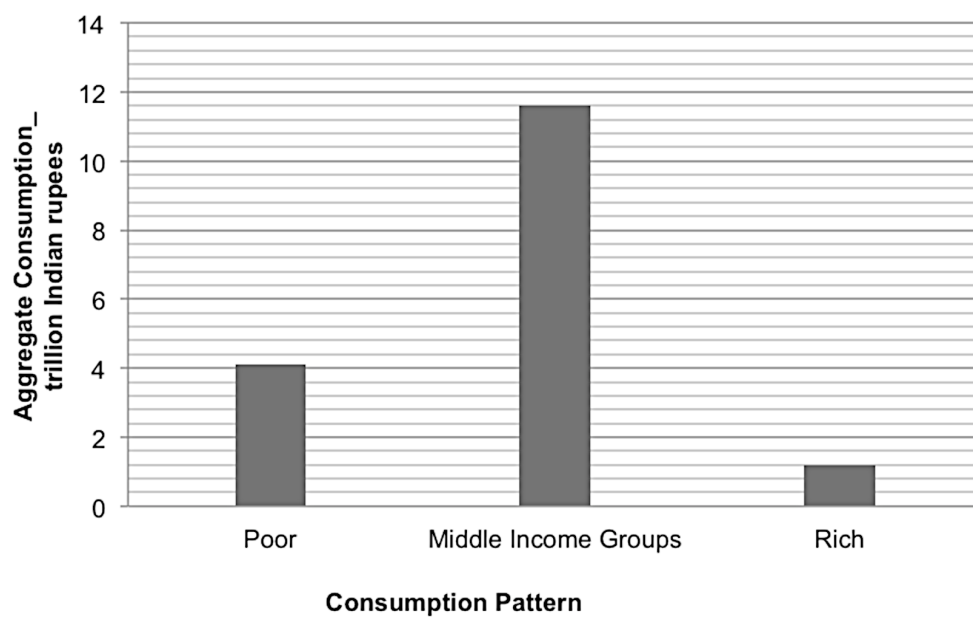


Figure 1-4. Consumption pattern: India, 2005 (Ablett et al., 2007, Grunewald et al., 2012)

There is substantive research to prove that climate change will have a severe impact on the global hydrological system, ecosystems, sea level, crop production and related processes. Furthermore, it is predicted to have a greater impact in the tropical areas including India (Jayant et al., 2006).

India is in a critical position regarding a 700 million rural population, directly dependent on a climate sensitive sector for their subsistence and livelihoods (Jayant et al., 2006). This has been the first priority of the government of India and is well reflected in its National Five Year plans (Commission, 2008).

1.1.2 The Indian Middle Class Demographic

Commentators such as Leela Fernandes and Varma have argued that economic empowerment supplemented by exposure to the media has transformed the culturally rooted people to explore redefined values, which have major impacts on an otherwise sustainable lifestyle (Fernandes, 2000b, Fernandes, 2000a, Fernandes, 2006, Varma, 2007).

The complex and multifaceted society of India is interwoven with caste, religion and regional disparities, where new-found economic status and affluence in middle-class segments has a critical impact on the process of sustainable development. The Indian National Council for Applied Research has classified India's population into five demographic groups based on income and spending power: the very rich, the consuming class, the climbers, the aspirants and the destitute. The consuming class and climbers are identified as constituting the “Indian middle class” (NCAER, 2009). The “Indian middle class” is defined in more detail, discussed and developed in chapter two.

The initial development of post-independent India was dominated by Mahatma Gandhi and the first Prime Minister, Nehru. In an immediate postcolonial context, the Indian middle class has historically followed Gandhian principles and restrained itself from the obvious display of wealth (Wessel, 2004). To give coherence to a country of diverse ethnic and cultural groupings, a national government prioritised the promotion of shared national values. Pre-eminent in this was value attached to the notion of community over the needs and desires of the individual.

In post-independent India, a quite cohesive consensus dominated middle class mores and values, who defined themselves through Gandhian principles of modesty and self-restraint that included the avoidance of ostentatious displays of wealth such as the home (Wessel, 2004). In his autobiography Nehru wrote “the rising middle classes wanted some cultural roots to cling on to; something that gave them assurance of their own worth, something that would reduce the sense of frustration and humiliation that foreign conquest and rule had produced” (Nehru, 1959). In a country subject to intricate levels of social stratification, iconic figures such as Nehru consciously sought cohesion and shared values in a newly formed and fragile nation state. The government had some success in forming a consensus amongst middle income earners that placed value on community over the individual that held true in an introverted economy with modest levels of growth.

A societal change can be traced from after the death of Prime Minister Shastri in 1966. The political climate changed dramatically, with a population less deferential and motivated to facilitate change (Varma, 2007). This coincided with the reports of systemic corruption in the political classes. The electorate therefore became disillusioned with the hypocritical situation of a government promoting the values of Nehru and Gandhi whilst indulging in financial self-aggrandizement (Wolpert, 1989). In such a context, many of the middle classes now prioritised success, irrespective of means, and money regardless of source (Varma, 2007). Liberalisation in 1991 bought

new entrants to the Indian middle class. Economic freedoms not only encouraged upward mobility within a defined middle class, it also fired aspiration in lower income groups to progress in what were hitherto rigid class and caste structures (Fernandes, 2006)

The IT sector has driven major change in societal structures. Many citizens saw huge progress in a few decades, achieving prosperity and mobility unimaginable to their parental generation (Tim, 2006). Such disorientating wealth finds expression in a variety of ways including building design and interiors (Saavala, 2003). These new additions to the middle class started to define themselves on the basis of consumption and wealth within a perceived meritocracy (Saavala, 2003). It is this consumption pattern that is shaping the culture and identity of the middle class (Wessel, 2004).

Politics, economics and, most importantly, the social scenario have changed drastically after economic liberalisation and globalisation. According to Andre Beteille, though the aspirations of the new middle class Indian typically centre around career (Imtiaz and Helmut, 2001), it is consumerism that has clearly become the primary Indian value (Fernandes, 2000a). The media exploited the middle class to create a new consumer culture. They did this effectively by targeting the materialist middle class. Whilst some segments of a culturally sensitive Indian middle class still assign value to active citizenship (Khilnani, 2004, Varma, 2007), confident expressions of upward social and economic mobility are demonstrated in the desire and aspiration to construct their own homes.

The innate sustainable qualities of climate responsive housing can be contrasted with contemporary housing typologies. The expansion of new housing has been driven by economic growth in sectors such as IT that have benefitted from economic globalisation and liberalisation. It serves an educated, aspirational and increasingly

affluent faction within the middle class who have acquisitive value systems where housing is more of a reflection of individual status and wealth (Saavala, 2003).

1.1.3 Housing

The residential sector in the construction industry accounts for 22 per cent of global energy consumption (Parker et al., 2003). In the case of India, about 17 per cent of emissions originate from construction activities of which 60% can be attributed to the housing sector (Tiwari, 2003). Construction in the housing sector amounts to approximately 10% of total carbon emissions in India with new buildings reflecting greater income and mobility amongst the population. It would be simplistic to characterise a growing middle class as being exclusively materialistic where social and cultural conditions unique to India have the opportunity to marry prosperity, property and low environmental impact. Commentators such as P. K. Varma assert that Indian society cannot remain cohesive at a basic, functioning level if it is merely measured as an aggregation of personal wants (Varma, 2007).

It is important to understand housing as a social and cultural phenomena that can allow insights into the effective formulation of localised and relevant low carbon housing strategies. Although a growing population seeks to accommodate developing countries' valid aspirations to achieve higher levels of prosperity, it is still imperative to reduce carbon emissions within India. Whilst a low carbon society for developed nations can be defined as “inventing low carbon technology and reducing carbon dioxide emission by the middle of 20th century” (Skea and Nishioka, 2008), for developing nations, the achievement of low carbon communities must go hand in hand with achieving wider development goals . Furthermore, while acknowledging the role of technology, an emphasis has to be placed on the importance of lifestyle and social change (Skea and Nishioka, 2008).

In a geographically and culturally diverse country like India, it is not possible to generalise the implication of social and cultural dimensions on housing and their impact on the sustainable built environment. Mysore, which is known as the cultural city of Karnataka, India, has been studied to examine the impact of the social and cultural shift of Indian middle class demographic.

1.1.4 Mysore

Mysore city was the capital of the former south Indian kingdom of Mysore and is situated about 140 km south west of Bengaluru (Bangalore) (Table 1-1). In 1904, the monarch Krishnaraja Wadiyar proposed the first development plan for Mysore to improve health and hygiene and decongest the fort area that was the centre of political power. In the process Mysore had established a reputation for sound, sometimes technocratic government that consciously encouraged climate responsive and low impact urban planning solutions (Vandana, 2008, Ikegame, 2007, Issar, 1991, Rice, 1897).

Now it is an important city in the state of Karnataka, and is recognised as having a significant cultural status. Though Mysore has had a sustained growth from tourism and industry, the more recent growth of IT industries in the 2000s has resulted in the city becoming an important hub after Bangalore. Overspill from Bangalore and its growth rate has resulted in a city of 124.42 sq km area, with an urban population of 914,919 people (Mysore, 2011). Development pressures after independence and economic liberalisation have drastically changed neighbourhood patterns and housing typologies.

| | |
|------------------------------|---|
| Geographical Location | 76 12" (E) longitude 12 8" (N) latitude |
| | Second-largest city in the state of Karnataka, 146 km southwest of the state capital Bengaluru |
| Population 2011 census | 914919 |
| Area | 128.42 Sq Kms |
| Per capita water supply | 125 LPCD |
| Summer Temp (Apr – Jun) | 21 ⁰ - 34 ⁰ C |
| Winter Temp (Dec – Feb) | 12 ⁰ - 30 ⁰ C |
| Average Rainfall (Jun – Aug) | 785 mm |
| University | Mysore University (Estd 1916) |
| Attractions | Dasara festival, Mysore Palace, Chamundi Hills, Krishnarajasagar Dam and Brivandan Gardens |
| Industries | Brooke Bond Lipton India Ltd, JK Tyre & Industries Limited, Hndustan Unilever Limited, Infosys, TVS, Reid and Taylor, Security Printing and Minting Corporation of India Ltd, The South India Paper Mills Ltd, Wipro Technologies, Larson and Toubro, TCS, ITC Paper Mills |
| Imp. Organisations | Central Food Technological Research Institute, Defense Food Research Laboratory, Government tool room and training center, Central Institute of Plastic Engineering and Technology, Central Sericulture and Training institute |
| Nearest Railway Station | Mysore |
| Nearest Airport | Bangalore International Airport |

Table 1-1. Mysore_ Fact file (Mysore, 2011, Karnataka, 2010)

Social and public issues, power and politics play a crucial role in formulating planning processes (India, 2007), which in turn have a direct impact on building design at grassroots level. Changes in social and political circumstances will drastically affect the informed decisions made at policy level, which governs the micro design solutions (Karnataka, 1961). In the case of Mysore city, it has been

found that post-independence architecture is governed by a version of a well-planned European model neighbourhoods, with highly defined ownership boundaries (MUDA, 2008). This is in sharp contrast to the pre-independence community ownership of open and semi-open space adjacent to houses (Issar, 1991).

The city of Mysore originally grew from considered, planned development even during the colonial period. The coming together of Swadeshi¹ narratives of self help [and self determination] ensured a preference for localised material sourcing and responsive planning configurations (Vandana, 2008). Post-independence (1947), social change encouraged by the state development authority has promoted middle-income classes to favour discrete plotted developments in the western model.

Altered social and cultural values have played a crucial role in the adoption of new housing typologies. Changed social conditions meant that people started to see the strengths of community living as weaknesses. For instance, shared facilities were interpreted as leading to a lack of privacy.

The development of the European model of plotted development had an impact on the aspirations of middle class homeowners. Acquiring a plot, building their dream house and expressing their affluence with their newly acquired wealth has enabled them to move beyond the community oriented housing to economically influenced plotted development. The relation between the homeowners' aspirations and housing requirement are fairly consistent among different parts of India.

In the case of Mysore, these values along with occupation have a bearing on housing typology. The change of community living and social values has a major impact on

¹Swadeshi means “indigenously manufactured”; it was first of the four formally organised movements by Congress Nationalists against the British Raj in 1905.

sustainable housing. Independent houses rather than clustered housing have increased the footprint of dwellings by 50% (Satish and Brennan, 2010), which has clear implications on the proportional increase of resource consumption and embodied energy. Use of individual spaces over shared spaces has increased consumption in terms of operational energy of a household and, consequently the carbon footprint.

Changing family patterns along with change in work patterns also contribute to an increased carbon footprint. The nuclear family compared to the joint family occupies more space per person and further increases energy consumption. One of the key questions to trace is how economic empowerment has changed social and cultural values and created significant implications for sustainable development at Mysore.

India has a unique combination of interwoven culture and climate with emphasis on simple living (Varma, 2007). It is only after economic liberalisation that the attitude and spending pattern of some people has changed (Shah, 2008). The main concern is the resultant unsustainable built environment and the solutions explored are more technocratic and top-down, which are moving away from social concerns (Mathur, 2007). This research aims to address this major issue of understanding people's aspirations and relating them to sustainability as a participatory bottom-up approach.

1.2 Research Objectives

1.2.1 Introduction:

As argued by scholars in the field of sustainable architecture, the social, economic and contextual issues are more critical than the measurable performance or general guidelines at global level (Mayer, 2004). It becomes more imperative where the social values and lifestyle of the middle classes have been altered with economic empowerment. This, along with other factors, has transformed the sustainable lifestyle of the middle classes to become unsustainable, with a direct impact on the sustainable built environment.

Architecture has mostly been described in quantitative, measurable terms. The concept of sustainability is well-established and measured in quantitative terms at the international level. Most of the issues addressed in the Brundtland report (Brundtland and World Commission on Environment and Development., 1987), would involve a predominantly scientific framework. It is well-established that successful sustainable research projects would incorporate a wide range of research methods and approaches. It has been proven by many scholars that sustainable features are mostly defined in scientific terms (Williamson et al., 2003). Though this approach brings in tangible validity, while working in the built environment, one has to consider other issues like circumstances, values, implicit boundaries of knowledge, local condition and so forth (Brennan, 2011).

This suggests that a qualitative approach is essential to understanding the social aspects of housing and a quantitative approach is a must to define the scientific and parametric issues, which can be applied to various sustainable factors. Housing involves understanding of complex issues that include physical aspects, economic considerations, aspirations, attitude, and ethics. This can be achieved by using different methodologies and examining both qualitative and quantitative

factors. In this context, exploring sustainable housing for the middle classes, who constitute nearly 30 % of the Indian population, is considered as a contextual, multi-threaded approach. To ascertain the implication of people's aspirations, the most crucial section of the demographics in India – the middle class – has been identified as a representative sample.

The city of Mysore, with its traditions of social and sustainable attitudes to housing is a particularly useful setting to consider the growing impact of middle class affluence on sustainability.

1.2.2 Sustainable housing strategies for the expanding Indian middle class

Economic globalisation has enabled India to be a forerunner as a development hub in the world. It has also provided opportunities for economic upward mobility amongst middle class Indians. With their newfound economic status and affluence, it can be argued that the middle classes have a crucial role to play in the process of sustainable development.

Consumerism has become an embedded Indian value (Fernandes, 2006). This has changed an image of a once financially cautious and thrifty middle class to one of affordable indulgence (Nijman, 2006). The complex and multifaceted society of India is interwoven with caste, religion and regional disparities, where new-found economic status and affluence in the middle class have a critical impact on the process of sustainable development. Rapid economic development has enabled the middle class to obtain greater dominance in the power structure of society (Singh, 2009). These economically empowered affluent middle class homeowners have the strength to consume finite resources at a rate that starts to match that of the

developed world. It is their changed values and consumption pattern which has an implication on sustainable housing.

In this context, the built environment is at a crossroads, subject to two competing forces. The first is to be an important part of national and international strategies to reduce consumption and carbon emissions. At the same time, however, it is the function of the construction sector to respond to the affluent seeking housing that reflects their status. A key to unlocking such a quandary lies in looking at successful ways in which housing has been procured in the past and finding strategies to harmonise such design principles with contemporary middle class aspirations and needs.

Sustainable strategies followed in post independence India have been described as either 'eco-technical' or 'eco-cultural' (Guy and Farmer, 2001). These technically complex or primitive approaches to low carbon building do not address the social and cultural issues that underpin sustainable built environments. The emphasis of this research has been to understand housing as a social and cultural phenomenon, which can allow insights into the effective formulation of localised and relevant sustainable housing strategies.

In the process of identifying the qualitative issues and examining the social and cultural values, the research also examines the tangible, quantitative factors which are constantly used to verify and validate qualitative data and to ascertain evidence during the research. As explained in the research methodology section in chapter 3, both qualitative and quantitative methodologies are used while analysing, interpreting and drawing conclusions.

The increase in house building activity that comes with growing prosperity and a propensity towards ostentation has a deep impact on the built environment with

respect to both embodied and operating resource impacts. The impact can be mitigated by deploying intelligent design solutions that work in concert with middle class values and aspirations.

Increased resource consumption and carbon emissions that are traditionally associated with higher household incomes run counter to climate change goals. A key challenge is to research ways in which sustainable housing in an Indian context can both mitigate carbon emissions and at the same time address the material aspirations and desires of a fast-growing middle class.

1.2.3 Contextual study: Mysore, India

Research scholars have established that Mysore, a city in south India, formerly the state capital and close to the current state capital of Karnataka, Bangalore, can be identified as the precursor to sustainable development and the forerunner to green architecture (Vandana, 2008). The city of Mysore originally grew from considered, planned development even during the colonial period. Development pressures after independence and economic liberalisation have drastically changed neighbourhood patterns and housing typologies. This study traces how economic empowerment has changed social and cultural values and created significant implications for sustainable development at Mysore.

The provision of housing in India has traditionally been less related to income and wealth. It is a useful example in that it has a history that directly influenced environmental response in the built environment. Traditionally as elsewhere in the country, it featured ingrained customs of social classification based on occupation.

A key question is: What virtues of pre-independence Mysore can be revisited to offer middle income sectors sustainable and desirable housing? Obviously, an effective

local government and planning framework is instrumental as was experienced in Mysore. This research will study whether the Swadeshi values of localism still resonate in the middle class and how the display of such values can confer status in a way similar to the current condition of ostentatious consumption. A key challenge of contemporary house building in India lies in the disregard of open space that detracts from the visual and social amenity of the house and street.

There is a paradox in that post-independence India saw less localism as espoused by the Swadeshi. With priorities to establish an industrial infrastructure, planning was centralised with little emphasis on urban planning strategies. Modern movement planning and design techniques that were based firmly on European practice (MUDA, 2008) displaced climate responsive typologies and their lighter ecological footprint. The initial research carried out at Mysore has been pivotal in narrowing the research question to identify building elements at the transition space-boundary condition, which clearly reflects the move away from climate responsive house typology to more contemporary plotted development. This focused study area is extensively researched with two sets of fieldwork and interaction with the stakeholders and decision-makers of Mysore.

1.2.4 Research Significance

At the policy level there are two important aspects which shape the research; first, the present policy decision of the government of India and second, the impact of regulations and decision-makers on sustainable development and housing. In this regard, the policy regulation published recently by the environmental ministry (MoEF, 2012, MoEF, 2011), clearly shows the emphasis on the environmental dimension of sustainability and that critical concerns of social dimensions are not addressed. Further, in the case of habitat, issues related to housing, the components of housing and potential areas of emission are yet to be addressed. This research

feeds into the overall knowledge in assessing the social dimension of sustainability while examining the most important middle classes, their aspirations, lifestyle and resultant built environments.

The second and most important factor is the effectiveness of regulations in India. This factor is elaborated upon in the Chapter 3, focusing specifically on Mysore and later, in Chapter 8, while reflecting on the fieldwork and research at policy level. A critical factor in the Indian condition is that sustainability cannot wait for the government to legislate like Western Europe, where it is all driven by regulations. As elaborated upon in Chapter 3, people believe that the economic development of individuals is not because of the government, but rather in spite of the government and its policies. Thus people's perceptions and acceptability play a crucial role while formalising sustainable strategies and this has been the central point of this thesis.

One of the questions asked is, can a bottom-up approach be effective in implementing sustainable strategies. The social and cultural background of the people was validated by understanding people's preferences, their interest in community and voluntary activities. Related and at the other end of spectrum is, another important question of significance of top down approach, wherein policy decision is forced on each household by the government. In the process this research tests the level at which the sustainable agenda could be introduced.

This research aims to focus on one, but major sector of emission, housing. The purpose of this research is to ascertain the key factors that govern the design of middle class housing and what indications this might give to the establishment of robust methodologies for the design of sustainable homes.

Another key part of the study is about the way in which Mysore could be seen as a progenitor for sustainable design, when it is actually resisted by middle classes and

what lessons can be learnt from traditional housing. Their relevance in the contemporary housing typology is also examined.

1.2.5 Research process: methodology

The middle class homeowners' aspirations are validated in the first part of the research and the research questions are narrowed down based on their preferences and sustainable agenda. The second part of the research is focused on the boundary condition and transition spaces and people's preferences are tested for their acceptability to move towards sustainable building elements.

To examine people's perceptions, a series of proposals for different ways of dealing with boundary conditions were produced during the reflection of the first set of fieldwork and preparation for the second set of fieldwork. These boundary conditions engage the social, economic and environmental sustainable agendas based on the notions of global national sustainability. These are also going to engage with some of the planning traditions of Mysore and middle class demographics, perception and attitude identified during the first set of fieldwork used while generating these models. In this sense, equal priority is given to sustainable agenda, while thinking carefully about boundaries and people's aspirations.

These models are tested during the second set of fieldwork and validated by quantitative analysis of empirical data as embodied energy, carbon emission and land footprint. The methodology and processes used are elaborated upon in Chapter 3. Different parts of the research and two sets of fieldwork conducted at Mysore are linked to each other by the grounded theory methodology. The structure and process of research along with the relationship of chapters and how they are linked are shown in a research structure diagram (Figure 1-5).

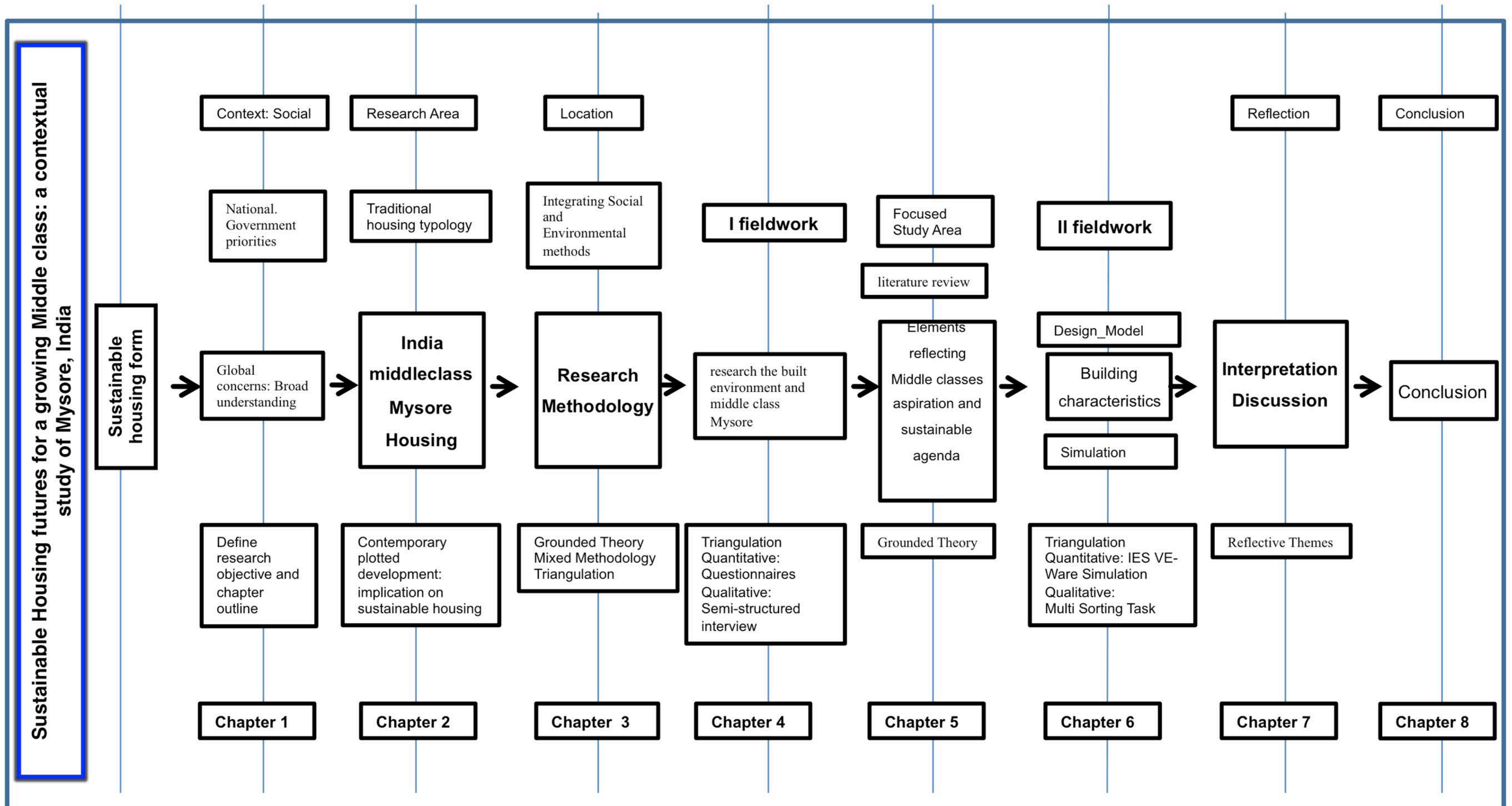


Figure 1-5. Research Structure_ Chapter outline

The research objectives and context are out set in chapter 1. Postcolonial development in India, a contextual understanding of the Indian middle class, sustainable housing and a study area of Mysore are examined in chapter 2. The research methodology adopted in terms of grounded theory and mixed method research and its relevance for this research is elaborated upon in chapter 3.

The first set of fieldwork was conducted to understand the Mysorean middle classes. The outcome was triangulated with the research conducted earlier (chapter 2). A reflection on the first set of fieldwork and an analysis of building elements, which are used for the second set of fieldwork are elaborated upon in chapter 5. The process for the second set of fieldwork and its outcome are explained in chapter 6. The first and the second sets of fieldwork were triangulated with the research work conducted throughout the process and the outcome is narrated as reflective themes in chapter 7. A synopsis of each chapter is briefly elaborated below after a summary of the research objectives.

1.3 Summary:

The underpinning factor about India is its unique development success. The economic development and, in most cases, success are always identified as being due to the individual or the public sector. Development is not attributed to the government and its policies. Rather, it is acknowledged to have happened in spite of policies and the national agenda. It is in this context, that the sustainable built environment has to be people-driven and participatory rather than government-driven and with a policy guided approach. Secondly, India has very recently committed to address the challenges of climate change and is working in the direction of sustainable development. The eight planning missions it has identified reflect the direction of the policy and answer the fundamental questions of which sectors it intends to address. Whereas in the whole process, the government is yet to identify

the major concern of 'HOW' it is addressing these issues. It would be too late to wait for the government to regulate and act.

The prevailing research and policy guideline in India clearly reflect its intention to reduce the carbon emission quantitatively and the emphasis of using rating system and technology as a tool is evident in the present scenario. It is in this context that this research takes more of a bottom-up approach to understand the aspirations and values of the people and examines the strategies to harmonise them towards sustainable housing.

The thesis is structured in such a way as to bring out the cultural and social aspects of sustainability of the middle classes. To examine the social and cultural aspects, the research focuses on the views of Mysore in the past and its people's strong understanding of sustainable regional practices. This research examines the changes and people's understanding of sustainable housing. The research also attempts to further understand what sustainability is at a time when people are going through enormous economic change.

1.4 Synopsis of chapters

1.4.1 Chapter 2: Literature review

There is abundant research carried out about sustainable development and particularly more so about the sustainable built environment. There is enough literature to identify different types of sustainability and environmental concerns. There is information available about the difference between developed and developing countries and the strategies to be adopted in the process of a sustainable built environment.

This research does not intend to document the available literature globally in chronological order. As explained in the research methods chapter, the literature study and initial research are used to narrow the research area and focus the area of research. In this context the research starts from the very beginning wherein the context of this research and global concerns and its implication on the research area are established in the first chapter, the introduction.

The global context and general sustainable development agenda are used as props to define the study area and are cited at regular intervals. The research is focused exclusively on sustainable housing strategies for middle class demographics of India and in particular relating to the housing typologies of Mysore. This chapter elaborates these three major sections: sustainable development in India, Indian middle class and the city of Mysore. They provide the basis for further research and are extensively referred to during the preparation for the fieldwork and while analysing and validating the data collected during both sets of fieldwork.

India, one of the fastest growing economies, is also one of the largest carbon emitters. Due to the huge population and more than 70% of the people being poor, the per capita energy consumption and carbon emissions have been very low. After

independence, India had to formulate its development strategies which were addressed by divergent views of the two most important figures during independence. The traditional self-reliance bottom-up approach of Gandhi was in stark contrast to Nehru's emphasis on science and technology and his industrialised, urban-centred, top-down approach. This part of the chapter examines the dialectic of Indian sustainable development and its influence on architecture and the sustainable built environment.

After independence in 1947, emphasis was on health, food and employment wherein the challenges related to urban policies were never considered as a major priority till recently and it was only in 1972, that the National Committee on environmental planning and co-ordination (NCEPC) was formulated. Development of urban development policy and emphasis on the environment is elaborated upon in this part to reflect the prevailing situation. This section is concluded with a brief understanding of sustainable housing in India in general.

The Indian middle class was rooted in the social and cultural values and was known for their simple and thrifty living values. Now they have transformed themselves to spendthrift, demonstrative people with clear signs of transformed ideology and values. Though there are more people below the poverty line in India compared to the middle class, it is the very few rich and affordability of the middle class, which is getting in the way of sustainable housing.

This chapter starts by justifying the selection of middle class as the focused study demographic. In the beginning, it traces the historical background, growth and demographic of the middle classes. It draws the perspective from the middle class demographics elsewhere while focusing on the Indian middle class and looks at both quantity and qualitative information about middle class demographics.

While understanding the formation of the middle class, it tries to unlock the complex system of social class and caste, and how it has a bearing on the formation of the middle class. It embarks on different strands of growth of the middle class over a period of time and also investigates the addition of new members to this 'club'. As researched by scholars like Lela (Fernandes, 2000a, Fernandes, 2000b, Fernandes, 2006), this chapter underpins the values of the new middle class contrary to the existing middle class and overlapping on economic empowerment; it looks at the implication on housing and construction.

Post-independent India faced with the challenge of identity had always oscillated between the rhetoric of national identity on one side and the desire to develop and follow the developed nations on the other. Lack of a unifying culture, social background and factors which has made India one of the most diverse nations, in a way resulted in lack of identity and moral values for the people of independent India. This vacuum was effectively filled by the national rhetoric and the philosophy of great leaders like Gandhi and Nehru. There is a clear distinction between the development strategies of these two important leaders, and this study sums up the influence they had while shaping the values of middle-class people and also demonstrates how values have shifted from socially responsible, rural and agricultural oriented Gandhian philosophy to the technology dependent, urban centric and development oriented Nehruvian model.

Finally, this chapter sums up the values of the middle class Indians loosely which acts as a base for the fieldwork, which in turn examines the values and aspirations of the middle-class people of Mysore first and relates to their aspirations and inference towards different housing typologies during the fieldwork later.

Mysore, one of the princely states during British rule had used all the adverse conditions to provide a resilient and robust development plan. Mysore was known for

its sustainable development and was considered as a progenitor of the sustainable movement in India in the early 20th century. The city is even today known as the cultural capital of Karnataka and recognised for its deep-rooted cultural and social values. In the last 40 years, there has been a transformation in the morphology of Mysore and a general change in the pattern of middle class ideology in India has relevance in Mysore. This chapter traces the development of Mysore since the first development plan in the early 19th century.

Between 1903 and 1947, sustainable development features can be traced in the Mysore urban development. This was affirmed by the use of local construction materials, the Swadeshi movement, robust planning and clear legislation. Socially cohesive, inclusive housing typologies demonstrate proto sustainable strategies being climate responsive and calibrated to local social and economic needs. This part of the chapter traces the sustainable built environment during pre-independence Mysore.

After independence, the state of Mysore became part of the reconfigured Karnataka State, and the capital shifted from Mysore to Bangalore and lost the significance and privileges it previously enjoyed. Before looking at the present scenario and housing typology, the second part of the chapter traces the significant developments of Mysore, planning and housing in particular, between 1947 and 1980 when the economic liberalisation drastically changed the Indian growth rate in general and rekindled the development of Mysore in particular.

Finally, the chapter sums up the prevailing housing typology of the middle class Mysoreans. This typology was used as a base for the fieldwork, which examines the values and aspirations of the middle-class people of Mysore first and relates to their aspirations and preferences while harmonising them towards housing typologies in the later fieldwork.

1.4.2 Chapter 3: Research methods

This chapter outlines the methodology used throughout the research. The crucial part of the research of adopting the appropriate methodology to arrive at the desired output is emphasised in the early part of the chapter. This chapter starts with the research methodology devised. The grounded theory has not only been effective to refine the research question, it also helps to account for new findings throughout the research. This is very important due to the nature of the research and also because of the way the construction industry works in India.

This chapter reflects on the overall perspective of the grounded theory, its origin and its adaptation in different disciplines. This study is useful to understand the significance of using grounded theory as research methodology and its effective implementation in this research.

In the next part of this chapter, understanding of the grounded theory and its application along with the overall structure of the thesis is elaborated. This part provides an overview of the different stages of the research, the nature of two major sets of fieldwork, how it is tied to earlier research and finally how the outcome of each section is used to make informed decisions about the next stage.

Grounded theory is used only as a central theme and different methods and methodologies are applied based on the nature of the investigation and requirement throughout the research. Again the most important methodologies used across the research – a mixed methodology and triangulation methods – are elaborated upon in this chapter and the different methods devised are explained in their respective chapters.

The methodology devised is the crucial part of the research and this chapter provides a clear understanding of the development of the research methods based on the nature of the research. While finalising the research methodology, other feasible alternatives are examined and the process of choosing a particular methodology and the methods used are explained at the beginning of each chapter.

1.4.3 Chapter 4: Understanding Mysore's middle class

The central part of this research, to understand the values and attitudes of the middle class demographics and then to reflect on their choices and preferences and their implications on sustainable housing, is carried out by conducting a series of investigations at Mysore. Of the two sets of extensive fieldwork conducted, the first set of fieldwork investigates people's aspirations, values and prevailing housing scenario at Mysore.

This chapter outlines one of the two sets of fieldworks undertaken during the research, underpins the critical aspect of this research (social sustainability) and provides a contextual connection by working on the primary information collected during the fieldwork.

The first part of this chapter draws inferences from the initial research and conclusions of the literature review. The initial research and literature review are used to understand the Indian demographics in general and middle class homeowners in particular. Some of the critical factors like social and cultural values and change in economic conditions and their implications and specifically people's needs, requirements, aspirations, choices and attitude are examined. The initial study clearly reflects the changed housing typology from climate responsive traditional housing to contemporary European model plotted development. The significance of change in

the housing typology and home construction process are analysed. This fundamental research is used to set the outline for the fieldwork.

The second part of this chapter sets the objectives of the fieldwork and elaborates the methodology followed. The questionnaires and semi-structured interview questions are prepared based on the earlier research about the sustainable built environment. The methodology comprises literature and archive research to establish the historical content and review some important recent trends. This part elaborates the extensive fieldwork conducted, including questionnaires over a wide range of participants (owners, builders and designers) and semi-structured interviews with key players, including academics, architects and government agencies.

The next part elaborates the process of the fieldwork. First, the selection process and criteria followed to shortlist the builders, architects and homeowners as samples for the interview and questionnaire are explained and similarly, the process of identifying the study area based on location, occupation of the homeowners is explained.

The third part elaborates on the fieldwork and narrates the actual process of the fieldwork at Mysore. This fieldwork maps the building and construction process and the level of influence of legislation, policies, architects and builders on homeowners during the design and house building process. To investigate sustainable practices, the house construction process is related to the aspirations of the owners by analysing the housing practice. This is further triangulated by analysing people's expectations, their daily practices, daily life, house layouts, material choice, façade, and space within the property, and the significance of private and public spaces.

To sum up, the outcome of the fieldwork is triangulated with the literature review and middle class homeowners' aspirations. The results of the survey are summarised

and reviewed under the category of communities, site, entrance, house layout and materials. This chapter concludes by interpreting middle class attitudes towards housing elements.

1.4.4 Chapter 5: Transition space, Boundary condition: Focused study area

The first set of fieldwork and the literature review are revisited and analysed extensively. The general understanding of people's aspirations is analysed to derive further research questions. The first set of fieldwork feeds in the vital factors of people's perception and the social and cultural dimension. The other crucial factor of the research is the sustainable housing typologies and this chapter starts by explaining different sustainable housing typologies feasible from an Indian perspective.

This chapter begins with an explanation of eco communities, community living examples and its success and failure in the Indian condition. (This includes the works of Charles Correa, and Auroville, etc.). It also examines the best examples close to the study area (Eco villages in Bangalore and Mysore). This part is summed up by examining its relevance to growing middle class mores.

The outcome of this study and the conclusions from the first set of fieldwork are linked to the aspirations of the middle-class people and the critical area of the house where it makes the major impact is identified. The next part discusses how the focused study area is narrowed to in-between spaces of outside and inside the house, the relationship of one house to another and to the boundary and also between rooms and external space. The rationale behind this choice as the transition space for the social interaction and drastic transformations which has major impact on the

sustainable housing is elaborated upon. The next part elaborates on the focused study area, the boundary conditions.

This chapter concludes with the element analysis of boundary conditions, wherein the traditional and contemporary typologies are analysed and drawing from the feedback from the first set of fieldwork, six main elements are identified. These building characteristics or elements have clearly shown a change from the previous traditional typologies and a move away from earlier sustainable practices. People's preferences for these elements are tested during the second batch of fieldwork, which is elaborated upon in the next chapter.

1.4.5 Chapter 6: Relating people's attitudes to housing elements – second set of fieldwork

The intention of this chapter is to relate people's preferences to building elements and sustainable housing is conducted through an extensive second set of fieldwork at Mysore. Chapter 5 has been the preparation for the second set of fieldwork and this chapter elaborates upon the methodology, fieldwork process and analysis of data collected during the second set of fieldwork.

This chapter sets the objectives and methodology. To assess the aspirations and choices of middle class homeowners, alternate models are prepared based on their preferences and sustainable practices by exploring different boundary conditions. To elicit the most appropriate information, a multiple sorting task process is used. Extensive fieldwork studies undertaken include qualitative and quantitative methods, semi-structured interview, and detailed interaction with architects, builders, users and daylong observation of the built houses. Different boundary conditions and options are evaluated by the participants. Their responses are structured through a multiple sorting task.

The selection process and criteria followed to shortlist the builders, architects and homeowners as samples for interview and questionnaire are explained and similarly, the process of identifying the study area based on location and occupation of the homeowners is explained.

The final part of this chapter elaborates upon the results and narrates the outcome of the second set of fieldwork. Observations are analysed and reflected upon specifically for each element identified: opening, security, material, volume, entrance and interaction. Finally, the outcome is analysed to interpret people's preferences towards sustainable housing strategies.

1.4.6 Chapter 7: Reflection and Discussion

The outcome of the fieldwork and research demonstrates the prevailing housing scenario in India and the unsustainable practices at Mysore. The second fieldwork study also provides insight into the design and construction process. The element analysis and stakeholders' responses to each element clearly reflect homeowners' varied preferences towards sustainable models and the semi-structured interview has provided useful insight into the rationale for their choices. This chapter reflects on the outcome of the research while engaging stakeholder's aspirations to adopt sustainable strategies.

The study acknowledges that it would be too simplistic to consider reverting the process to the pre-industrial era, and it would be Utopia to go back to live in the vernacular, early established pattern.

The major outcome of the research and the specific issues identified during the research and fieldwork are discussed as themes and the first part of this chapter

elaborates upon these themes. One of the questions of this research, to examine the feasibility of home grown solutions, a bottom-up approach is examined. This part reflects on middle class homeowners' values and whether they have any impact on the otherwise sustainable practices Mysore was once known for.

Security is homeowners' predominant concern and has been a critical issue shaping the boundary conditions. Homeowners' perceptions about security are discussed. Gated communities have been perceived as a sustainable solution to the concern of security, and peoples' aspirations. This theme dwells on the concept of gated communities and examines its relevance for Mysore middle class homeowners.

Mysore was known for sustainable precedence and the most crucial contributor has been the robust development plan and policy decision between 1903 and 1947. This theme examines the effect of regulation in the present Indian situation, both as policy, vision and objectives of the state on one hand and the effective implementation strategy on the other and their impact on sustainable housing strategies.

Sustainability is often contradicting and counterintuitive. The next section reflects on the paradoxes identified during the research. Important ones which have been elaborated are: global challenge to reduce energy consumption and carbon emission whereas the national challenge is to increase the growth rate to provide a better standard of living and middle class homeowners detachment from all these and an increase in consumption of finite resources. The second contradiction is environmental sustainability versus sustainable social mobility. As the plotted development is based on the economic condition of the people, it can be viewed as a positive step in the direction of social mobility, whereas plotted development has been identified as unsustainable in many other aspects including the environmental aspect.

The next section reflects on the challenges of harmonising middle class demographics aspirations towards sustainable strategies. Finally, this chapter examines the large-scale issues, which are not specifically researched in this thesis but have a clear impact on the research area. For instance, one of the solutions for sustainable housing is projected as eco communities and this part examines their relevance against the backdrop of this research. As identified in the literature review, India has always been polarised between high-tech and low-tech, and its implication on the research is examined. The awareness and exposure have a major impact on people's aspirations to move towards sustainable strategies. This section examines the prevailing condition and its implication on the study area.

1.4.7 Chapter 8: Conclusion

This chapter summarises the research and lists the outcome in terms of potential areas where the sustainable strategies can be pushed and for which the people would be willing to support and make compromises. This research plays a crucial role in light of the commitment from India to reduce carbon emissions and the government identifying housing as one of the five major sectors to target the reduction. Although the findings reflect the situation in Mysore, they can easily be used to reflect the many cities in India which have similar conditions, by making slight modifications based on the location and social conditions. Thus it will serve as a useful tool for policy makers to focus on the issues which could provide the desired results.

Chapter 2: Literature Review

2.1 Introduction

The previous chapter tackled the concerns of sustainable development at global level and underpinned the need for research in the developing economies like India. It also emphasised the significance of research in the area of sustainable built environment. The bottom-up approach to understand people and their aspirations and the implication this has on housing is contextual and was researched for a particular place in India – Mysore. However, the research can be used with modifications to reflect the people and location for other places in India.

This chapter specifically examines the growth of India after independence and traces the sustainable agenda in the process and, more specifically, urban development. The review then focuses particularly on the urban development and emphasis on sustainable agenda in the historical city Mysore. The housing typology has altered from a traditional climate responsive form to more aspirational, European models and this phenomenon is investigated by understanding one important section of Indian demographics: the expanding middle class.

2.2 Sustainable development in India

The issue of sustainable development has global consequences that require policy commitments at a national level, which must then be addressed in local development plans (Hawkes and Forster, 2002). India is currently the fifth greatest producer of CO₂ (the key component of greenhouse gases) in the world. This not only affects the country but will have adverse effects across the world (Williamson et al., 2003). In this context, Agenda 21 (UN, 1992) has stressed the need for the reduction of the emission of carbon dioxide where specific strategies must be adopted by each of the

member countries. Being committed to the UNO, India is developing policies towards carbon reduction. India, like other developing countries also has the greater responsibility of steering the country towards economic growth.

The average annual gross domestic product (GDP) growth rate of India was only 3.6 per cent for the first three decades after independence (Bhattacharya and Sakthivel, 2004). This famously known ‘Hindu growth rate’² rose to 5.6 per cent in the 1980s after economic reforms and accelerated to 6 per cent in the 1990s (Rodrik and Subramanian, 2005, Williamson and Zaghera, 2002). According to the recent World Bank data, India has maintained GDP of 6.9 per cent, rising to nearly 10 per cent in 2007 and 2010 (WorldBank, 2011). With the political compulsion to maintain a higher growth rate and provide opportunities for a huge population, growth has become the only ‘mantra’ of the government (Karnataka, 2010).

The Indian Government, still riding on the success of economic development, believes much more is to be achieved before looking at green initiatives and carbon reduction. Globalisation and the resultant economic empowerment have not come without shortfalls. As in the west, the resultant consumer attitude has, undoubtedly, bought supremacy; but it has also enhanced the disparity between the rich and poor both at a local and global level (Rao, 1927). Although liberalisation has given the benefit of higher growth and has placed India as one of the key developing countries and a front runner in major global policy decisions, what is of significance is its reflection on the improvement of an individual’s quality of life.

² The growth rate of India in the first three decades after independence was very slow due to increasing governmental controls. This slow growth rate is popularly known as the ‘Hindu rate of growth’ See: (Rodrik and Subramanian, 2005, William and Zaghera, 2002).

There are studies that indicate clearly that economic growth in India is not participatory, and this improved growth rate has only increased inequality and widened the gap amongst rich and poor (Pachauri, 2004). In the case of India, a further concern is the cost of this growth. Most of the development activity happening in India is due to the expanse of resource intensive projects that are also causing pollution (Karnataka, 2010).

2.2.1 Sustainable development and architecture in Indian context

“A technological society has two choices. First it can wait until catastrophic failures expose systemic deficiencies, distortion and self-deceptions... Secondly, a culture can provide social checks and balances to correct for systemic distortion prior to catastrophic failures.”

Mahatma Gandhi (1869-1948)

The challenges India faced after independence were multidimensional. Apart from economic development, it also had to preserve its domestic authority and the physical security of its citizens as well as provide its citizens with social advancement. Unlike developed countries, which acquired these responsibilities gradually, India had to rapidly adopt them (Khilnani, 2004). Being an agrarian country, with more than 75 per cent of the population living in villages, it was equally important to address issues like rural development, literacy, and health. It is in this context, that the dialectic of the development paths of Gandhi and Nehru must be understood.

The initial development of post-independent India was dominated by the father of the nation, Gandhi and the philosophy of its first Prime Minister, Nehru. Gandhi and Nehru had divergent viewpoints regarding the development of India. Gandhi believed in traditional self-reliance, rural development and empowering the local

community in the process of nation building. On the other hand, Nehru, who came from a different background and had studied abroad, was keen to develop India from a modern angle. He was of the opinion that modernisation was the best way to solve the problems India was facing such as unemployment, poverty and famine. He believed science and technology were integral and fundamental components of nation building and that they would be instrumental in supporting industrialisation and urbanisation in order to make India a modern state (Mathur, 2007). In his autobiography he wrote:

“India was in my blood... and yet I approached her almost as an alien critic, full of dislike for the present as well as for many of the relics of the past that I saw. To some extent I came to her via the west and looked at her as a friendly westerner might have done. I was eager and anxious to change her outlook and appearance and give her the garb of modernity. And yet doubts rose within me.”
(Jawaharlal Nehru, 1946 (Khilnani, 2004))

These two different visions were instrumental in the dialectic of Indian development and its reflection can be easily felt on sustainable development and socio-cultural values.

Gandhian discourses on the improvement of the social status of the poor and low castes often echoed middle class views on social philosophy. Despite Gandhi’s success in transforming the nationalist movement into a mass-based grassroots form of mobilisation, it did not significantly expand the composition of the organisational leadership base. These dynamics are captured in Nehru’s nostalgic ambivalence toward the role of the middle class:

“The present for me, and for many others like me, was an odd mixture of medievalism, appalling poverty and misery and a somewhat superficial

modernism of the middle classes. I was not an admirer of my own class or kind, and yet inevitably I looked to it for leadership in the struggle for India's salvation; that middle class felt caged and circumscribed and wanted to grow and develop itself. Unable to do so within the framework of British rule, a spirit of revolt grew against this rule, and yet this spirit was not directed against the structure that crushed us. It sought to retain it and control it by displacing the British. This middle class were too much the product of that structure to challenge it and seek to uproot it.” (Nehru 1969)

Gandhi's principles favoured the bottom-up approach, underlining democratic principles, decentralisation and empowering people, resulting in community organisation and the use of locally available, low-cost materials. He had inspired the establishment of building centres in which their main principles were to promote alternate, rural construction technologies and transfer knowledge of affordable housing solutions for urban and rural poor. These centres also provided training for masons and builders.

According to PavanVarma, there were essential and theoretically irreconcilable differences between the outlook of Gandhi and that of Nehru. Gandhi was against urbanisation and always believed in apathy towards the poor and self-sustenance to the extent of going back to the village and weaving his own cloth. Nehru believed in industrial development. In the concluding remarks of his inaugural Azad memorial lectures, he said:

“Let us pursue our path to industrial progress with all our strength and vigor and, at the same time, remember that material riches without toleration and compassion and wisdom may well turn to dust and ashes” Jawaharlal Nehru (Nehru, 1959).

The middle classes were in pursuit of modernity, which was interpreted by Nehru as a means of ‘shedding the shackles of the past and adopting a rationalist and scientific outlook’. In his ‘Discovery of India’, Nehru wrote “*India must break with much of her past and not allow it to dominate the present*” (Nehru, 1961). Nehru believed in adopted solutions by foreign institutions and, accordingly, formulated new research centres in leading Institutions in India such as the ‘Indian Institute of Technology’, ‘Energy Research Center’, ‘Development Alternative’, and Central Building Research Institute. The solutions for sustainable development provided by these research centers were technology-driven. Considering the diversity in India, this technocratic top-down approach and solutions were universal, as opposed to the localised solutions proposed by the bottom-up concept.

Nehru’s ambitions for large projects like steel factories and power plants greatly influenced the pattern of development (Khilnani, 2004) and superseded the labour intensive, environmentally friendly development programmes envisioned by Gandhi (Roy et al., 1995). Gandhi’s approach to development was people-centered and his concern for social environment and promoting community is evident. On the contrary, Nehru’s agenda for development did not place emphasis on conserving resources and disassociated itself from social and community concerns (Chakrabarti, 2001). The impact of this dialectic is evident in all walks of India, including the built environment. Although there is constant strife between these two development paths, it is the Nehruvian model which was favoured for shaping independent India. This is evident even in the grandiose, resource-driven urban planning process like, Chandigarh, the new city envisaged by Nehru (Vidyarthi, 2010, Bharne, 2011).

2.2.2 National Policy

Before British rule, the Indian sub-continent was never ruled by a single system or ruler in its history. It was split into parts by smaller chieftains, kings and emperors. In this sense pre-colonial history had hardly prepared people for the modern democratic system. As argued by Sunil Khilani, India became a democracy without really knowing how, why or what it meant to be one (Khilnani, 2004). Democracy was established as people realised that they would not be able to stand divided and overcome colonial rule.

The constitution of India was formulated in 1949 as a 'Sovereign, Socialist, and a Secular Democratic Republic'. The constitution provides social, economic and political justice, liberty of thought, expression, belief, faith and worship. It also ensures equality of status and opportunity. India, also known as Bharat, is a union of states and the constitution defines the power distribution between the central federal government and the state governments. The legislative power is divided into three sections as Union list, States list and Concurrent listing the Seventh Schedule to the Constitution (India, 2007).

The Union list provides executive power to central government on hundreds of important issues of national importance including defence, armed forces, foreign affairs, war and peace, citizenship, railways, shipping control of industries, regulation and development of mines. The State list provides executive power to state government for fifty two items like maintaining law and order, police forces, healthcare, transport, land policies, electricity by state and village administration (India, 2007).

The national government deals primarily with finance, external affairs and at that level its response to global environmental concerns are always at national level. The salient feature of this devolution of power is lack of significance and clarity of issues like sustainable urban development. For instance, the deciding authority of different components of urban concerns like land, revenue, tax, infrastructure are distributed between central and state government. Furthermore, urban development has not featured in any of the lists. Taking the philosophy of Mahatma Gandhi into consideration, which was closely followed by Nehru, the first prime minister of India, this is not surprising.

At the early stage of independence, urban development was not given much importance and it was perceived as an unwanted legacy of British colonisation (Rosser, 1972). Different components of urban development, such as town planning, housing and slum clearance, land acquisition, transportation and power, are not under the control of one system (either at state or national level). Instead, they have been distributed among all three lists (Union, State and Concurrent) (Wallace, 1951), which has added confusion and bureaucratic delays. This has resulted in urban development being given low priority. According to Rosser (1972), this low priority is partly and more understandably due to the urgent pressure of other issues such as food production and rural development, and partly a result of the failure of developing countries to perceive urbanisation as a positive force in national social and economic development.

After Independence, Nehru established The National Planning Commission for the strategic development of India in 1950 (Figure 2-1). The National Planning Commission was constituted to pursue the objectives of the government of India, to promote standards of living through efficient exploration of resources and to increase the production of the country (Commission, 2008). In the 1950s emphasis was clearly on agriculture, cottage industries and rural population with 61.3 per cent of

GDP spent on food alone. Nehru's centralised plan and ambition for grandiose projects paved the way for strong state-owned or controlled key industries and services, mineral resources, railway and shipping which acted as forerunners to the five-year plans.

| | Mysore | India | World | |
|------|---|---|--------------------------------------|------|
| 1900 | 1903- Mysore development plan | Swadesi Movement - 1905 | | 1900 |
| | | 1910- Swadesi movement | | |
| 1920 | | | World War 1- 1914-1918 | 1920 |
| | | Non Co-operation Movement- 1920 | | |
| | | Satyagraha - 1930 | | |
| 1940 | | | World War II - 1939-45 | 1940 |
| | | Quit India movement - 1942 | | |
| | | INDEPENDENCE - 1947 | | |
| | 1947- Power shift to Bangalore | | | |
| | | National Planning Commission -1950 | | |
| | | Five Year Plans - 1951 | | |
| 1960 | 1963- KTCP act | | | 1960 |
| | | | Clean air act - 1956 & 1968 | |
| | | | Limit to growth report - 1972 | |
| | 1972- Out line development plan | | | |
| | | Integrated Development of Small & Medium Towns (IDSMT) - 1979 | | |
| 1980 | | | World conservation strategy - 1980 | 1980 |
| | 1980- C D P | | | |
| | | | Bruntland Report - 1987 | |
| | | | Agenda - 21 - 1992 | |
| | | globalisation - 1992 | | |
| | | | European Environmental Agency - 1994 | |
| | | NewDelhi Declaration - 1994 | | |
| | | | Kyoto Conference - 1997 | |
| 2000 | 1997- Revised C D P | | | 2000 |
| | | Jawaharlal Nehru Urban Renewal Mission (JNURM)- Dec 2005 | | |
| | 2007- City Development plan - (under JNURM) | | | |

Figure 2-1. Important Dates

The long-term goals are split into shorter Five-year plans, which emphasise the prevailing critical issues. In the first two five-year plans, precedence was given to centrally planned industrialization (Commission, 2008) and economic development.³ These plans contain little evidence of concern for the implication of national development policy and the programme for population growth. Unfortunately, these five-year plans do not take into account environmental costs and failed to provide long-term prospects for a rise in living standards (Roy et al., 1995). An example of this is the Bhopal environmental disaster, where economic interests have superseded environmental concerns (Goldsmith, 1997).

The priority of India post independence was to address famine, unemployment and basic needs. The policy resource was focused more on the development project and sustainable development was always considered as a secondary issue and was not given much importance until 1970. The National Committee on environmental planning and co-ordination (NCEPC) was formulated in 1972. India's belief that science and technology can provide solutions for environmental issues was echoed in the formulation of the NCEPC as part of the department of Science and Technology (Mathur, 2007).

The NCEPC acted as an advisory body, coordinating with the planning commission on development projects and evaluating these projects in terms of environmental impact. The NCEPC also contributed to formulating research proposals and coordinated research programmes on environmental issues. Though it had only a secondary role, the major contribution of the NCEPC was to include environmental concerns in the fifth five-year plan (Commission, 2008). In 1980, the NCEPC gained

³ National five-year plans: The Planning commission (Government of India) sets the vision for the overall development of India through five-year plans. The first (1951-56) and second (1956-61) five-year plans placed more importance on energy, communications and heavy industry.

independent department status. It was in charge of environment and planning. In 1985, it was upgraded to the Ministry of Forests and Environment (MoEF). This brought together all natural resources. During the course of time they were instrumental in formulating a few important acts, namely the Water Act 1981, the Air Act 1981 and the Environment Act 1986. The pollution control board was empowered to execute these Acts and is controlled at state and centre level. The focus is towards the environment and pollution and does not directly cover the housing and building industry.

‘The increased urbanisation, and the government’s inability to provide housing and urban infrastructure for all, forced the sixth and seventh five-year plans to focus their emphasis on providing land and basic services to the urban poor. During these days, the focus was on more immediate requirements in terms of creating new towns like Gandhinagar, and Chandigarhor the extension of important cities as redevelopment projects, and town planning schemes taken up at cities like Bangalore, Mumbai and Calcutta. It was only in 1994 that the national urban policy was formulated, the first specific policy towards control and planned urban development’ (Habitat, 1996).

2.2.3 Urban Development

During the pre-independence period town planning was given little attention. The extent of urban planning was limited to basic services such as sanitation or a showcase for the imperial capital such as Delhi. Whereas it is the large number of unplanned and over congested towns, which constitutes the new problems. For the unplanned and over-congested towns and cities, Patrick Geddes proposed a "diagnostic civic survey". According to him, the ultimate goal of the civic survey was "to enter into the spirit of our city, its historic essence and continuous life" (Goodfriend, 1979). Geddes’s work in early 20th-century India reflects his emphasis

on understanding of cultural conceptions of space and its utilisation during city planning.

Another architect who emphasised climate and culture in town planning is Otto Koenigsberger⁴. Being the first director of housing for the Indian Ministry of Health of independent India, he emphasised a localised planning philosophy and argued that post-war planning in India needs a new radical approach, different to that of the West. His work in Mysore as ‘chief architect of Mysore State’ first, and director of housing at Delhi later, reflects his emphasis on culture and context. He strongly advocated for a building typology responsive to tropical conditions that emphasise the importance of outdoor living. He argued that groups of villages would be a better solution for underdeveloped areas than the planned towns of the west (Koenigsberger, 1952). He advocated local community involvement in the planning process. (Vandana, 2008, Koenigsberger, 1971).

These philosophies and principles proposed by architects and planners like Geddes and Koenigsberger were implemented in specific projects more as one off projects and had little influence on town planning and housing typologies. Indeed these ideas failed to influence the policy decisions of Independent India.

City planning started only in the 1960s. Only by the end of the third five-year plan (1965-66), did state governments agree to prepare city development plans (Das, 1981). Initially emphasis was more on providing basic services and shelter for the poor. Middle class housing was never in the radar of the government of India. This has resulted in unplanned and unregulated urban growth (Gnaneshwar, 1995).

⁴ Otto Koenigsberger (1908-1993), German Architect, served as Chief Architect of the Public Works Department (PWD) in Mysore from 1939 to 1948. He moved to London in 1954 and founded the Department of Tropical Architecture (1954-1971) at the Architectural Association (AA) School of Architecture.

The early efforts to decongest the cities and provide strategies have been influenced by the West. According to Ved Prakash, new towns were designed to decongest the cities after independence. These new urban centres were located in the context of an economic development process. His conclusion, quantifying the annual per capita operating and maintenance costs which were high costs, clearly reflects the lack of concern of these towns towards climate responsive and culturally rooted planning principles (Prakash, 1969).

The National Urbanisation Policy was prepared by The Town and Country Planning Organisation, Ministry of Urban Development, Government of India, in 1975. Again the objectives were to bridge the gap between the urban and rural settlements and to provide minimum level of services for improving the quality of life in urban and rural areas (Gnaneshwar, 1995). A comprehensive approach to urban policies was seriously addressed only after 1980.

The National Building Committee (NBC) is the governing body which controls the building industries through the Town and Country Planning Act. The building regulation, norms and standard code of practice was originally published in 1970 (BIS, 1970). In its original publication, the NBC did not account for sustainable development. The NBC revised its publication in 2005 and it still only has a limited approach to sustainability. It is not focusing entirely on the environment nor is it limited to certain types of construction: for instance, NBC elaborates the significance of bamboo in construction whereas other materials, regional differences, specific climate responsive constructional materials and techniques are not emphasised (BIS, 2005).

A continuation of this was the Energy Act (2001), which was instrumental in formulating a new building code, 'The Energy Conservation Building Code'

(ECBC), in 2007 (Kumar, 2009). This provides a guideline for the energy performance of commercial buildings. Along with this, the Ministry of the Environment and Forestry has adopted an environmental evaluation process called the Environmental Impact Assessment. Through this, it regulates the impact of new development projects on the environment.

The whole development process is evidently non-participatory and loudly echoes the technocratic, top-down process advocated by Nehru. The research outcome and resultant practice has been technology driven and does not reflect the social dimension of development. There is very little research being conducted, which demonstrates the understating of social concerns in sustainable development and housing.

The urban issues and challenges India faces are many. The average level of urbanisation in India was 27.78 per cent in 2001, much lower compared to the 40 per cent of urbanisation in developing countries (Bhagat, 2005). In 1901, only 10.84 per cent of Indians lived in urban areas, which increased to 13.86 per cent in 1941. Urban population nearly doubled by 1991 with 25.72 per cent of the total population living in urban centres. According to the 2011 census, 31.16 per cent of Indians live in urban areas (Census, 2011). The underpinning factor is the 27.5 per cent urban growth rate per annum, whereas Karnataka has recorded a nearly 40 per cent urban growth rate per annum (Bhagat, 2005).

This unplanned growth of urban centres has resulted in many problems. In most cases, the system is not able to tackle basic needs like health, water, power and waste management (Kundu and Dubey, 2006). In Karnataka, development plans have been prepared for only 30 cities. For remaining towns and for all grampanchyats (village

councils), the planning process (development plans) has not yet started (Swati, 2007). Even though the national 74th Amendment and the Panchyat Raj Act⁵ empower local authorities to formulate development plans (Chakrabarti, 2001, Karnataka, 1993), it is the lack of technical expertise to execute these policies that is of serious concern.

The shift in values and policies such as those, between high tech and low tech, culturally rooted and Western influenced, traditional and modern, could be felt right from a policy level through to the cultural and social aspects of an individual. In this context, it is important to understand the complex socio cultural values of an individual, which have a major impact on sustainable housing.

2.2.4 Post Independence Architecture

Architectural practice in India is also distributed in this dialectic. Most architects and research organisations were influenced by the literature and research work of American and European architects like Louis Isadore Kahn, Frank Lloyd Wright and Le Corbusier (Lang, 2002). Hence, most of the time, architectural solutions evolved as a direct influence of the modern architecture of the west. There are architects who believed in regionalism and practised climate-based architecture and evolved solutions which were more climate and culture-based (Majumdar 2001). For instance, experiments of Laurie Baker in South India with locally available terracotta (Bhatia and Housing and Urban Development Corporation., 1991) or the extensive

⁵ The Karnataka Panchayat Raj Bill, 1993, is established as a three-tiered Panchayat Raj System in the State with the elected bodies at Grama (Village), Taluk and District levels for greater participation of the people and more effective implementation of rural developed programmes in the State.

research conducted at Auroville (Wheeler and Beatley, 2004, Auroville, 2012), South India has remained as a stand-alone example and has failed to inspire architects and homeowners at large. Similarly, works and writings of prominent architects of Independent India like Doshi and Correa has been contextual, and climate responsive (Correa, 1983, Correa, 1991, Ashraf et al., 1998, Curtis, 1988, Kaza, 2007). However, not many contemporary architects have shown the influence of these prominent architects in their practice.

The Nehruvian model of resource-driven development and an emphasis on modern architecture (Sharma, 2004, Chatterjee, 2008) played a key role in shaping the architectural practice of post independence India. The present top-down approach of the Government has been influenced by the planning philosophies of the West and does not provide opportunities for sustainable development. This is in contrast to the pre-independent period. In the pre-independent and colonial period, India was never conceived as one nation. Each smaller region had autonomy and there was a clear emphasis on the local and contextual requirements along with the social and cultural values of the people. These were in a way responsible for the sustainable built environment.

One good example of this is Mysore, which, as already noted, was known for the early development plans and had features that can be identified as pro-sustainable. Mysore has undergone changes like any other city in India and the people of Mysore clearly reflect the change in attitude and cultural values of the Indian middle class. In this context, Mysore has been chosen as the study area and its development, and morphology along with housing typologies are elaborated in the next section.

2.3 Mysore

Mysore is a major city of Karnataka and famous for its rich and vibrant history and heritage. Mysore is known for its grand palaces, majestic temples and beautiful gardens most of which attract international tourists even today.

Mysore City is located at 76 12" (East) longitude and 12 8" (North) latitude. Its altitude is about 762m above mean sea level (MUDA, 1996). It is the second largest city in the State of Karnataka, and 140kms from Bangalore, the state capital located in the southern part of the Deccan Plateau (Figure 2-2). Mysore is known for its subtropical climate. The minimum temperature in winter is around 15 degrees Celsius and in summer the maximum temperature is around 35 degrees Celsius. Mysore's average annual rainfall is around 86 centimeters (MUDA, 2007). The Mysore city corporation has nearly a million people residing in an area of 128.42 square kilometers (Mysore, 2011).



Figure 2-2. Map of India: Mysore's location

Mysore was the forerunner of sustainable practices in the early 1900s (Vandana, 2008). Changes in the political and administrative scenario after independence (1947) drastically changed the development practices of India in general and of Mysore in particular. Legislation plays a crucial role in the formulation and implementation of national policy at grassroots level. This change in political and administrative ambience has had a major impact on sustainable practices.

The state of Mysore– the largest of the five major kingdoms that survived within the British colony – was ruled by the Wadiyars⁶(Ikegame, 2007). The Wadiyar Dynasty experienced mixed fortunes, although it remained a kingdom during British colonial rule, albeit with little power to act independently⁷. It was under direct and indirect British rule between 1799-1831 and 1831-1881 respectively (Rice, 1897). Though other kings in India had established smooth working relations with the British, Mysore always remained under the scrutiny of British rulers and the rulers of Mysore were deprived of political and administrative power.

During 1898-1899 thousands of people died of the plague. Around the same time the Mysore Palace, built of wood, burnt down during the marriage ceremony of one of the Wadiyar princesses (Ikegame, 2007). These events acted as a catalyst for redevelopment. In response to these, in order to mitigate both the disastrous effects of the fire and the plague, and to decongest the fort area, King Krishnadevaraya established a city improvement trust board in 1903. A capable government

⁶Wadiyars – A family of a local chief who ruled the area around Mysore city and established themselves as the successors of Vijayanagara Dynasty in 1610 IKEGAME, AYA 2007. *Royalty in Colonial and Post-Colonial India : A Historical Anthropology of Mysore from 1799 to the present*. PhD, The University of Edinburgh.

⁷Wadiyars dynasty (1399 to 1947) had a brief insurgence from Hyder Ali and his son Tippu sultan from 1761 till 1799.

bureaucracy, under the control of an appointed Diwan⁸, was therefore able to propose one of the first development plans in Asia⁹ (Figure 2-3).

The fort quarter of Mysore (Figure 2-3) that contained the palace was located in the relatively flat area of the saucer-shaped topography of the Mysore region. The palace is located strategically in relation to the Chamundi hills, and oriented in response to the temple on top of the Chamundi hills, which acted as a focal point in the development process. The fort, effectively a residential town sitting alongside the palace until the 19th century, was protected by fortifications with a moat on the perimeter. The Purnaiah canal was constructed to supply water to the moat from the river Cauvery (Rao, 1927).

⁸The position of Dewan was created by Mughals as ‘chief revenue officer’ of a province. Later, the title of ‘Diwan’ was used in Hindu princely states including Mysore, to refer to the highest officials in the court after the king. The Diwans of Mysore were an integral part of the administration of Mysore from 1881 to 1946. During the British rule, although the state was run under the name of the maharajas’ (King), Diwan were powerful and played a key role in the real administrative decision-making process.

⁹Mysore was the first city in Asia to have a development plan (1903). Information published in the article “Tree ownership rights to growers may boost green Cover” in “Hindu”, India's National Newspaper on Thursday, Aug 26, 2004.



Figure 2-3. Mysore City Plan: 1902 (Issar, 1991)

One of the main objectives of the proposed development plan was to decongest the settlements around the fort and relieve the unhygienic conditions of the moat and Purnaiah canal, which had been identified as the major cause of the plague. Since the town had grown beyond the fort, its defensive function was obsolete; therefore, the moat was completely filled and new parks were proposed. The whole fort area was used exclusively for the construction of a new palace built in the same location as the old palace. All other activities, including residences were moved away from the fort,

whilst retaining a few important temples: this enabled the new proposal to provide well-structured open spaces and parks around the palace. The Purnaiah canal was completely filled and used as a main road leading out of the palace, with proposed commercial activities taking place along the new road (called Sayyaji Rao Road). Other major roads were basically main roads leading out of the town to different places, which radiated from the fort.

The prevailing roads connecting Mysore to other villages were widened as main roads. To decongest the central area and address safety issues, new layouts were proposed with clear socio-religious segregation. Since the palace was the principle employer of the area, layouts were developed approximately in relation to the requirements of the palace. Arguably, with the social groups and occupations being interrelated, the spatial allocation of the workforce had an inbuilt socio-cultural aspect (Issar, 1991). The secondary roads leading from main roads were mostly in grid-iron form and connected layouts (mohallas). Narrow feeder lanes (residential lanes) connected the secondary road and layouts.



Figure 2-4. Jagali Transition

Agraharas¹⁰ were used as a prototype for the new residential layouts during the preparation of the development plan in 1904 (Issar, 1991). Typically, residences were distributed around an open space or aligned linearly with a shared party wall (terraced) built to the edge of the road. There was a very tenuous boundary to differentiate the end of the road from the beginning of the house. Physically, a semi-open raised space (Jagali) acts as a transition from the road to the inner part of the house (Figure 2-4). These Jagalis, which are always in the shade, were and are a convenient space for socialising and acted as a meeting area for the inhabitants. Jagalis overlooking the street had brought a sense of physical and psychological security to these spaces, which were actively used as interaction areas. People shared their leisure activities and entertainment with their neighbours in these informal spaces (Figure 2-5).



Figure 2-5. External space

¹⁰Traditionally, two hundred years ago, royalty used to assign villages to Brahmins for their maintenance, known as the 'Agrahara'. The layout of 'Agraharas' were used as a residential prototype while preparing development plans. A typical residential layout was a U-shaped row of houses built round a park, which resembled the present day group housing design of neighbourhoods. For more information about Agraharas of Mysore see: (ISSAR, T. P. 1991. *Mysore - the royal city*, Bangalore, My tec process Pvt. Ltd.

This inherently environmentally responsive form derived from the social classification based on occupation had clear advantages of shared security and social interaction. Mysore enjoys a mild and pleasant climate, and people are able to spend more than fifty per cent of their time in climate responsive Jagalis.

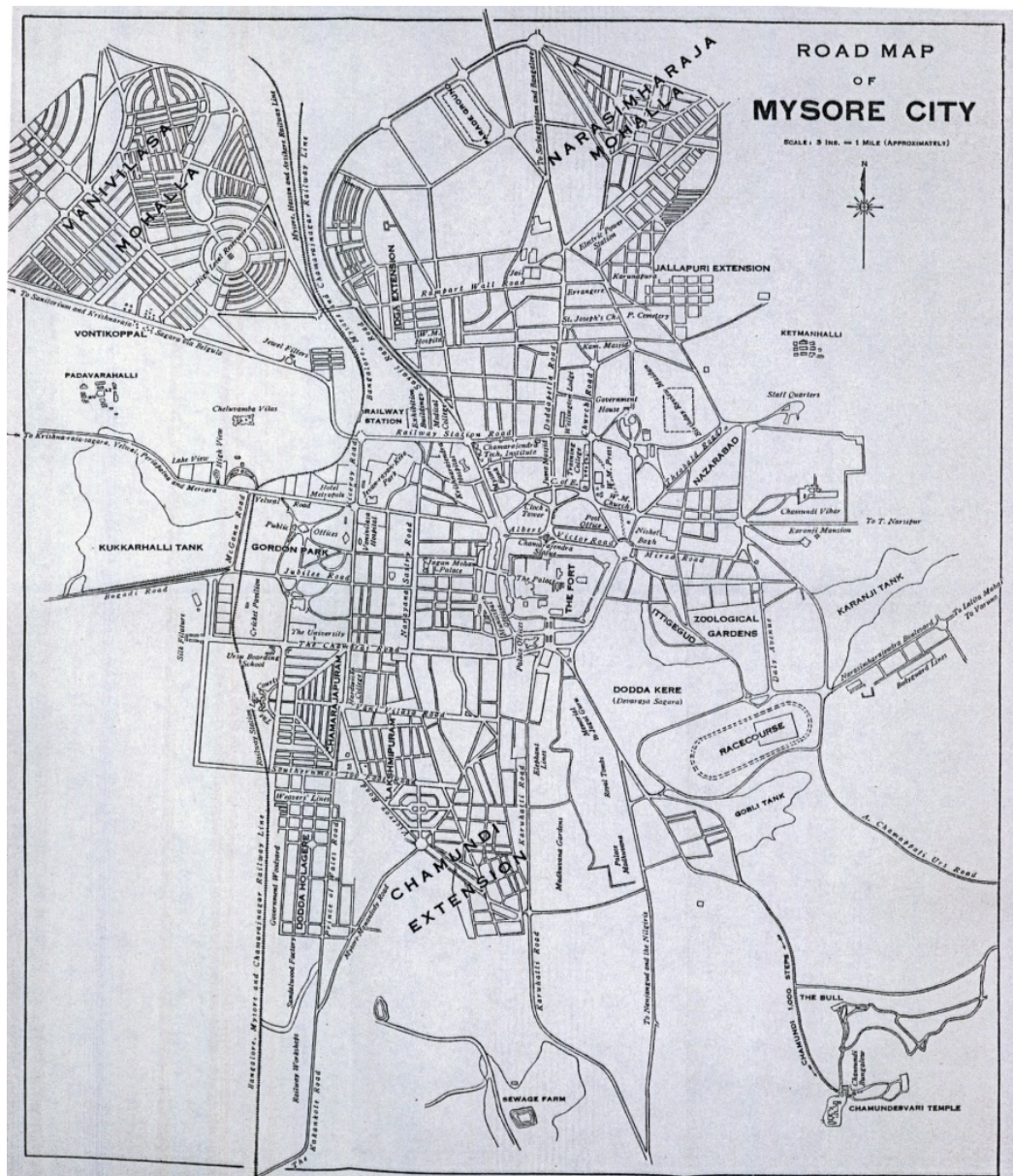


Figure 2-6. Mysore City Plan: 1930 (NLS, 1930)

Constructed of thick mud (later brick) walls and terracotta tile roofs, the houses had small openings towards shaded areas. As the Jagali was used as an external meeting space of the house, the relatively large central hall was used as an internal meeting area (Figure 2-7). Very few spaces inside the house had a fixed purpose (Ikegame, 2007). Examples of these are the kitchen, bathroom and store room. It was the occasion that decided the use of space: most spaces were multifunctional, for example the hall was used for sitting, working, sleeping, dining, gathering and so forth. The water supply and waste management were very efficient, and it is still intact in most areas today (Hindu, 2004).



Figure 2-7. Old interior

Shared facilities (including party walls), the efficient use of semi-open outdoor spaces for much of the day, and the effective use of multi-purpose areas all facilitated a compact building footprint. Using locally available material within a climatically responsive layout and construction would today be regarded as a good example of efficient sustainable development.

Plot ratios are dense compared to more diffuse contemporary layouts with less environmental impact because of more efficient land use. Comparisons in Mysore of typical Agrahara settlements with contemporary middle income settlements indicate an increased dwelling footprint. Cartographic measurements of representative land parcels indicate that for a contemporary dwelling, a typical independent house in a plotted development, 50 per cent more plot area is used compared to the more traditional Agrahara typologies.

The Jagali neighbourhood network of narrow roads, cluster planning and integration of community areas have successfully provided shared shading to reduce solar gains and improve the environment of external spaces. A lower ecological footprint in the housing clusters is achieved by modest material consumption using shared building elements such as party walls and by using locally available, natural and processed, materials. The use of local construction materials, sustainable building practices at micro level, robust planning and clear legislation to promote local material and sustainable practices also resonated with the local agendas of the pre-independence Swadeshi movement (Figure 2-6). The term ‘Swadeshi’ means ‘indigenously manufactured’ and was one of four key movements established by the Congress Party to campaign for independence.

Being a “puppet Sovereignty” (Ikegame, 2007) with reduced political and administrative power, the Wadiyars consistently tried to use cultural and social issues to gain recognition and to connect themselves with the people. During the freedom struggle, when the Swadeshi movement was conceived to protest against the use of imported materials at national level (Wolpert, 1989), Mysore rulers tried to use this opportunity to establish themselves. The Swadeshi movement’s stress on the use of local materials was addressed differently by the Mysore Region.

The industrial and commercial strategy, relieved of excessive political pressures was implemented in Mysore expeditiously of the policy by an effective political class and able technocrats (Vandana, 2008). As a result of this, the benefits of economic progress were optimised to maximise local benefit. At the same time, the conservation of parkland and the qualities of the Jagali meant that Mysore was noted for its visual amenity (Parsons, 1930).

Mysore was the first state in India to gain electricity: this took place in 1908 (Khajane, 2006, Issar, 1991).¹¹ The resultant industrialisation, prompted by collaboration between state and private capital and further emphasised by co-action with American and European technocrats to modernise the state, was a deliberate move for political, cultural and economic autonomy. As a result, people showed a clear preference for goods manufactured or sourced within Mysore (Vandana, 2008). Though the Swadeshi movement was perceived as an anti-colonial movement, its conduct in Mysore was a forerunner to contemporary strategies of sustainable development. The concept of the Swadeshi drive had a major impact on the practising architects of the time. For example, Otto Koenigsberger (Koenigsberger, 1971), was inspired by sustainable practices, i.e. the use of local construction materials, working with limited resources and passive technology (Koenigsberger et al., 1975). According to Vandana (Vandana, 2008) “His ideas developed in response to the Swadeshi drive to use local construction materials, limited resources and passive technologies. This was to later inform Tropical Architecture, a discourse solely predicated upon energy and resource consumption”.¹²

¹¹ According to Karnataka Gazetteer, Shivanasamudra (Mysore state) is the place where the first hydroelectric power station in Asia was established in 1902. Mysore was lit on Sep 26, 1908. Information published in the article “Celebrating 100 years of electricity” in “Hindu”, India's National Newspaper on Sep 26, 2006.

¹²Koenigsberger opened the Department of Tropical Architecture in 1954 at the AA, London.

Sustainable development in this context is not mere reinterpretation of vernacular traditions, but the result of effective localised governance and economic activity. The use of local construction materials, sustainable building practices at micro level, robust planning and clear legislation to promote local material had promoted sustainable agendas. Sustainable practices in the name of the Swadeshi movement, and implementation of the policy by able Diwans (prime ministers) and qualified technocrats were all instrumental in sustainable urban development at Mysore between 1903 and 1947.

The impact of robust plans and development during this period is evident even after Independence. The development strategies put forth during this period are identified as the first City Improvement Trust Board (1903) in the country. According to the Mysore Urban Development Authority, this has resulted in better planned extensions and better housing. In spite of such a great legacy, the first outline development plan was prepared after independence in only 1966 and the Mysore Urban development Authority was constituted in 1988.

Attitudes to planning changed drastically after independence in 1947. In India, policy was now determined at national level. Mysore became part of the state of Karnataka and the capital shifted from Mysore to Bangalore, which was already the military cantonment during the British rule. Town planning functions were pursued at state level and in Karnataka, legislation was enacted in the Karnataka Town and Country Planning Act of 1962. In spite of being the second largest city in Karnataka, Mysore was neglected after 1950 (Mahadev, 1975) and the planning process became infrastructure-driven. It was only in 1972 that the outline development plan was prepared (MUDA, 1996). Both the approved comprehensive development plan (1981) and the revised comprehensive development plan (1997) were mostly

physical plans emphasising the planning and zoning of land use. Guidelines were worked out in the form of regulations and bylaws for development activities.

In spite of a well established system and great legacy, these development plans failed to provide required basic services and control haphazard growth. This resulted in Mysore being identified for an urban renewal project. Accordingly Mysore is one of the cities chosen for an urban renewal mission by the Ministry of Urban Development in the recent scheme known as the Jawaharlal Nehru National Urban Renewal Mission (JNNURM, 2007). Accordingly the City Development Plan (CDP) was prepared in 2007 (MUDA). Unfortunately, these development plans do not include either policy guidelines or details for sustainable practices. Current development plans have not addressed contemporary environmental pressures and emerging sustainable agendas (MUDA, 2011)¹³.

The lack of policy and guidelines is evident at neighbourhood level. Contrary to the prevailing practice, the standard house design after 1947 became a set of rooms with a clearly identified function for each space (MUDA, 2008).¹⁴ Well-lit and ventilated rooms overlook the open space left as part of the setback on each side of the site or plot. These large openings, though they open outwards, respect the privacy of the individual owner by being contained within the fenced private surroundings. With the pre-1947 sense of enclosure thus broken, one can appreciate the sense of openness possible with independent houses, standing without any relation to each

¹³ A proposed master plan of Mysore local planning area 2031 has four objectives: 1. To promote Mysore city as the destination for investment. 2. To promote and conserve cultural heritage. 3. To plan for an emerging metropolis with options for a Mono/Metro Rail system. And 4. Suitable Planning measures to prevent the misuse of natural landscapes.

¹⁴ The Mysore Urban Development Authority has proposed building by-laws and zoning regulations as part of a comprehensive development plan. They used to provide alternate model plans for houses up until recently. Variations of these and new European models have been followed by architects.

other and moved away from the road (Saraswatipuram layout (**Figure 2-8**), (MUDA, 2008)).¹⁵

Roads, independent of houses, have pedestrian ways and are clearly demarcated from the property of private individuals by compounds and open spaces between buildings as part of regulation and building by-laws (MUDA, 2007)¹⁶. In spite of the layout being well worked out, with a hierarchy of roads, amenities and play areas, it is a total departure from the enclosed and close-knit prevailing sustainable practice. Insensitivity to sustainable practice is evident in the whole process.

¹⁵Saraswatipuram Layout: This was started in 1953-1954 and fully developed in separate stages till 1972-1973. In this period, model houses and residential sites were constructed and formed. The layout plan is available on their website (<http://www.mudamysore.gov.in/index.htm>) and a Google image of this area was accessed on Jan 07, 2009.

¹⁶ The public is not legally bound to follow the model plans provided by the MUDA. However, all buildings must follow the prescribed coverage, set back and other regulations prescribed by the MUDA based on the location, size of the plot.

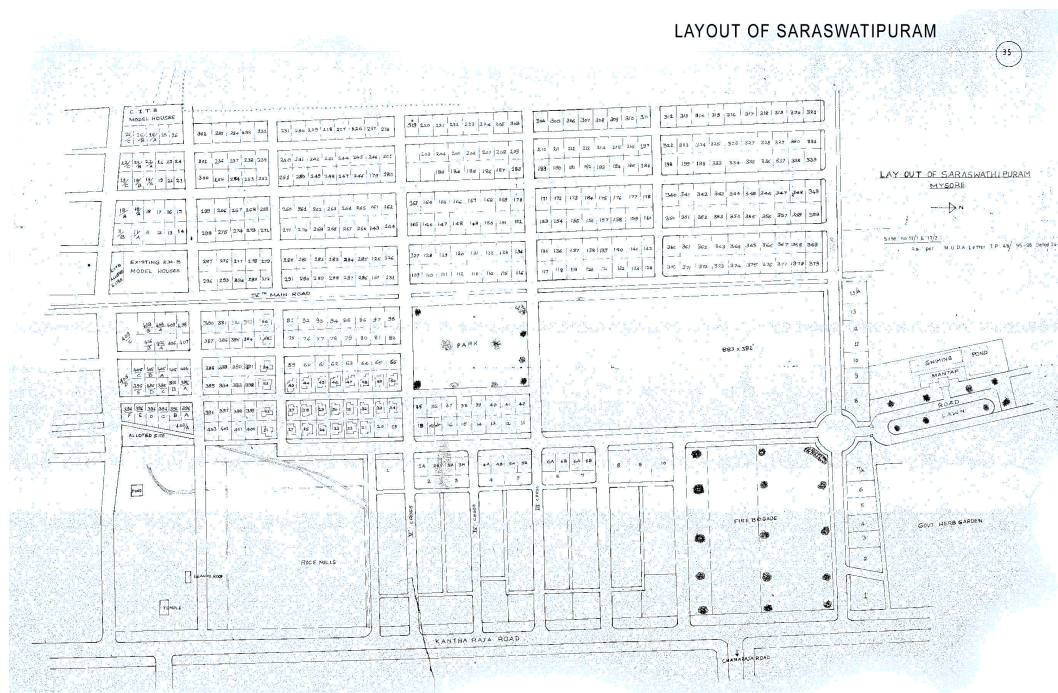


Figure 2-8. Saraswatipuram Layout (MUDA, 2008)

In Mysore, with its tradition of environmentally aware planning and architectural strategies, such neglect has had a serious impact on housing typology. The planning system, with its ‘top-down’ approach, did not establish deliverable policies for sustainable development. Secondly, the European planning system and new housing designs evident after 1947 were clearly moving away from a sustainable tradition.

The impact of a planning system and a move away from traditional housing typology is not only limited to Mysore but evident across India (Prasad, 1998). There are certain issues particular to Mysore and there are many factors which are applicable to India in general.

After 1947, Bangalore became the state capital (Kulke, 1993). Mysore had a minor role in comparison, with only tourism and education as prime occupations (Shaw and Satish, 2005).¹⁷ In a contemporary context, globalisation and the resultant urbanisation have transformed Mysore into a multidimensional, cosmopolitan city (Figure 2-9). With the growth of information technology, the city has emerged as the second largest software exporter in Karnataka with major companies like Infosys, Bharat Earth Movers, J. K. Tyres, Wipro, Falcon Tyres, Larsen & Toubro, and Theorem India providing many job opportunities (Sharma, 2004). A good climate, strong infrastructure facilities and the growth in job opportunities have attracted more people to Mysore (Mahesh, 1993).

17 In the 1950s prominent public sector industries such as Hindustan Machine Tools (HMT), Hindustan Aeronautics Limited (HAL), Bharat Heavy Electricals Limited (BHEL), Bharat Earth Movers Limited (BEML) and Indian Telephone Industries (ITI) were set up at Bangalore. Mysore being hardly 140km away from Bangalore remained only as cultural capital.

Mysore City
Revised Comprehensive Development Plan
2011 AD



Figure 2-9. Mysore City Comprehensive Development Plan- 2011 (MUDA, 1996)

The changes in needs, affordability and standards of living have resulted in an increase in people's expectations. Population growth and change in economic conditions have increased land value, which has encouraged high-rise apartments development (Mahadev, 1975, Mahesh, 1993).¹⁸ To facilitate these developments, environmentally insensitive materials such as aluminum and imported marble are used extensively. With no restrictions from policy makers on materials, type or methods of construction, people tend to use economically viable or demonstrative materials which have serious environmental impact. For example, homeowners prefer large openings, which generate the need for air-conditioning to control the resultant heat, or the use of a particular material just for the sake of status (Wessel, 2004). Similarly, there are major changes evident in social and cultural aspects of contemporary society (Tim, 2006).

Most important of all, with a consumer society in the driving seat there is now a radical shift away from traditional values (Varma, 1999). Palace, occupation and religion have less relevance, as do social structures based on social segregation. A society that is cosmopolitan and diversified, and has varied options for entertainment, has proved that once most usable semi-open spaces (Jagali) to be redundant in present-day scenarios. The movement away from extended families to nuclear families has also had a bearing on the need for social change (Ben, 1961).

The innate sustainable qualities of the Jagali housing can be contrasted with contemporary housing typologies. Expansion of new housing has been driven by growth in sectors such as IT that have benefitted from economic globalisation and liberalisation. It serves an educated, aspirational and increasingly affluent faction

¹⁸Mahadev PD - 1975 *People, Space & Economy of an Indian City: An Urban Morphology of Mysore City*- Page 99 – 104: Graph shows the taller structure/high density in the city centre. Heights of the buildings and density come down as we move away from the city centre.

within the middle class who have acquisitive value systems where housing is as much a reflection of individual status and wealth.

The design of traditional Agrahara housing clusters have the virtue of enhanced density compared with contemporary layouts, that when combined with carefully designed openings, Jagalis and courtyards can contribute to greater environmental comfort with less environmental impact (Satish et al., 2011, Issar, 1991, Vandana, 2008). However, new design typologies aimed at the aspirational and consuming classes need to reinvent the traditional yet simultaneously respond to a culture of raised expectations (CITB, 1987, MUDA, 1996).

This study reflects the crucial factors which influence sustainable housing typologies in the Indian condition. Apart from legislation and environmentally responsive design, the major factor which plays a crucial role in defining the housing typology are the social, cultural and economic dimensions of society.

Research suggests diversity in Indian culture and the social system. It is important to understand the social and cultural values of the society while examining sustainable housing strategies. There is rapid progress in the economic condition of the people of India and more so of the middle class. Along with economic empowerment, they are also undergoing transformation in their social and cultural values. Now, the Indian middle class is considered as the largest consumer groups in India which is virtually shaping the development of India. With this background, sustainable housing strategies are examined for the growing Indian middle class.

2.4 The Indian middle class

Conventional theory attributes to the middle class qualities of balance, prudence and stability. Aristotle argued that “the best political community is formed by citizens of the middle class” Aristotle 306 BC (William, 2001). Society cannot survive if it is only an aggregation of personal desires (Varma, 2007). The issue is all the more critical in developing countries where the democratic system empowers the majority. If the majority of voters are poor, then the interests of the middle class are threatened. In the reconfigured urban fabric, while a culturally rooted Indian middle class still believes in social and cultural values, it also recognises the changing attitude at a global level. Within that middle class, the expression of upward mobility and the demonstration of economic status may be easily felt in the most important activities of their lifetime, that is, house construction.

In the complex situation of India, interwoven caste, religion and regional disparities, along with the newfound economic status and spending power of the middle class, have a crucial role to play in the process of sustainable development. C Wright Mills (1958) defined the new middle class in the United States in terms of the rise of salaried white-collar professionals with a distinctive lifestyle. Leela Fernandes has differentiated the definition of the middle class between developed nations and developing nations. The middle class in developed countries is clearly demarcated as salaried, white-collar professionals with a distinctive lifestyle. They are the driving force of the economy. On the other hand, the middle class in developing nations is smaller in size and lacks access to a similar level of infrastructure and represents an emerging rather than a stable socio-economic group. In the case of India, apart from being largely dependent on government employment, it is also closely followed by caste-based movements and politics (Fernandes, 2006).

In India, class has been defined according to the caste or religion of the person (Kulke and Rothermund, 1998). The focus shifted slightly towards land ownership in the last century. Poor literacy levels in India has resulted in these social structures intertwined with religion and this has played a crucial role in Indian demographics in the last few decades (Misra, 1961). The Indian constitution provides equal opportunities for all citizens. It introduced the protection of civil rights act in 1955 to encourage the participation of lower classes in public and social activities. After independence, social classification with religion and economy were two strands in the classification of demographics, wherein the economy has preceded the post-1990s religion- and class-based social structure.

According to Pavan K Varma (Varma, 1999, Varma, 2007), the middle class in an Indian context is anyone who has a home to live in and can afford three meals a day, has access to basic health care, public transport and schooling. By these parameters, the middle class could well be upwards of four hundred million: below the two per cent of the very rich, and above the three hundred million who consist of those below the poverty line plus the two hundred million or so who may not be destitute but are still very poor. The heterogeneity of such large swathes of people hardly needs reiteration. In 1947, the middle class, a creation largely of the colonial interaction with the British, was a small and exclusive club. This began to change in the 1960s and 1970s, and more dramatically after 1991.

The middle class now constitutes about 25 per cent of the total population of India (Saavala, 2003). More than 27 per cent of the people stand below the poverty line and about 28 per cent of the people are based around it (Sridharan, 2004). Changes in economic conditions have enabled the middle class to dominate the power structure of society (Singh, 2009). It is the spending pattern and the social dimension of the middle class that call for closer examination.

The middle class in India was constituted not so much by its social or economic standing as by its politics of the public sphere. The definition and power of the middle class came from its propagation of modern ways of life (Fernandes 2000). According to Ahmad and Reifeld, the ideas of a middle class social order were imported to India during British rule. It was a conscious effort on their part to create a middle class which was to be a class of imitators and not the originators of new values and methods (Imtiaz and Helmut, 2001). During the colonial period, education policy was used as a tool in the creation of the middle class. The colonial administrator Thomas Macauley advocated a new educational policy to “create a class who would be interpreters between us (British) and the million, whom we govern, a class, Indian in blood and colour, but English in tastes, in opinions, in morals and intellect” (Jefferess, 2007). The educated class that emerged in India as a result of British educational policies cared more for position and influence within the civil service than for mass education or economic development. Thus, from the circumstances of their origin and growth, the members of the educated class, such as civil servants, lawyers, college teachers and doctors, constituted the bulk of the Indian middle class. This middle class was largely dominated by the traditional higher castes (Varma, 1999).

This rising middle class was essentially shaped by colonial character, though its newness was deeply rooted in the colonial education system, it also retained and nourished its old social distinctions. It is this unique combination which has shaped the Indian middle class during the colonial and postcolonial period (Fernandes 2000). British rule had imposed constraints on the development and socio-economic mobility of the new middle class. Being dependent on a colonial state, the middle class occupied an uncertain position (Varma, 1999). Due to the conscious effort by the British, industries were never fully developed and hence, unlike developed nations, the Indian middle class could not expand as an industrial middle class (Fernandes 2006). According to Leela Fernandes “The structural constraints of

colonialism placed this newly emerging social group in a unique position of ambivalence that rested between the privileges and points of access that education provided and restricted access to economic and political power” (Fernandes 2006).

In this constrained environment, English education did not simply represent a means for a shift in cultural status, it also provided a central avenue for various segments of upper caste, middle class individuals to consolidate their socio-economic position within the political economy of colonial rule (Varma, 1999). The history of the new middle class, as Tanika Sarkar put it, was marked by absences and voids produced by radical discrimination and the absence of economic and political leadership within the confines of colonial rule (Fernandes 2006). Although the new colonial middle class was numerically quite small and its opportunities for advancement were certainly limited, these small but articulate elite was able to gain prominence because of the specificities of its socio-economic position (Fernandes 2006).

The strong colonial influence, fracturing a prevailing social system, also had adverse effects. Echoing Ahmad and Reifeld’s understanding of the middle class, Yogendra Singh argues that the Indian middle class faces the dilemma of not having roots in tradition or in modernity (Singh, 2007).

Although the middle classes are defined as not being in absolute poverty in the developed world, the Indian National Council for Applied Research has classified India's population into five demographic groups:

- The very rich
- The consuming class
- The climbers
- The aspirants and
- The destitute

The primary metrics for such a classification being based on income, and spending power, the consuming class and climbers are identified as constituting the “Indian middle class” (NCAER 2009).

| | Annual income (in Rupees) at 1994-95 prices | Description | Research focus |
|-----------|---|---|-------------------------|
| The rich | >215,000 | Own and 'consume' most of the expensive consumer products and premium expendables. The climbers and the aspirants also have the socio-cultural traits of the "consumer" class. | The Indian Middle class |
| Consumers | 45,001-215,000 | | |
| Climbers | 22,001-45,000 | | |
| Aspirants | 16,001-22,000 | | |
| Destitute | <16,000 | The people are deprived of basic human needs. | |

Table 2-1. Population distribution_ India (NCAER, 2009)

According to Pavan K Varma, affluence plays a crucial role in defining the middle class in the Indian context. Initially, the middle class was a small and exclusive group of people created largely during the British colonial period. The size and composition began to change in the 1960s and more dramatically after economic liberalisation in 1991.

Post independent policies to provide subsidies and positive discrimination for the lower class have helped them to join the exclusive club of the middle class. Others

include ‘millions of shopkeepers, small time entrepreneurs, property agents, semi-skilled industrial and service workers, and lower level salaried households where the combined income of husband and wife generates a disposable income substantially greater than the pensions of the old guard’ (Varma, 1999).

During the British rule, the Indian middle class was in a dilemma, as its primary aim was to end British rule, with a clear anti-colonial outlook on one hand and to retain the new acquired status on the other. In this complex situation, the middle class wanted political independence and the end of British rule. Meanwhile, it was keen to retain the system of governance, a socio-economic matrix in which the middle classes had acquired a stake (Varma 2007). The middle class in the early decades of post-independent India was shaped by a continued strong dependence on the state. Earlier colonial linkages between the state and middle class created through educational policies and state employment were expanded through the state-managed model of economic planning and development (Fernandes 2006).

The Indian middle class had historically followed Gandhian principles and restrained themselves from the show of wealth (Wessel, 2004). According to Nehru, cultural values had given the middle classes a sense of pride (Nehru, 1961). In a country known for its diverse factors, these national figures had set the loose fabric of moral and social format. It had unwritten approval from all walks of life, including the middle class.

According to Leela Fernandes, it is the simultaneous presumption of the “inevitability” of middle class leadership on the one hand, and the identification between the elite tiers of the middle class and the structures of colonial modernity on the other, that shaped the direction of middle class nationalist thought and activity (Fernandes 2006).

The middle classes were highly inspired by Gandhi's simple lifestyle and his ability to live by what he preached. He became less of an example of austerity in the tradition of the mahatmas in India and more of a symbol of voluntary restraint from material wants in a poor country like India. His austere lifestyle was not viewed as something to be emulated in an absolute sense; it was internalised more as a guiding principle: high thinking and simple living. According to Varma, "If Gandhi was revered for actually having the courage to live like those below him, Nehru was admired for effortlessly being able to renounce the comforts and prerequisites that were his by virtue of belonging to a class above" (Varma, 1999).

Gandhi's stress on cottage industries and his somewhat pastoral vision of self-sufficient village communities was recognised by the middle class. But it was Nehru's vision of an awakened India, invulnerable to outside manipulation and moving towards the creation of a modern and industrialised economy on the basis of its long suppressed indigenous strengths that had a far greater appeal for this class (Varma, 1999).

Apart from the influence of these two people, there were two other crucial factors strengthening the thought processes of the middle class during independence. Firstly, one aspect of the supporting middle class attitudes was a belief in the uniqueness of the Indian liberation struggle. A largely non-violent agitation succeeded in vanquishing one of the world's most powerful colonial empires, and it did so on the universal principles of freedom and equality without professing a hatred for the enemy. This gave self-righteousness and a sense of moral superiority to the middle class. It also helped to nurture a continued acceptance of the role of the moral in the public realm, which was a positive factor in the years immediately following independence.

Secondly, also contributing to the makeup of middle class India's thinking was a romanticisation of India's past. This is manifested in an emotional pride in a mythical past where India, prior to humiliating subjections, was a land of prosperity, culturally efflorescent, morally awakened, and politically powerful.

These elements formed the ideological framework of the Indian middle class at the time of Independence (Varma, 1999). The middle class, in order to have a vision beyond its immediate material interests, has always needed to have something to look up to: either an ideology which is more than the sum of its own interests or a leader whom it can respect and repose confidence in. In the years after 1947, it had both. This framework of the Gandhi-Nehru legacy helped motivate the middle class to play a role in nation-building with both optimism and idealism. There was an ideology, a vision, a calling which the middle class could owe loyalty to. It was this loyalty to something other than merely its own gratifications that gave it a larger cause and purpose (Varma, 1999).

Gandhi made no secret of his belief in religion. He strongly believed in Hinduism and displayed love and affection for people of other faiths. He advocated tolerance and inclusion of non-Hindus (Varshney, 1993). Religious symbols occurred frequently in his writings and public announcements. On the other hand, Nehru, in keeping with his espousal of the modern and rationalistic outlook, shied away from religious imagery and ritual. He believed that religion at the level of ordinary practice led to orthodoxy and prejudice and a narrowness of vision which was at fundamental variance with the aim of inculcating a scientific temper and building a progressive India (Varma, 1999).

In the early decades of independence, the state contributed both directly and indirectly to the expansion and consolidation of middle class interests in a number of ways. While socialist rhetoric addressed the poor, developmental practices and

policies reflected a modernist outlook that tapped into urban middle class visions and desires for rapid technological and industrial growth. It is the middle class people who were the key beneficiaries of a socialist growth model adopted in the post independent development strategy (planning commission). The middle class represented a central social group that served as an agent that both shaped and was a primary target of nationalist discourses of development as well as of specific state policies (Varma, 1999).

The middle class configuration and composition changed after independence and more drastically after economic liberalisation. According to Leela Fernandes, the concept of ‘new middle class’ was introduced to Indian subcontinent by the colonial rule. The identity of the new middle class was that individuals from varying social segments can acquire the kinds of capital, such as education, credentials, skills and cultural resources, which can provide them with access to membership in this distinctive middle class (Fernandes, 2000b). This has been in sharp contrast to the socially defined class system. The result is that the emerging politics of the new middle class have broader national political and material implications for the Indian middle class that now includes marginalised socio-economic groups (Fernandes, 2006).

After the death of Lal Bahadur Sastri¹⁹, India’s second prime minister, in 1966, the political climate of India changed dramatically. Freedom was the cause for which people fought at this time. Henceforth, individuals’ needs became important and their self importance was the cause for which they had to struggle (Varma, 1999). At

¹⁹Lal Bahadur Shastri (2 October 1904 – 11 January 1966), a leader of the Indian National Congress party, was the prime minister of India (1964–66) after Jawaharlal Nehru. Sastri joined Gandhi in the Indian independence movement in the 1920s.

national level, the middle classes were influenced by corrupt members of parliament and also nepotism (Wolpert, 1989).

Famine, growing disparity of income, the lack of resources and low wages pushed the middle class to conveniently believe that there was no harm in following the precedent set by the politicians and aspiring towards success; irrespective of means, and money regardless of source (Varma, 1999).

The new Indian middle class accommodated the professional, white-collar private-sector employees and also people from the newly formulated service sector. This new middle class provided a breakthrough from the stereotypical notion of a homogeneous consumerist class (Fernandes, 2000b). The concept of the new middle class is neither a stagnate, homogeneous group, nor a particular working class people unlike that in developed countries. They are constantly evolving and in most cases their ambition is to climb the social ladder. While analysing the development of the middle class in Asia, Michel Ladet and Ung Song have identified three stages of development of the middle class:

1. Modernisation: economic development, urbanisation and education influence the process of modernisation of the middle classes.
2. Westernisation: in the next stage, rise in the advertising of foreign brands will fuel the interest in the lifestyle of rich countries.
3. 'Opening Up', The Great East-West Globalisation, Culture Mix and Fusion: in the next stage, globalisation will result in the fusion of regional popular and western popular culture.

According to Ladet and Song, this fusion will have a greater impact on the urban Asian youth (Ladet and Song, 2002). In the case of India, we can easily identify these three phases, however with a complex class structure, we can find these

successive developments for most of the middle class people at micro level and also all three stages simultaneously across the Indian middle class.

The roots of the link between the middle classes and a consumer-based identity associated with economic liberalisation first began to emerge in Rajiv Gandhi's²⁰ regime in the 1980s (Sibal, 2012) and have expanded since the period of liberalisation in the 1990s. The identity of the new middle class is intertwined with shifting public cultural representations of the Indian nation-state. The image of this group is marked both by its local urban origins and by its global aspirations of economic and cultural achievement. The image of the new middle class represents an idealised national standard of living that other social groups can aspire to and potentially achieve through practices of consumption (Varma, 1999).

Economic liberalisation has provided an opportunity for people to aspire across the class structure, and the middle class contains the most beneficiaries of this phenomenon. According to Satish Deshpande, the middle class has consolidated its social, economic and political standing by benefitting from globalisation (Deshpande, 2004). Economic liberalisation not only encouraged upward mobility of the middle classes, it also supported the notion of progress for the lower classes to aspire to economic development (Fernandes, 2000b).

²⁰Rajiv Gandhi (20 August 1944 – 21 May 1991), was the prime minister of India(1984–89) after the assassination of his mother, prime minister, Indira Gandhi. The top-down model of state-led economic development was not sustainable and during the Rajiv Gandhi's premiership, business was given freedom with lesser state interference. Economists have identified this as a crucial period in the Indian economic development.

The growing visibility of this new Indian middle class embodies the emergence of a wider national political culture, one that has shifted from older ideologies of a state-managed economy to a middle class culture of consumption. Proponents of economic liberalisation portray the middle class as a group that is fundamentally tied to the success of economic reforms (Fernandes, 2000b).

Leela Fernandes' focus on the practices and politics of the new middle class points to a conception of a much denser field of relationships and activities in which individuals and subgroups in the middle class attempt to negotiate, respond to, and shape the political dynamics of liberalisation. This often takes place in ways and in spaces that may not at first glance appear to be overtly related to changes associated with politics of economic reform (Fernandes, 2000b).

Consumption has become the new mantra and the middle class is the central figure in the process of relishing the benefits of the emerging opportunities of economic liberalisation. The new middle class, which is known for consumption and associated lifestyle changes, differentiates itself from the traditional middle class, which was held back by cultural criticism on consumption inherent in Nehruvian state socialism and Gandhian ideals of austerity (Varma, 1999). The urban middle class is delineated as consumers not just of the newly available commodities in liberalising India but consumers of a new India that has been produced through the meanings attached to these commodities (Varma, 1999). According to Leela Fernandes, while emerging opportunities for the consumption of newly available commodities represent the public face of the benefits of economic liberalisation, the central figure in such representations of consumption is the urban middle class. The urban middle class, in effect, represents a socio-cultural embodiment of India's transition to a committed liberalising nation (Fernandes, 2006).

Education has played a pivotal role in shaping the Indian middle class. According to the Deutsche Bank Research report, education is the third largest household expenditure behind one's house and groceries (Saxena, 2010). India's economic growth has resulted in greater employability and middle class benefit most from this phenomenon. The middle classes' emphasis on education is evident, where the maximum number of students in higher education, and those who work as professionals have a middle-class background.

The IT sector and its resultant white-collar jobs helped the middle class in its upward mobility. People saw huge change taking place in one generation (Creswell and Plano Clark, 2007). This new-found wealth is disproportionate to former incomes and considerably higher compared to that of their parents. It found expression in all possible ways including house building and interiors (Saavala, 2003). The new middle class started identifying and valuing themselves based on the basis of consumption and wealth with in a perceived meritocracy (Saavala, 2003). It is this consumption pattern that is now shaping the culture and identity of the middle class (Wessel, 2004). India is part of the global economy and consumption is defining the Indian economy (Ladet and Song, 2002).

The distinctiveness of the new middle class has rested on a range of representational practices centred around particular characteristics of consumption, style and social distinction. According to Leela Fernandes "The lifestyle of the new middle class is in many ways the most visible symbolic representation of the benefits of India's embrace of globalisation. This middle class is not simply a new socio-economic group; it embodies a changing set of sociocultural norms of the Indian nation". Such changes have ranged from conventional shifts in patterns of urban redevelopment with the rise of shopping malls and upper middle class housing complexes to more subtle changes in aesthetic and cultural practices (Fernandes, 2000b).

The global perspective of India's new economy has begun to turn from celebrations of a burgeoning 250-million-strong middle class consumer market to anxieties over an educated workforce that now threatens the U.S. and European middle classes through the outsourcing of service-sector jobs (Fernandes, 2000b). These have their ramification on the spatial reorganisation of neighborhoods within cities and small towns. In this reorganisation, the middle class has developed new suburban aesthetic identities and lifestyles that seek to displace visual signs of poverty from public spaces (Fernandes, 2000b).

The rapid expansion of a new middle class in India during the last decade of the twentieth century has influenced many parts of the public sphere (Varma, 1999). The expanded role of the market has had a mixed response from the middle class (Fernandes, 2000b). According to Andre Beteille, though the aspirations of the new middle class centre typically around career (Imtiaz and Helmut, 2001), it is consumerism which has clearly become the Indian value (Fernandes, 2000b). The media exploited the middle class to create a new consumer culture. It did this effectively by targeting the materialist middle class. This has shifted the concept of a thrifty middle class with a saving mentality to one of affordable indulgence (Varma, 1999). A consequence of globalisation is the extension of the consumer markets from the developed to developing world. The outsourcing of jobs thus improves the profitability of the developed countries whilst simultaneously expanding the market for their goods (Saxena, 2010). The spending spree has increased the wants of the people and now two incomes are often needed to run a middle class house.

India is known for its unique strength to oscillate between the religious and traditional practices and science and technology. As Gyan Prakash has summed it beautifully, in India "Life is like a stream. One bank is the Vedas and the other bank is the contemporary world, which includes science and technology. If both banks are

not firm, the water will scatter. If both banks are firm, the river will run its course” (Prakash, 2002). It is in this flow that the middle class is interwoven together with culture and science, with beliefs and rationales, and they are also oscillating between their responsibilities and self indulgence (Till, 1998).

It would be too simplistic to generalise the values of the middle class as being exclusively materialistic and totally following the Nehruvian principal. According to Khilnani, “The idea of India is not homogenous and univocal. No single idea can possibly hope to capture the many ideas...” (Khilnani 2004). According to Pawan Verma, “India is divided into two parts: one India that reflects and must cater to the upwardly mobile aspirations of the middle and elite classes; and a second India, often called Bharat, which is doomed to remain at the periphery of the relatively affluent India...”. The concern is whether the middle class is capable of creating a value system which can promote a civil society that encompasses in its upwardly mobile trajectory all sections of Indian society (Varma, 1999). This process represents an emerging dimension in Indian politics, one in which middle class individuals and social groups now consciously claim that the Indian middle class is a distinctive social group with its own set of social, political, and economic interests that must be actively represented (Fernandes, 2006).

In effect, according to Leela Fernandes, the middle class consumer-citizen is in effect the new “common man,” victimised both by a corrupt and ineffective political system on the one hand and the supposedly privileged and protected poor and working classes on the other. The production of consumer-based identities in the context of liberalisation has rested on a politics of distinction between the middle class on one hand and the poor and working class on the other.

Contrary to the national policy and government effort, which have supported the middle classes directly and indirectly, the middle class is frustrated and angry, which

is not simply a reflection of cultural anxiety but is also linked to perceptions that their interests are not being served by politicians and by the state (Fernandes, 2000b). This newfound consumerism-oriented approach in the context of liberalisation, has brought in the distinction between the middle class on one hand and the poor and working class on the other. Though this distinction between the middle and working classes is a historical phenomenon that is not causally produced by liberalisation, the creation of the new middle class identity has intensified these processes (Fernandes, 2000b).

Since more than 55 per cent of people are in the economically weaker group (Sridharan, 2004), a primary goal of the government is to provide basic services and facilities. This has been reflected in the Five Year Plans (Rosser, 1972). However, liberalisation strengthened both the national income and the middle class. Unfortunately, this has widened the gap between the poor and the middle class (Fernandes, 2000b). In spite of being the beneficiary of liberalisation and government policy, the middle class feel they have not received enough and have conveniently left the national concern to the government (Mathur 2007). Being self-centred, the middle class has not taken active participation in national developments (Ganguly-Scrase, 2003). Though middle classes have strong opinions about politics and the development of the country, research organisations like Deutsche Bank Research have identified a shortfall in the actual participation of the middle class in the democratic system (Saxena, 2010). This empowered middle class indulging in over-consumption has no empathy for the poor and has left it to the nation to provide for them. In the process, India is rising despite the state (Austin et al., 2002) and hence has become a rich country of poor people.

Moral considerations aside, there can be no sustainable growth without the public at large seeing itself as the major stakeholder in the successful functioning of the economy (Shah, 2008). A key question is whether middle class people can link self-

interest to long-term goals rather than only to immediate benefit. The lack of social commitment is evident in the consumer culture of the middle class, which is opposed to all that stands in the way, including redistribution of resources and opportunities (Wessel, 2004). An appeal by the government is unlikely to incline the average middle class Indian towards voluntary work for the disadvantaged (Varma, 1999). With the changed political and socio-economic scenario and the resultant attitude of the middle class, the ideal social activism of Gandhi sounds unachievable.

It is the unthinking consumption of the middle classes along with the national agenda of development that puts sustainable development at risk. The very fundamentals of sustainable development – to consume enough without compromising the needs of the future generation – are destined for head on collision with the middle class, who are spending with no concern for the present poor people or future generations (Nijman, 2006).

Sustainable development can go hand in hand with the middle class only with changes in the attitudes of the people, and their ability to relate themselves to reality. Recognising upward movement as a hallmark of the middle class and approaching sustainable development as an upward movement of technology and socio-economic issues, can be used to cater for the aspirations of the middle class which are sustainable in nature.

Finally, the middle class often consciously seeks to emulate the consumption practices associated with the upper class or upper middle class, with individual families often overextending themselves financially in order to obtain particular commodities that are symbols of the culture of wealth demonstration. It can also be summed up as, middle class individuals engage in practices designed to acquire the aesthetic and cultural knowledge necessary to adapt to shifting consumption practices (Fernandes, 2000b, Fernandes, 2006).

Against this background, the Indian middle class is not a homogeneous section of people. Due to the diversity of demographics, it is difficult to typify the common issues of middle classes relating to housing. This section also suggests that Mysore is not an exception to the scenario observed at national level as the plotted development has superseded culturally rooted climate responsive housing typologies.

The implication of reconfigured middle class people is evident in housing. While investigating the strategies for sustainable housing, the primary question to be addressed is whether the middle class people's aspirations are detrimental to sustainable housing. This research integrates the social and cultural values of people and examines the potential sustainable strategies in one section of the built environment, the house, and the most crucial part of individuals only after food and clothing.

2.5 Conclusion

In conclusion, in India, national development and in particular urban development do not reflect the urgency or concern for sustainable development and some of the good works by research institutes or individual architects have remained as standalone efforts and failed to influence wider audiences. Furthermore, the sustainable features evident in traditional housing typologies has been overlooked in the prevailing housing, wherein the innate sustainable qualities of the Jagali housing can be contrasted with contemporary housing typologies.

In the case of Mysore, the expansion of new housing has been driven by economic growth, which benefitted from economic globalisation and liberalisation. Economic empowerment serves an educated, aspirational and increasingly affluent faction within the middle class who has acquisitive value systems where housing is as much

a reflection of individual status and wealth. The urban middle class are particularly important to this research as their aspirations have an impact on consumption, which affects the environment.

The above findings underpin the significance of a bottom-up approach and lead to one of the pivotal parts of this research: whether middle class aspirations in housing are detrimental to sustainable development. This is examined by understanding the aspirations of the middle class people of Mysore in the first fieldwork conducted and examined for its implication on sustainable housing elements in the second bout of fieldwork.

One of the unique factors of this research is the way the social research of understanding the people's aspirations is mixed with the environmental design parameters of parametric analysis of energy consumption and carbon emission. This requires an equally specific research methodology to be developed to identify and balance both qualitative and quantitative information.

One of the key methodologies used is grounded theory and key findings of this chapter are revisited in subsequent chapters as this informs the structure of the research. The next chapter explains the methodology employed for this research.

Chapter 3: Research Methods

3.1 Introduction

This chapter outlines the overall research methodology for this thesis.

3.1.1 Research objective

As argued by scholars in the field of sustainable architecture, social, economic and contextual issues are more critical than the measurable performance or general guidelines at the global level (Mayer, 2004). It becomes imperative where the social values and lifestyle of the middle class have been transformed through economic development albeit with much greater environmental impact.

Sustainability as an internationally recognised concept was articulated by the Brundtland report in a rational, scientific framework (Brundtland, 1987). It is well established that successful sustainable research projects would incorporate a wide range of research methods and approaches. Many scholars hold that sustainable features in architecture are mostly defined in scientific terms (Williamson et al., 2003). Though this approach brings a quantifiable sense, when working in the built environment, one also has to consider issues such as cultural and geographic contexts, the implicit boundaries of knowledge, and conditioned design discourse (Brennan, 2011).

This suggests that in respect to sustainable housing design, a qualitative approach is essential to understand social and cultural dynamics as well as quantitative strategies to measure and benchmark performance. Housing has the qualities of a social phenomenon. To formulate sustainable design strategies requires both qualitative and quantitative input, suggesting a range of research methodologies. In this context,

exploring sustainable housing for middle-class should be considered as a contextual and multi threaded approach using triangulation techniques and grounded theory to validate the findings of the fieldwork undertaken for this research.

3.2 Research methodology

The research is developed as an open inquiry about sustainable housing. The research question is defined and narrowed through the process of research in the form of the literature review and fieldwork. Grounded theory acts as an overriding research methodology for this research. It allows for a series of methodologies, which enable an understanding of the complex and evolving middle class housing in India.

The first part of the chapter elaborates on the grounded theory methodology and its application in this research. This research has involved a complex process of gathering and analysing data that is both qualitative and quantitative in nature. The second part of the chapter elaborates on a mixed methodology used to combine qualitative and quantitative data and analysis. The collected information is complex and data is gathered from a series of sources including fieldwork and semi-structured interviews. In this context, among different mixed methodology practices, research triangulation as set out by Bryman (2008), Creswell and Plano (2007), Teddlie and Tashakkori (2009) is employed. The advantages of using triangulation methodologies as defined by Berg (1995), Norman Denzin (1994), Fontona and Frey (1994), are set out in this chapter.

Understanding of the devised methodologies is related to the research process in the next part of the chapter. The research structure is elaborated upon by integrating the important stages of the research and the corresponding research methodology applied. Finally, three important phases of research and methodology employed are explained.

In respect of the research process, we can differentiate between ‘method’ and ‘methodology’. Method ‘denotes a procedure, tool, or technique used by the inquirer to generate and analyse data’ (Schwandt, 2001) see (Beadle, 2008), such as questionnaire surveys and multi sorting tasks. Methodology “connotes sets of rules and procedures to guide research” (Miller and Brewer, 2003). Method thus refers to the different processes applied during data collection, comprising interview structure, questionnaire pattern, and archival research. Such methods used in this research, are explained at the beginning of the chapters where they are employed, to contextualise their relevance and significance in the process of data collection, and analysis in the research.

3.3 Explanation of the devised research methodologies

3.3.1 Context

As established in the previous chapters, post-colonial development fuelled by economic globalisation has transformed perceptions of the home among the Indian middle-class, with the dwelling becoming a commodity to demonstrate affluence and status. The housing neighbourhood has shifted from being community oriented, with inclusive residential clusters to one of independent and exclusive developments. Mysore was known for the tradition of resilient communal development and infrastructure.

The research is therefore concerned with local perceptions towards sustainability and relationships between owners, contractors, builders, architects and planners. In the process of exploring sustainable housing, the underpinning factor is carbon emission reduction and a significant part of the research is a mix between the analysis of the performance and the acceptability of the changes.

The nature of this research is therefore quite complex with a range of different metrics derived from both quantitative and qualitative research. Such a context can be addressed using grounded theory as an overriding research methodology.

3.3.2 Grounded theory

Grounded theory has been established as a research methodology that enables the efficient analysis of varieties of data that are rich and detailed and has roots in diverse social and geographical contexts (Charmaz, 2006). Grounded theory acts as a framework which guides the research process and, according to Hunter and Kelly, in grounded theory research, the theory is derived from a structured data set (Hunter and Kelly, 2008) p86. The underpinning factor of grounded theory is to generate a hypothesis based on the data and, in this sense, the theory is embedded in the data (Alan 2003) see (Hunter and Kelly, 2008). Grounded theory refers to both the method of inquiry and the product of inquiry (Charmaz, 2005).

Grounded theory methodology was originally developed by Barney G. Glaser and Anselm L. Strauss (Glaser, 1992, Glaser, 2007, Glaser and Strauss, 1967, Strauss and Corbin, 1994). According to Glaser, grounded theory is systematically and inductively arrived at by ongoing collection and analysis of data whereby the researcher does not start with a preconceived idea, and theory is not forced for the verification or rearranging of data (Glaser, 1992). As grounded theory involves a systematic process of gathering and analysing data to evolve a theory, the theory may be used to predict and explain the phenomena (Hunter and Kelly, 2008). This process supports the new researcher, who has no preconceived idea of results and allows the theory to emerge. According to Hunter and Kelly, the sources for grounded theory vary, which include case studies, interviews, historical accounts, field observations and documents (Hunter and Kelly, 2008).

According to Glaser, grounded theory enables researchers to work with a series of successive data to develop theories (Glaser, 1992). For instance, a researcher might develop a tentative theory based on the first set of data, and then collect more data to test this theory. If the new set of data fits the current version of theory, the researcher moves on to the next series of data collection, otherwise the researcher will revise the theory to fit both the first and recent set of data (Willis, 2007).

As summed up by Glaser and Strauss, grounded theory is derived from data and then illustrated by a characteristic example of the data (Glaser and Strauss, 1967).

Echoing a similar idea, Charmaz has argued that the grounded theory method comprises a systematic, inductive and comparative approach for conducting an inquiry for the purpose of constructing theory (Charmaz and Bryant, 2007, Charmaz, 2006). According to Charmaz and Bryant, this process will help data collection and analysis to occur simultaneously (Charmaz and Bryant, 2007).

While comparing concept and evidence Glaser and Strauss argue that evidence can be generated from the conceptual categories or their properties (Glaser and Strauss, 1967). In this process even if the evidence has any inaccuracies, the concept is a relevant abstraction about what is going on in the area studied (Glaser and Strauss, 1967). Allan (2003) highlights that grounded theory is different from other methodologies as a concurrent approach is taken by both collecting and analysing the data (see (Hunter and Kelly, 2008)). This is different from the hypothesis testing and quantitative methods adopted in traditional scientific approaches.

According to Glaser, well-constructed grounded theory will meet its four most central criteria: fitting the research area, works easily, relevant and modifiable (Glaser, 1992). By carefully inducing grounded theory in the research area, one can fit the realities under the study. The methodological process starts from the very

beginning, and the relevance of methodology is reflected as the coding begins on the first interviews and observation (Glaser, 1992). In grounded theory, the research question is not a statement that defines the phenomenon to be studied (Glaser, 1992, Charmaz and Bryant, 2007). The focus for the research is achieved from the collection of a series of data and out of open coding collection and analysing by constant comparison (Glaser, 1992).

Scholars who have used grounded theory methods extensively have identified many uses and advantages of this particular approach. Grounded theory, with its emphasis on action and process, justifies the process by addressing the needs of the qualitative approaches. It justifies ontology by adopting qualitative research method tools like data analysis and systematic analysis. Eliminating the need for a hypothesis at the beginning of the research, grounded theory offers justification for methodological flexibility. Furthermore, as the theory is developed over a series of data, it overcomes the fear of a too briefly considered application. With the flexibility to refine the theory based on inflow of data and adopting a comparative approach, grounded theory justifies open-mindedness and ensures the research engages analysis by adopting emerging information (Bryant and Charmaz, 2007).

Star has argued that grounded theory is an excellent tool for understanding invisible things (Star, 2007). Since the theory is developed from a given social structure, it can relate to real people or objects and thus Stern argues that grounded theory makes sense (Stern, 2007). In grounded theory, an additional set of data are collected based on the theoretical relevance, which is different from conventional ethnographies (Glaser), where a description of observation is more important than the theoretical relevance (Hood, 2007).

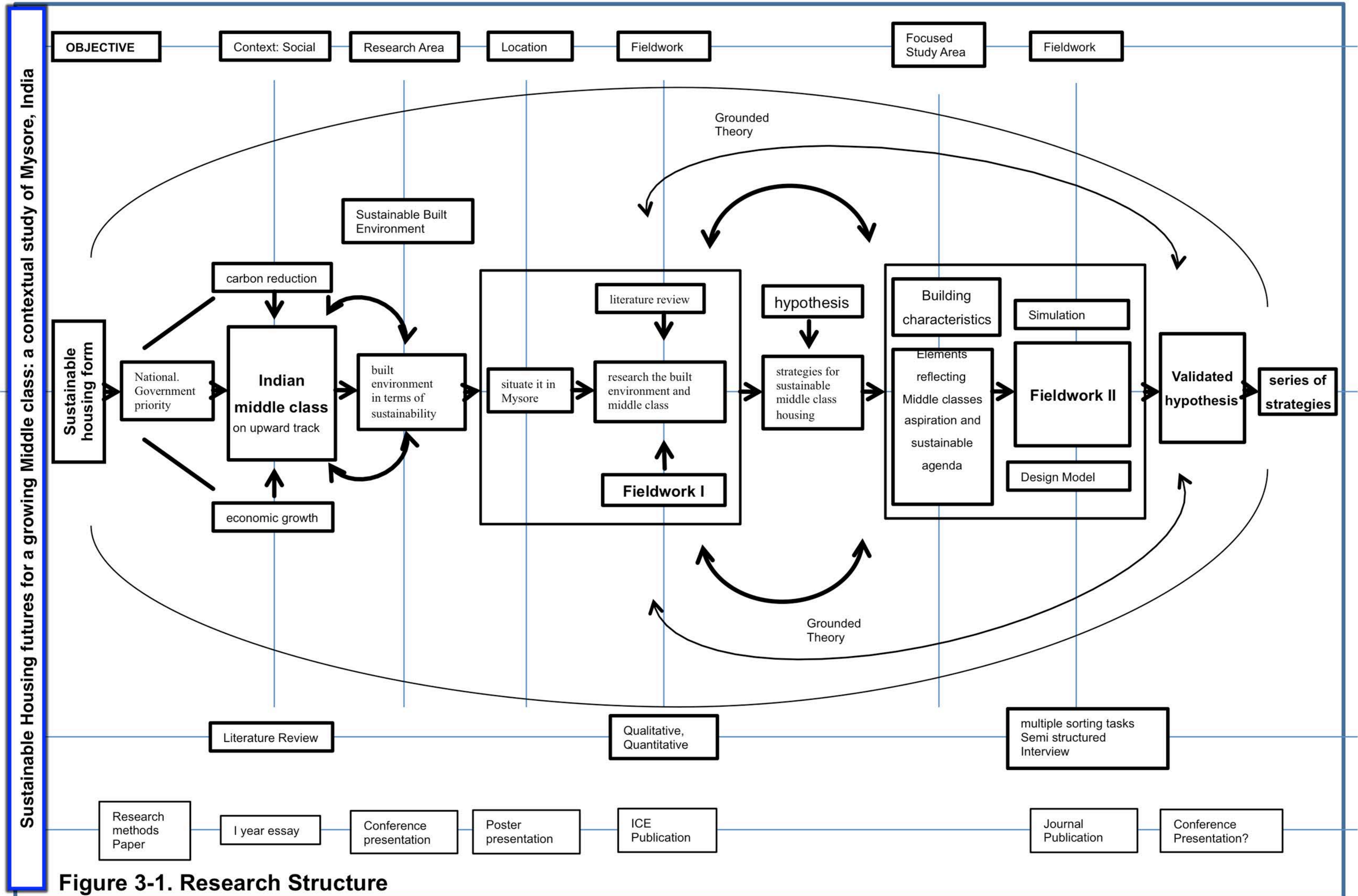
According to Hood, grounded theory research can save time by not transcribing material that is irrelevant to those categories (Hood, 2007, Glaser and Strauss,

1967). As experienced by Timmermans and Tavory, grounded theory enables the researcher to distinguish with confidence between noise and music in the research (Timmermans and Tavory, 2007). Similarly, Charmaz has used grounded theory to reach imaginative interpretations (Charmaz and Bryant, 2007) and Creswell et al have used grounded theory to address the diverse population and social conditions (Green et al., 2007).

Struebing has argued that grounded theory is the result of a constant interaction between empirical data and evolving theory and the research process moves in a series of loops between an empirical process and conceptual thinking or evolving theory (Strubing, 2007). Strauss has explained this ‘inductive, deductive and verification’ as a significant analytical process in grounded theory (Strauss and Corbin, 1994). According to Charmez, grounded theory works in a non-linear way, wherein the researcher sums up the findings at each stage and based on the outcome, revisits the previous stage to collect required further data (Charmaz, 2006).

Grounded theory has been adopted as the overall research methodology for the research with specific methodologies for each stage of the research that are explained in detail in respective chapters. During the initial exploration process, the research follows the grounded theory concept and instead of collecting data during literature study and analyse later; the data collection and analysis have been conducted simultaneously.

Grounded theory methodology has been adopted for this research to successively organise different phases of research. It has been a powerful tool to collect the data, code and categorise it, to formulate the research questions and validate them in the successive phases. The research framework charted in figure 3.1, demonstrates the effective application of grounded theory in the research.



The research process started with a broad question of how to explore design strategies for sustainable housing. Works by sociologists and anthropologists, such as, Leela Fernandes and Pavan Varma were used to identify the significance of the growth of the middle class in India. Its impact was analysed from a series of perspectives, by examining the Government documents and its strategic priorities and the role of the built environment in respect of carbon emissions.

The first set of fieldwork and literature research was used to collect the next set of data. The first set of fieldwork was used to identify attitude, expectations and aspirations of the homeowners of Mysore. The outcome of the first set of fieldwork was coded and catalogued, and this information has been triangulated by the literature review. The fieldwork results were examined for key indicators of sustainability from the macro to the micro scale that comprises community living, site layout, entrance, house planning, building finishes and façade.

The grounded theory principle of ‘revisiting previous stages to narrow the focused research area’, was adopted and the research area was narrowed to the boundary condition – transition spaces of houses. The process of coding and cataloguing was conducted for the focused study area and information is collated by conducting the second set of fieldwork and the literature research.

The research structure illustrates the research methodology (**Figure 3-1**), wherein grounded theory enables the initial literature study to inform the broad research question and location of the study area. In the process, the first set of fieldwork informs the way the second set of fieldwork has been organised.

The first set of fieldwork and the empirical analysis are compared together with earlier research (**Figure 3-1**), which is used to identify the building characteristics at boundary level and transition space. Mysore homeowners' preferences are identified by preparing different models. An analysis of the second set of fieldwork and the simulations carried out, supports the research to address the questions arising from the fieldwork.

This research examines social and cultural values on one hand and assesses the implications in terms of energy and carbon use on the other. As different methodologies are adopted to examine qualitative and quantitative data, Mixed Method research practices are followed using Triangulation methodologies.

Concept and basics of mixed methods methodology and triangulation methods are described below, and their use and application are elaborated in the respective chapters.

3.3.3 Mixed methods research

Groat and Wang in 'Architectural research methods', have argued that researchers in many fields, including architecture are now encouraged to adopt multiple methods from different traditions in one study towards an integrated approach (Groat and Wang, 2002). In the case of sustainable housing, the research focus is defined by diverse dimensions which requires layers of information to understand the complex phenomenon of sustainability and housing. At the same time an understanding is desirable of the requirements of building inhabitants, their values, economic empowerment. This not only requires data from a wide range of primary sources, but also has to be analysed from different perspectives.

According to the definition, Mixed Methods research involves both collecting and analysing quantitative and qualitative data (Creswell and Plano Clark, 2007). It also contains a combination of the techniques found in both qualitative and quantitative traditions (Teddlie and Tashakkori, 2009). Quantitative data is usually numeric and includes closed-ended information such as that found on attitude, behaviour, or performance instruments. Qualitative data tends towards narrative and consists of open-ended information that the researcher gathers through interviews with participants, sites of research, gathering documents from a private or public source (Creswell and Plano Clark, 2007, Teddlie and Tashakkori, 2009).

An underlying advantage of Mixed Method research is that the research provides a better understanding of the problem rather than working within the tradition of a single discipline. A combination of qualitative and quantitative approaches provides a better understanding of the research problem than either approach alone (Creswell and Plano Clark, 2007, Bryman, 2008).

Both qualitative and quantitative research approaches have their own weaknesses. For instance, the voice of the participants and an understanding of the context or setting in which research is conducted is not directly addressed in quantitative research. Conversely, researchers consider personal interpretation and resultant bias a weakness in qualitative research. Furthermore, the researcher has to face the challenge of generalising the findings to a large group because of the limited number of participants studied (Creswell and Plano Clark, 2007). By answering the questions which cannot be answered by qualitative and quantitative research alone, mixed method research provides comprehensive evidence and offsets the weakness of either approach used by itself (Creswell and Plano Clark, 2007) .

The process of mixed methods research is beyond simply collecting and analysing qualitative and quantitative data. It has to be consciously built together to form a

complete picture of the problem than they do when used alone. The process of merging or converging of qualitative and quantitative data is done by building one on the other or embedding one within the other to support each other (Creswell and Plano Clark, 2007). According to Creswell and Plano Clark (2007), mixed method research uses both deductive and inductive logic in a sequence which could be described as the inductive – deductive research cycle.

The nature of using qualitative and quantitative data has drawn attention of many researchers who have devoted a great attention to clarifying the different types of mixed methods research designs. Ashakkapri and Teddlie (2003) have identified 40 different types of mixed method design in their literature (see (Creswell and Plano Clark, 2007)). Creswell and Plano have classified mixed methods research into four major types:

- The triangulation Design (Teddlie and Tashakkori, 2009),
- The embedded Design,
- The Explanatory Design and
- The Exploratory Design (Creswell and Plano Clark, 2007).

The triangulation design has been considered as most suitable type of mixed methods research methodology (Fontana and Frey, 1994) and adopted for most part of the research.

3.3.4 Triangulation

The well-known and the most accepted approach to mixed methods research is considered as Triangulation design (Creswell and Plano Clark, 2007). According to Teddlie and Tashakkori, Triangulation refers to the combinations and comparisons of multiple data sources, data collection and analysis procedures for the better understanding of the research problem (Teddlie and Tashakkori, 2009).

Triangulation is considered as one of the more efficient processes in research methodology as it enables the researchers to implement the qualitative and quantitative methods during the same time frame and with equivalent emphasis. As the data collected for qualitative and quantitative research can be analysed simultaneously, it provides better opportunities to understand the research problem (Creswell and Plano Clark, 2007, Bryman, 2008, Fontana and Frey, 1994).

Triangulation has multiple meanings. The origin can be traced to “multiple operationalism” (Huberman and Miles, 1994). According to Huberman and Miles, multiple measures are used to ensure the variances of the measures are reflected (Huberman and Miles, 1994). The term triangulation has originated from surveying activities, map making, navigation, and military practices. In each case, location of unknown object is derived by drawing sighting lines from three known points or objects (Berg, 1995). Although two sighting lines are sufficient to locate the point at the intersection, the third line will provide a more accurate estimate of unknown object.

While adopting this concept to social research Berg argues that, combination of lines of sight will provide a better, richer, and more substantive picture of the reality for the researcher (Berg, 1995). In the sociological research, Norman Denzin has

identified triangulation as a protocol in his book, the research act (Denzin, 2009). According to Denzin, researchers can use triangulation as a protocol to gain needed confirmation, to increase credence in the interpretation, and to demonstrate commonality of an assertion (Stake, 1995). According to Huberman and Miles, triangulation also reflects the convergence among researchers and theories (Huberman and Miles, 1994).

There are different types of triangulation methods identified based on the nature of the research, type of data, and level of research. In the 'Handbook of qualitative research', Denzin and Lincoln have identified four classifications (Janesick, 1994, Denzin and Lincoln, 1994, Denzin, 2007):

1. Data triangulation: the use of a variety of data sources in a study
2. Investigator triangulation: the use of several different researchers or evaluators.
3. Theory triangulation: the use of multiple perspectives to interpret a single set of data.
4. Methodological triangulation: the use of multiple methods to study a single problem.

Reinforcing this classification, Janesick has added fifth type as 'interdisciplinary triangulation' (Janesick, 1994).

The nature of this research necessitates data from different sources and from different disciplines, hence 'Data triangulation' and 'interdisciplinary triangulation' will be employed. 'Data triangulation' is achieved by using data from different sources, like Government documents, archival research, primary surveys and interviews with resource people. The fifth type - 'interdisciplinary triangulation' - is addressed by integrating research methods extensively used in social research, such as qualitative analysis through 'multi-task processing' and an environmental design

process to quantify the impact of homeowners' preferences by simulating house models in integrated environmental solutions.

The research also looks at 'theory triangulation' and 'methodological triangulation' by using multiple methods. For example, the data collected during fieldworks are analysed through different perspectives and methods. For instance, in both sets of fieldworks, the collected data are analysed by different perspectives as a set of data and by using different methods as one task of understanding middle classes' preferences in the first set of fieldwork and the implication of their choices on sustainable housing in the second set of fieldwork.

Based on the way data from quantitative and qualitative research are used and combined, variants of triangulation design have been identified as 'the convergence model, the data transformation model, the validating quantitative data model and the multilevel model' (Creswell and Plano Clark, 2007).

In 'convergence model', qualitative and quantitative data is collected and analysed separately, and then the results are converged during the interpretation. This model is used to validate or confirm quantitative results with qualitative findings. 'Data triangulation' is similar to convergence model in data collection and analysis initially. Later, one data type is transformed to other types. This transformation helps for comparison, interrelation, and further analysis of the two data sets (Creswell and Plano Clark, 2007).

The 'validating quantitative data model' is used to enhance the findings from a survey. Open-ended qualitative questions are used in the survey to validate and expand on the quantitative findings. The multilevel model is used to integrate different level of analysis, where quantitative and qualitative data are used to address

at a different level within the research. The findings from each level are joined together into one overall interpretation.

Again, in the context of this research, triangulations have been used in different variations and more effectively as data triangulation, in both sets of fieldwork. The quantitative information collected through the questionnaire survey is validated by the qualitative information collected through semi-structured interviews.

Furthermore, in the second phase of the research, validating quantitative data models and multi-level models have been effectively employed. The qualitative data is used to construct the study models, which are tested and validated by quantitative studies of model simulations. At the next level these models are tested by both qualitative and quantitative data collected during the fieldwork. The process and methods adopted have been elaborated in the respective chapters.

Though many researchers use triangulation for multiple-data gathering technique, Fielding and Fielding (1986) have related quantitative and qualitative data to counteract the threats to validity identified in each (Berg, 1995). Denzin argues that multiple research strategies, part of triangulation procedure, increase the depth of understanding of the investigation (Denzin, 2007, Berg, 1995).

Researchers have also acknowledged the challenges involved while incorporating the triangulation design. According to Creswell and Clark, researchers have to be careful and have to put in an additional effort to ensure both qualitative and quantitative data are collected concurrently, and researchers should ensure that equal weight is given for each data type (Creswell and Plano Clark, 2007). In the event of non-concurrent quantitative and qualitative outputs, a researcher has to be cautious of the typical pitfall of negating the data collected from the best available method from the findings generated by an inferior method (Miller and Dingwall, 1997).

In this research the fieldwork was conducted with an intervening period of reflection. Both qualitative and quantitative data are collected concurrently. This has provided comprehensive data about the research area. As the data is collected by the researcher without any research assistance, and further as the researcher is aware of the geographic and demographic characteristics of the study area, it has been straightforward to ensure the source and quality of the data.

Different types of mixed methods researchs and triangulation methods are adopted to collect and analyse the data at different phases of the research. The data collection process, different methods and the analysis and outcome are discussed in the successive chapters.

The research framework charted in figure 3-1 provides the overview of the organisation of the research into successive phases. As explained earlier, grounded theory has been the overriding methodology which sets the platform at the initial stage of the research and integrates all the phases. The second and third phases are a pivotal part of the research that formulates the research questions, tests and validates the hypothesis. Both mixed and triangulation methods are extensively applied during these phases to collect and evaluate the data.

3.4 Research Process

3.4.1 First phase

The research area and broad research questions are identified in the first phase of the research. Grounded theory has been effective in the basic understanding of homeowners' preferences and coding to narrow the general research questions of examining sustainable housing solutions in India. Grounded theory aids one to focus more on the changed social-economic conditions and its implication this has on housing.

The grounded theory process helps narrow the research question of this thesis to two important issues: first; to provide a method to situate and contextualise the location of the enquiry and second; the means to research middle class demographic and its relationship to the built environment. The grounded theory process enables study of the literature to be undertaken in a non-linear way, wherein, instead of conducting literature review of existing data across the subject area; the research focuses on the Indian Middle class and housing in Mysore. As in the case of grounded theory, first series of data are then collected to understand existing conditions and identify the issues of significance and importance.

3.4.2 Second phase

The second phase of the research is designed and worked to consolidate and summarise the social, cultural aspect, and changing scenarios of Mysore and relate them to architecture and housing. In this context, fieldwork is conducted to investigate the notion of the middle class, their social, cultural preferences, their growth and characteristics. To relate the social and cultural aspect to housing, in-depth studies to understand the housing practices at Mysore, the process of housing procurement is examined involving all the stakeholders. Value, and perception of

house; usage of space and requirements, were collected methodically ascertaining the perception of home for a middle class Mysorean at the physical, symbolic and metaphysical level.

The large volume of data gathered before and during the fieldwork in the form of semi-structured interviews and questionnaire feedback from architects, builders and non-specialists of Mysore, along with interaction with government agencies and resource people, are from different backgrounds and of both qualitative and quantitative nature. Mixed Methodology has been used to efficiently build the information of one type on the other and a combination of both qualitative and quantitative information. The second phase of the research, the fieldwork, particular methods employed during the fieldwork, the questionnaire survey and semi-structured interview, including observation and analysis are explained in detail in chapter 5.

The feedback from the first set of fieldwork demonstrates that a fluid set of social and cultural boundaries has been replaced by more tangible, clearly defined physical boundaries, defining individual territory. These transition spaces or boundary conditions have an implication on sustainable housing. Following the process of grounded theory, an element analysis of the boundary condition is carried out. The outcome of the fieldwork is carefully analysed to identify the key architectural elements, which are used as models of enquiries. Mixed Methodology and Triangulation Method have been adopted to combine and validate the qualitative and quantitative data. This process helps to narrow the research area to establish the research question and has been a crucial part of the research. The process of identifying the focused study area as boundary condition and the methodology followed is elaborated in the beginning of chapter 6, which acts as the back drop of the next phase of the research.

3.4.3 Third phase

This phase is a pivotal part of the research in developing the research question or hypothesis. Based on Ground Theory, the hypothesis is focused to investigate sustainable boundary conditions.

There is a clear departure of the boundary conditions from being invisible, inviting, and interconnecting the community to more physical, well-defined and exclusive ones. The change in physical requirements is beyond legislative, and it encompasses issues beyond spatial organisations. These boundary conditions reflect people's perception of safety and security, socio-cultural concerns and their interest to be part of the community. Homeowners are using the physical boundary element as a tool to express once economic empowerment.

The research focuses on these boundary conditions, Transition spaces. Hypotheses are formulated to investigate the sustainable criteria while developing different models for alternative boundary conditions. This complex process engages with the sustainable agenda and also social, economic and environmental concerns. This will furthermore engage with some of the traditional values or traditional configurations, to do with housing or housing procurement, and resultant planning traditions of Mysore.

By deploying the environmental psychology methodology, the language of discussing architecture with non architect is developed. This 'multi sort tasking' process has been an extremely useful/powerful tool to qualitatively analyse the perception of people with a limited knowledge of architecture, and provide a clear input into their preferences of the boundary conditions among given alternatives.

This 'multi sort tasking' test is followed again by explaining the sustainable implication of each model and their response in the revised sorting reflects their willingness to compromise in the house design for the cause of sustainability. The process developing alternate models, narration of sustainability parameters and peoples preferences along with 'multi sort tasking' process has been elaborated in chapter 7.

Grounded theory methodology has been adopted to organise the research in successive stages and build theory based on the outcome of the study and analysis of the first phase and to refine the research questions to develop a theme or hypothesis. The models developed have been successfully designed to acknowledge the sustainable agenda on one hand and people's aspirations on the other. This is achieved by following the mixed methods research to combine the qualitative and quantitative data of people's perception, attitude, and facts reflecting energy consumption. Triangulation methodology has been adopted to validate the data collected at the site.

The process of the mixed methodology and the triangulation methodology is elaborated upon at the beginning of chapter 6. Similarly, the process of fieldwork, collection of qualitative and quantitative data and also different methods used during the fieldwork like 'multi sort tasking' process, and day-long observation of house performance, which form a major part of the third phase are elaborated later.

The affluence and aspirations of home owners and its implication on sustainable housing is the central theme of this research. This is explored by identifying the values and aspirations of the middle class home owners in chapter 4 and relating it to the sustainable housing in chapter 6. Grounded theory is adopted to reflect the results of the fieldwork to the literature review. This helps the research process to

consolidate the findings which enable the thematic interpretation and to consolidate possible strategies towards sustainable housing for the growing middleclass people.

To validate the findings, different boundary conditions are modelled in Google SketchUp and then exported into an environmental simulation package, Integrated Environmental Systems (IES). These models are tested for different suitability criteria before the fieldwork is conducted. Based on the feedback of the participants from the second fieldwork, a revised model is developed reflecting the sustainable concerns and people's willingness to adopt the same. The quantitative methodologies applied, more specifically, simulation study methods, are elaborated upon in chapter 6.

In this context, the research has adopted multi dimensional methodologies, wherein it integrates the methodologies and resultant data and analysis from different fields, namely: environmental design and social methods. Different methodologies adopted, and methods used during this phase and in the second field-work are elaborated in the chapter 6.

3.5 Conclusion

In summary, the research examines the issue of finding ways to meet the aspirations of the middle-class people that are sustainable; in the context of the south Indian city of Mysore. The initial fieldwork was designed and conducted to understand characteristics of the growing middle class and their influence on the built environment in using Mixed Methodology and Triangulation techniques. This led on to a second period of field researching in developing more specific models by applying grounded theory and triangulation methodology. Spatial scenarios for housing were developed, reflecting the samples preferences and sustainable agendas. Critical building characteristics were identified; entrance, volume, opening, security,

interaction and materials, at the boundary level and were tested by adopting ‘multi sort tasking’ process. The outcome was further tested by utilising environmental design technique and empiric simulation. It was triangulated with fieldwork data to propose the strategies for sustainable housing.

The methodology adopted has been critical to tie the architectural response to the cultural and political condition on one hand (social methods) and climate responsive, traditional design and simulate models to examine the tangible results later (environmental design methods).

Chapter 4: Understanding Mysore's middle class

The initial chapters defined the research questions and the previous chapter provides a framework to address the research questions.

This chapter validates the observations and resultant study area defined during the literature study and more specifically examines aspirations and values of the Mysore middle classes and implication on the sustainability of the built environment .The chapter also examines the factors that shape the values of the middle class generally and more specifically to Mysore.

4.1 Introduction

The understanding of middle class in the context of Mysore reflects a change in their lifestyle. Among them, transformations in the social and economic conditions have a profound influence on the dwelling space. The earlier chapters reflect the changes and transformations happening in these areas in post independence India and in the post liberalised economy after the 1990s. The initial research also indicated a move away from the traditional, vernacular housing typologies and a move towards a European typology. The initial studies suggest the negative implication on sustainable housing; the increase of land footprint, increased consumption of energy due to electrical appliances and air conditioning.

Though the literature and research reflects the values, aspirations and requirements of the Indian middle class, with the extensive socio-cultural and geographic differences, it would be too simplistic to generalise the trends across the whole of India. This chapter contextualises the understanding of the middle classes from literature study to a particular place, Mysore. Furthermore, research also traces the housing typology prevailing in Mysore and examines the needs, requirements and wants of the middle class Mysoreans and their impact on housing. As elaborated in

chapter 2, Mysore was known for the sustainable strategies it had adopted in the 1900s. The drastic change in the attitude of homeowners and policymakers towards a new typology which is perceived as desirable typologies needs to be examined.

The primary aim of the research is to study the middle classes' aspirations and examine the implication of homeowners' preferences on sustainable housing strategies. The research question could be broadly classified into two parts: firstly, to understand the middle class, their social structure, values and aspirations and secondly, to relate homeowners' preferences to housing requirements and align their attitude towards sustainable housing strategies.

To contextualise the research, both these strands are reflected upon and synchronised for the case of Mysore, drawing references from the literature study. With the understanding of the Indian middle class and its housing typologies, fieldwork was undertaken to identify the factors that influence housing selection and design and the effect homeowners' preferences have on sustainable housing.

The preliminary research involving the literature review is used to signpost the issues to be examined during the fieldwork. The emphasis is on the social dimension of the sustainable built environment and this research aims to look at the bottom-up approach of understanding people's aspirations and its implication on housing. Fieldwork is undertaken to examine the social, cultural and economic attitude of middle class homeowners, which has relevance to housing, construction and the sustainable built environment. This not only tests and validates the understanding at the national level but will also help to narrow the research objectives and examine the strategies for sustainable housing.

In the following section, the research methodology adopted for the fieldwork is explained and later, the results and the process of fieldwork are elaborated upon.

4.2 Research methodology

A review of the literature was used to establish traditional, sustainable practice and identify important current trends. The review indicates a change in people's attitudes and aspirations that has a direct bearing on sustainable housing. In order to understand these changes in depth, a field survey of house owners was conducted in Mysore. The fieldwork also examines builders' and architects' attitudes to design and procurement along with contemporary practice. The chapter draws particular inferences related to communities, layout, house design and materials from the questionnaires and interviews conducted. In order to understand the composition, practices, trends and attitudes of the middle class, the research engages with a wide field of built environments and social contexts, and as such requires methodologies that allow rigorous but flexible interpretation of fieldwork. Verification is sought using triangulation methodologies (Groat and Wang, 2002, Bryman, 2008) that can allow the usefulness of data to be reviewed from a variety of sources. In this case, research has been conducted through a literature review, scoping questionnaires and structured interviews. A key aspect of the methodology is, therefore, to assess each aspect of the research critically in relation to itself (Figure 4-1).

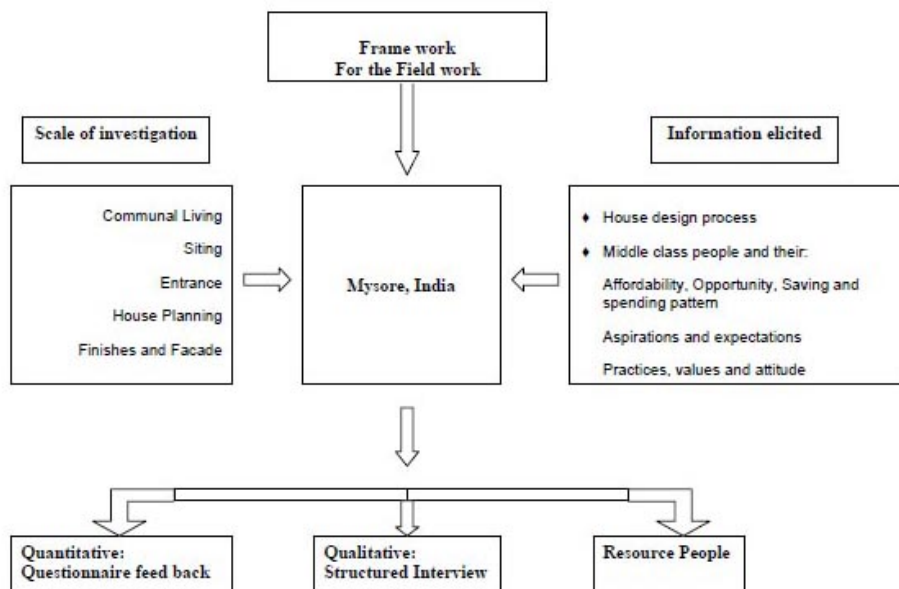


Figure 4-1. Framework for the fieldwork

4.2.1 Quantitative: The questionnaire survey

The review has been employed specifically to study and chart the rapid transformation and enlargement of the Indian middle class (**Figure 1-2**, Figure 1-3). The utilisation of building products and technologies is, in this context, driven as much by cultural aspiration as performance and price. The review then underpins the structure of the fieldwork, interviews and questionnaires. In undertaking the survey, attitudinal differences between occupation and social profile are identified through the use of common questions. Survey questionnaires were distributed to 240 people and with a response rate of over 90 per cent, questionnaires were collected from 220 persons. Respondents included the majority of practising architects and builders. Among the registered architects, all the architects with a minimum two years of experience responded to the survey. The questionnaire survey and interview structure templates are presented in Appendix A.

While distributing the questionnaires among owner-occupiers, special care was taken to ensure that different settlement patterns were represented. This included the old quarter of Mysore around the fort and palace that featured Agrahara layouts, those living in post-independence planning schemes and those in recent private sector developments. A wide spectrum of respondent occupations was collected, including government employees, state agencies, in addition to more recent additions such as software and IT sectors (Figure 4-2).

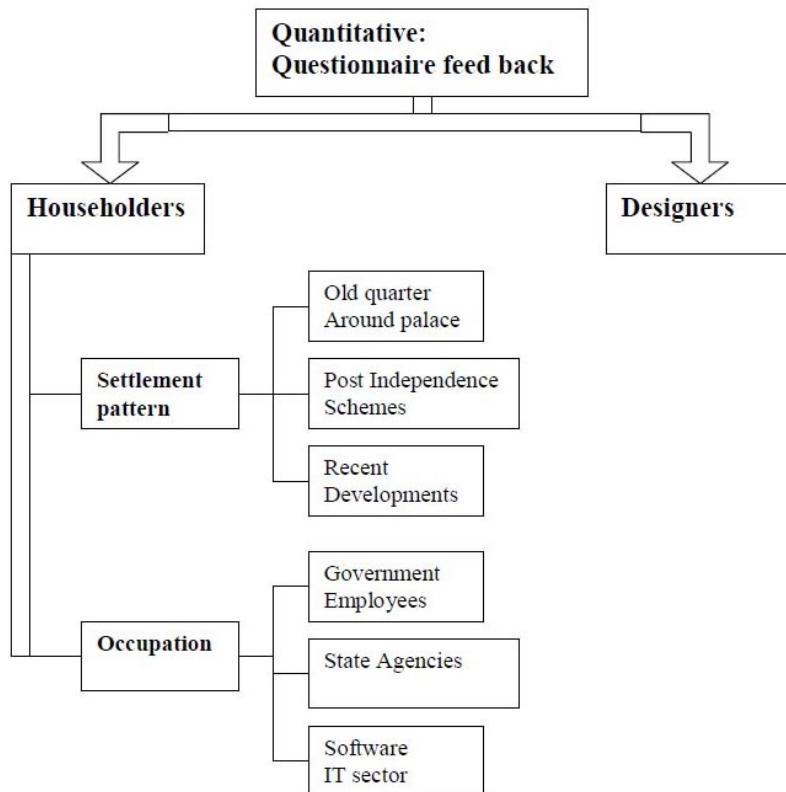


Figure 4-2. Quantitative study

The outcome of the fieldwork was tabulated and analysed by quantitative analysis software SPSS²¹ (SPSS, 2011). SPSS has been useful to compare and analyse the input of homeowners, designers and builders.

²¹ IBM SPSS Statistics, known as SPSS is a general-purpose statistics package well suited to social science and survey data. It is very good for processing complex data that addresses the entire analytical process, from planning to data collection and analysis.

4.2.2 Qualitative: The Semi-structured interview

There are strengths and weakness in both structured and semi-structured interviews. For instance, structured interviews are very helpful to gain quantifiable data, and the researcher can obtain, code and interpret data more quickly, easily and efficiently, whereas they may not allow the participants to express themselves freely. There is no scope for the researchers to deviate from or refine the questions during the fieldwork. On the contrary, the unstructured interviews will provide flexibility and are sensitive to the response of the participants, while being difficult to replicate and thus generalise.

During the first set of fieldwork, qualitative data was collected by conducting a semi-structured interview which validated and reinforced the information collected through the quantitative, questionnaire survey. The semi-structured interview provided the strengths of both the structured and unstructured interviews by negating the weaknesses of both.

In the process of the semi-structured interview, the interview questions were broadly divided into three main issues namely, house design process, middle class homeowner's aspirations and sustainable built environment. Each section had three lead questions. For instance, in the case of middle class homeowner's aspirations, three broad areas identified were clients' expectations, change in economic condition and its implication on housing and social and cultural aspects and its implication on housing.

At this stage the interview was more open ended where the further sub questions in each question was elaborated or refined based on the feedback of the participant. This gave the flexibility for the participants to express their views and opinions, and further opportunities to discuss issues which the participants thought were more critical. The semi-structured interview is very useful in qualitative studies as it is open to unexpected findings during the fieldwork (Knight and Ruddock, 2008).

A series of semi-structured interviews were undertaken with key personnel involved in the built environment (Table 4-1). Seventy interviews were conducted with people including architects, developers, local government employees, academic representatives, and owner-occupiers. The semi-structured interviews dealt with similar issues as those found in the questionnaires but allowed in-depth discussion, facilitating a nuanced series of responses to contextualise the questionnaire data. Triangulation of the research is thus through the complementary use of a literature review, a questionnaire and a structured interview. Within the context of fieldwork, this triangulation method is further used through collecting responses of those lying within consumer, development and regulatory fields.

| | Homeowners | Designers | Builders | Scholars/ Experts |
|--------------|------------|-----------|----------|----------------------|
| Quantitative | 220 | 20 | | |
| Qualitative | 33 | 11 | 7 | 14 |
| Total | 253 | 31 | 7 | 14 |

Table 4-1. Number of respondents, first fieldwork, Mysore 2009

In order to analyse the impact of development on neighbourhoods and housing, collected data are examined for key indicators of sustainability from the macro to the micro scale that comprise community living, site layout, entrance, house planning, finishes and façade.

The change in housing typology is not a mere imitation of the European model, rather it is intertwined with factors such as the social and cultural and economic aspects and, more importantly, their changes after independence and economic globalisation. The information elicited for each of these aspects is elaborated below.

The socio-cultural dimension defines the family and social system, interaction with their neighbours including community participation, which in turn define their spatial requirements and efficient use of these spaces. Economics defines the type of house the middle class aspirants can afford and one's house has now become a crucial factor in class definition as the trend of upward mobility of middle class demographics is always associated with economics.

The different questionnaires used for homeowners and designers and the interview structure followed during the semi-structured interview are listed in Appendix A. The process to define the contents of the questionnaire and interview structure is explained below.

As part of the quantitative survey and analysis, a questionnaire was prepared specifically for homeowners and altered for the builders and architects. These questionnaires were used to record the attitude of the middle class homeowners. The scenarios and statements were carefully crafted based on the literature review and information was elicited on the issues which have a bearing on housing and where clarity is required. To measure the acceptability and validate the hypothesis, the semantic differential scale²² (Jayne, 1996) was used for most of the scenarios. In some cases, where appropriate, ordinal or interval data and multiple item scales were used (Knight and Ruddock, 2008). The outline and nature of questions are elaborated upon along with the aim and objectives of the fieldwork in the next section.

²² A semantic differential scale is a tool designed to measure the social attitudes of the respondents. Typically the scale is a seven-point bipolar rating scale using adjectival opposites.

4.3 Research Process: Fieldwork Process

The preliminary research involving the literature review provided insight into the challenges involved while examining the sustainable housing futures for the growing middle classes.

A first set of fieldwork was conducted to validate some of the findings of the preliminary research and establish the bottom-up approach of understanding the study area, that is, Mysore and the aspirations and values of the middle class Mysoreans along with the prevailing design and construction process and awareness about a sustainable built environment among homeowners.

The main aims of the first set of fieldwork are:

- To understand the social and cultural patterns of behaviour and the values of the middle class homeowners.
- To examine the housing design, and the prevailing procurement process in Mysore.
- To examine the socio-economic influences on housing in Mysore.
- To examine the current awareness of the Mysoreans related to the sustainable built environment.

This section elaborates upon the research process: it documents the research questions and tools formulated in both the questionnaire and the structured interview formats to examine the identified aims.

4.3.1 Social and Cultural patterns of behaviour

The social and cultural aspect plays a crucial role in defining the spatial requirements of the house. The changed aspirations of the people will have a bearing on defining the housing typologies. The literature review clearly reflects the strength of the Indian family system in their community living and the joint family system.

Furthermore, the literature review suggests the inclination to live among their social class and community members. Before Independence, occupation was closely associated with the class and section of the community. It was a robust system, where people with similar occupations and class lived together and shared open and semi-open spaces. As seen in the Jagali typology, effective use of these spaces had a direct impact on the housing typology.

The changed preferences and requirements are also reflected in the literature review in general, which is tested and validated during the fieldwork. Mysore homeowners' preferences were identified by asking them to rate the priority they give to aspects like locality, neighbours, amenities, family and friends and so forth when choosing the location of their house (Questionnaire: question P5). The same question was asked of architects, builders and homeowners, which not only gives a clear picture of their overall perception, but it also helps one to study the gap, if any, in understanding client's needs by builders and architects (Questionnaire: question A2).

The concept of staying together, 'the joint family' system, is fast changing to nuclear families and the major strength of community living, in terms of interaction with neighbours, active participation in local activities is assessed (Questionnaire: question P2, P6). The critical factor of the time spent for personal needs versus community activities has altered drastically and has a direct bearing on the spatial organisation of internal and some external parts of the house. This information was sought by asking homeowners specific questions about their family's composition and asking them to rate the frequency of their activities that involves 'visiting family members and friends, meeting neighbours, attending functions' (Questionnaire: question P9). To reflect people's preferences and values based on the income group, their economic condition in terms of monthly income was collected as an ordinal or interval data (Questionnaire: question P3). The combination of socio-cultural and economic aspects defines the key elements like needs and wants on one hand and taste, choice and aspirations of the middle class demographic on the other (Shah,

2008). Questions are framed to elicit information on these dimensions (Questionnaire: question P4, P10).

4.3.2 Social and Cultural Values

Scholars have argued that there is a clear shift in the emerging aspirations and resultant value of the middle class, post 1991 economic liberalisation (Fernandes, 2000a). Questions are asked about the amount of money spent on their house construction along with the area of construction, followed by how they perceive their house and expect their house to be (Questionnaire: question P1, P4). This information, along with the amount spent on the project, reflects the significance the owner attributes to the house. Answers directly reflect the value attached which is related to the future of sustainable practices. Homeowners' preferences are further validated by understanding their values in terms of their willingness to compromise in case of constraints (Questionnaire: question P8).

Consumption is seen as both significantly shaping middle-class culture and identity. Scholars have explored the relationship of the middle class to the nation and national culture and identity (Fernandes, 2000b). While studying sustainable Housing development in Tamil Nadu to identify the parameters of housing, Bernhard Glaeser (Glaeser, 1995) argued that increases in income will have a direct impact on the social values and spending patterns of the family. This aspect is tested by asking people about their preferences in the case of a disproportionate increase in their income (Questionnaire: question P13). The information is further triangulated by a series of related questions which have direct relevance to the built environment (Questionnaire: question P11, 12).

An earlier understanding of people's preferences for family, neighbours and friends in the present context is further analysed by asking the homeowners the significance they give to different aspects like family activity, community activity and space between neighbours while finalising their house design (Questionnaire: question P6). In 'Planning for Sustainability' (Creating liveable, equitable, and ecological

communities) Stephen Wheeler (Wheeler, 2004) identified the declining sense of community as a crucial factor while listing the changes required in planning for sustainability. In the case of Mysore, the literature review suggests the move away from community living, and this aspect is validated by asking the respondents the importance given to family, community activity and neighbours while they are finalising their house design (Questionnaire: question P5, P6). The feedback from this question directly reflects the importance given to the relationship and values. It is intended to closely observe the feedback in relation to the age group of the respondents. Higher value for community activities clearly reflects the opportunities for sustainable proposals.

Homeowners' preferences are further elaborated by asking stakeholders to rate the significance different aspects have for them while finalising their house design. A range of issues like utilities, basic requirements and light and ventilation on one end and aesthetics and expression on the other end of the spectrum are covered with other issues like comfort, maximum use of space; climate is also discussed (Questionnaire: question P7). Local concerns like Vastu, culture, heritage, elders' advice is also taken note of while taking their preferences into consideration.

Apart from these, builders and architects are asked to reflect on their interaction with the homeowners and their preferences in the design process and, more specifically, the material selection process (Questionnaire: question A5). The focus is more on finishes in order to understand how the material is chosen. For instance, in the case of woodwork, homeowners' preference for 'show of wealth', durability, value for money, and aesthetics, clearly reflect the trend and priorities of middle class homeowners (Questionnaire: question A6).

Middle class homeowners' understanding of sustainability, their awareness and how they perceive their responsibility in the immediate society and wider national objectives are tested and information is gathered by means of a series of simple questions. For instance, a response to statement like 'Generally the rise in temperature inside the house is due to...' will reflect people's understanding of the

climatology and its impact on present housing typology (Questionnaire: question P11). Similarly, people's awareness of their rights and understanding of responsible authority (Questionnaire: question P17, P18), will also reflect their values and the likelihood of them aligning towards sustainable agendas.

Questions in this section provide tangible evidence of their understanding of sustainability. Another dimension to achieve a sustainable built environment – homeowners' desire to address the issues of global warming – is elaborated upon in the 'sustainable built environment' section 4.3.5.

4.3.3 Housing design, Procurement and process

A preliminary study of Mysore and a literature study reflect the change in housing typology. Most of the middle class house owners prefer new plotted development and identify themselves with the house organised around a number of bedrooms and utilities internally. This is in contrast to the emphasis placed on exterior spaces and least significance attached to interior spaces in traditional Jagali. The process of design and construction of houses was more complex than the European model adopted by homeowners. The critical challenge was to understand how the choices and preferences of middle class homeowners are shaped and what their decision-making process is during the house construction process. In the process of identifying the strategies for sustainable housing, it was critical to understand the decision-making process as it would be useful to identify the issue as a bottom-up approach.

The first part of the interview engaged the homeowners to elaborate on their house construction process (Interview: question PI-1-3). The interview was open-ended so homeowners would be able to express themselves freely. Leading questions like "How do you derive at the number of rooms and types of rooms, who assisted in finalising house design? How did you arrive at different spaces?..." were asked. Based on the input, further questions were asked or some were skipped. Furthermore,

each critical issue was discussed in depth to qualify interviewees' assertions and to explore the local and specific issues informing the house design and construction process.

To understand the pedagogical practices and trends, builders and architects were asked similar questions to the homeowners (Interview: question AI-1). Furthermore, they were specifically asked to elaborate on the participation of homeowners in the design and construction process. The open-ended discussion was useful to understand the influence of different factors on each profession. The architects and builders were asked to summarise the evolution of house design and the construction process and to note significant changes and trends during their career (Interview: question AI-2).

During the interview, some traditional elements which are climate responsive and efficiently used like internal court, external Jagali were specifically discussed, with emphasis on their relevance in the present context and homeowners' acceptance of these elements (Interview: question AIII-1). Stakeholders' attention was drawn to the changed housing typology: from cluster-based 'Vatharas' to plotted development and their understanding of the rationale for changes were discussed. Homeowners were specifically asked to elaborate on the factors which influenced their decision-making (Interview: question PIII-1-3). For instance if vastu was identified as one of the key factors, then they were asked to elaborate on their understanding and the rationale to follow the vastu. Furthermore, homeowners were quizzed about their use of external spaces and open spaces outside their house to the nearest park and playgrounds. Finally, the major difference in the plotted development was compared to clustered houses; the common community open spaces and smooth transition space were compared to the individual plots and a clear boundary to define one's territory was discussed (Interview: question PI-3). Homeowners were specifically asked about the significance of the gate and open space all-round their building, including the legal requirements and their influence on their decisions. This discussion was very useful as it not only provided an indication of people's choices, but also reflected the change in requirements and its impact on the spatial organisation of houses.

4.3.4 Socio-economic influences

The literature study clearly reflects the impact of socio-economic factors on sustainable housing typologies. These factors are identified and stakeholders' perception was elicited in the questionnaire survey. Homeowners were specifically and separately asked in depth about economic and social factors and their influence on their houses (Interview: question PII, PIII).

The second section of the interview engaged the homeowners to elaborate their perceptions both socially and economically. As established by social anthropologists Fernandes, Verma, traditional houses were very simple and minimalistic in material consumption and spatial requirements. The perception of a house has changed, it has been seen as a commodity to display one's wealth and express one's lifestyle.

This general understanding was tested and validated for middle class homeowners of Mysore. The fundamental factor of owning a house was explored by asking homeowners what the significance of owning a house was for them (Interview: question PII-1). Change in the usage of spaces was traced by asking about the most important elements of their house including their preference for quality of materials, space, and security. This was further explored by asking hypothetically what they would have done differently if they had more money and similarly what they would have compromised if they had less money while building their house (Interview: question PII).

This was further validated from the feedback of the architects and builders. Designers were asked to narrate their experience of interacting with middle class clients (Interview: question AII-1-3). They were specifically asked to identify the aspects clients give most importance to and how they address constraints such as economics and plot sizes (Interview: question AII-1).

Scholars have identified economic liberalisation and globalisation as a crucial factor in the changing consumption of the Indian middle class. The impact of the changed

economic conditions on the housing of middle class homeowners of Mysore was investigated by asking the architects and builders the impact of economic growth on design and clients' expectations (Interview: question AII-2). The same question was asked to the homeowners more directly as “Do they find any difference in the economic condition: looking back 15 – 20 years and looking ahead 15 -20 years” (Interview: question PII-2). Furthermore, they were asked to elaborate the implication of their changed economic condition on their standard of living and affordability (Interview: question PII-2-3). There is an established relation between the economic condition and the money spent on different aspects (Shah, 2008) and this aspect was further tested by asking homeowners about their pattern of spending (Interview: question PII-2).

The other crucial factor, middle class homeowner’s aspirations and their implication on housing was examined by asking them to narrate their expectations: how are their requirements derived? What is their ideal form of lifestyle? Furthermore, their perception of ownership is examined by asking: What defines their aspirations? This includes, for example, owning a car, a TV, air-conditioning, luxury items, a pool (Interview: question PII-3). Finally, homeowners were asked to explain their aspirations related to house and as a further lead question, they were asked where they would prioritise their spending (Interview: question PII-3).

A key dimension of sustainable housing is community living and social cohesion. Traditionally housing typology in Mysore is known for its sustainable features and in post independence India, there is a clear move away from these sustainable features. Change in daily practices and lifestyle have been attributed as the reason for changed requirements resulting in revised spatial organisation. Homeowners’ preferences are studied by asking a series of leading questions exploring their attitude towards neighbours, guests and their lifestyle (Interview: question PIII).

The influence of daily practices on spatial organisation was documented by understanding the daily routine of each member of the family (Interview: question PIII). The difference in their usage during the weekend was also considered. The

possible variation in usage by the families with different occupational patterns, for instance a typical family where both parents work and the children attend school for the most part of the day is different to one family member working with either parents or other members at home in the morning hours. Homeowners were also asked to reflect on changes in custom, practices and activities by asking them to track the changes in the last couple of decades and to look to the future (Interview: question PIII-1).

Finally, homeowners were asked to relate these factors to the spatial organisation of their house. The narration of daily activities and thinking out loud about social practices was very useful in the research to reflect on their redefined internal spaces and to examine how efficient or cohesive the layout plan is for their daily activities.

The traditional role of community living was examined by asking homeowners how much importance they give to guests compared to personal interests and in relation to spatial distribution (Interview: question PIII-1). Furthermore, their relationship with the neighbours is discussed in how the space between the buildings is used; would they share space? They were also asked how they would prefer to interact with neighbours and how much importance they attach to maintaining a bond between neighbours friends, family members and other relatives (Interview: question PIII-2-3).

To understand change in the family system and its implication on spatial planning, designers were asked to reflect on their experience of the relation between the requirements of the clients to their social and cultural background (Interview: question PIII). During further discussions other critical issues like family size, media and western influence were dwelt upon to further examine their influence on homeowners' aspirations and expectations.

4.3.5 Sustainable built environment: Current awareness

The major factor which defines the people's requirement is the concern for comfort and its implication on a sustainability agenda. The way people understand this broad term was tested in the questionnaire and further validated by interviewing homeowners and designers.

Comfort was cited as one of the crucial reasons for moving away from Agraharas towards plotted development. In this context, homeowners were asked what makes their ideal environment in terms of lighting, ventilation, cooling and security (Interview: question PIV-1). The same question was asked more directly and specifically to architects and builders as to how they define comfort. Furthermore, they were asked about their understanding of "Climate responsive Design" and as a sub theme they were asked whether they could relate vernacular architecture to comfort (Interview: question AIII-1). Based on the response, it was also verified whether climate responsive design elements are reflected in their design.

Finally the interview discussion was led more specifically towards the sustainable built environment. Architects and builders were asked about their understanding of the subject "sustainable built environment" and furthermore, according to them, how we can achieve sustainable built environment (Interview: question AIII-3). Owners were asked more direct question about measures they are implementing to reduce energy consumption (like reuse of material, conservation of water and electricity) (Interview: question PIV-1).

All the stakeholders were asked who they thought could contribute to the process of sustainable built environment and how this could be done (Interview: question PIV-3, AIII-3). This section was concluded with more specific questions as to how they could contribute to the process of the sustainable built environment.

4.4 Observation and analysis

A Combination of data collected through primary and secondary sources and visual documentation was analysed together to gain a preliminary understanding of the fieldwork. A series of graphs and charts produced from the questionnaire conducted during the fieldwork was analysed and reflections on the research questions are discussed briefly.

The main objective of the fieldwork was to understand the values and aspirations of the middle class and relate it to their housing process and further examine its implication on the sustainable agenda. The data collected was first reflected on the basic parameters set forth in the beginning of this chapter in order to understand the middle class homeowners of Mysore.

The outcome of the first set of fieldwork underpins the significance of the bottom-up approach, and understanding the values and expectations of the homeowners of Mysore. The key findings can be broadly summed under the following headings:

- Social behaviour and its implication on spatial requirements
- Neighbour interaction and its implication on house typology
- Neighbourhood interaction and its implication on housing typology
- The role of discretionary expenditure
- Building: construction and materials - selection process
- External space and boundary
- The building compound - its significance and expectations of the homeowner.
- Mysore: A critical context
- Attitudes to the sustainable built environment
- Sustainable features used in houses

4.4.1 Social Behaviours

One of the major changes acknowledged in the literature is the reconfigured family system and its implication on housing typology. The rationale for homeowners' choices could be tracked to the change in family composition. Historically, people were used to staying as a joint-family and would share facilities and resources. This usually meant that a few brothers together with their family and parents and unmarried sisters would stay together in one house. Whereas in the present context, in Mysore, only about 5% of homeowners live as a joint family and more than half of the middle class have changed and are living only with their spouse and children. Nearly one third are living with their parents along with their spouse and children (Figure 4-3).

One of the major shifts in the middle class demographic, as argued by Dr. Sridhar Babu, Researcher at The Energy Research Centre (TERI), is the newly found 'DINKS CONCEPT': Double Income, No Kid's concept (Respondent no.05), which defines the requirements and has serious implications on sustainable development. Lack of privacy and freedom to choose one's own daily practices and priorities are quoted as the main reasons for this shift and according to some architects, in some families, the nuclear family concept is so strong that even parents are not welcome and entertained (Respondent no.25).

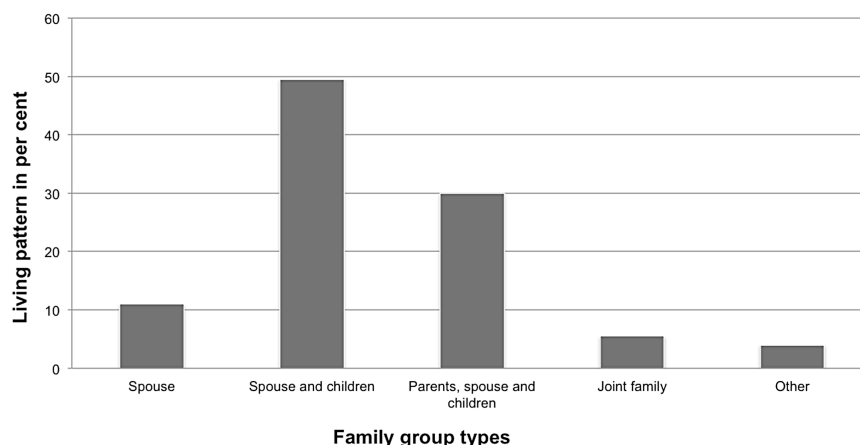


Figure 4-3. Living Pattern

Earlier housing was based on culture and occupation and was known for its community participation. In the reconfigured plotted development, the plots are sold, the price being based on the location and size of the plot. The crucial factors which define sustainable features like community living, interaction with neighbours and family members have clearly altered and for instance, factors like family and neighbours are given least priority while choosing the location of their home (Figure 4-4).

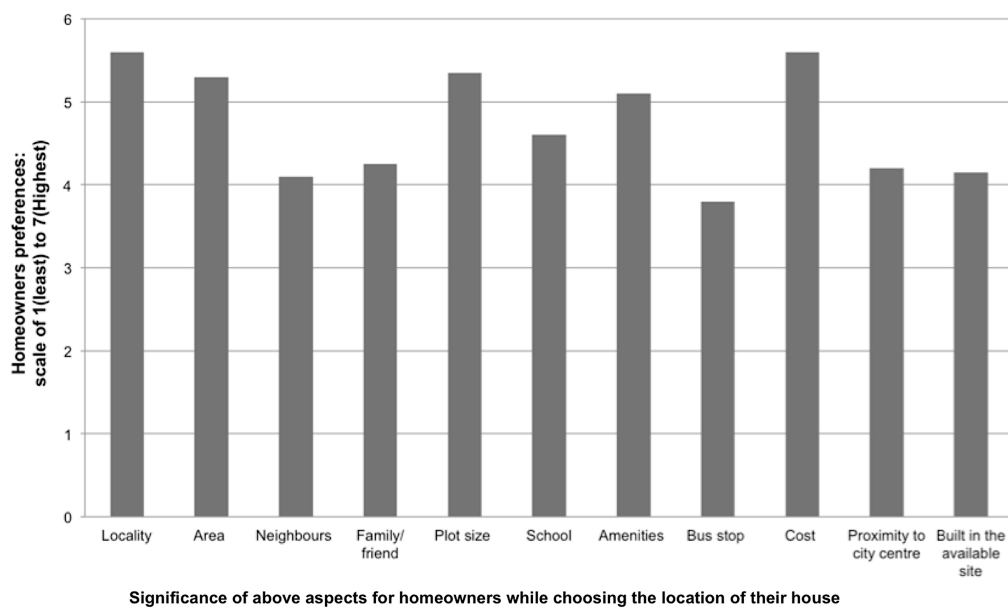


Figure 4-4. House location selection process

When it comes to design input, relatives and peer pressure define their requirements. According to the builders and architects, the West and the media have played a crucial role in exposing people to different opportunities (Respondent no.29). The number of children, site size, setbacks and financial situation define the design and requirements of the house. According to most of the owners interviewed, family is taken into consideration during the decision-making process. Most people who have bought newly built homes feel that architects' consultation fee is not justified and involving architects would be an expensive proposition. So, they seek ideas from relatives and friends visiting their recently constructed houses and relatively few owners approach architects.

The traditional housing typology was reflective of the social and cultural values of the homeowners. In the revised European model, middle class homeowners' aspirations and their reflections were examined by asking them about their expectations of the house in terms of appearance. Most of the respondents expect their house to depict social and cultural aspects. Only 10 % of them expect their house to reflect their financial status, whereas 60 % want their house to show the character and social and cultural taste of the family (**Figure 4-5**).

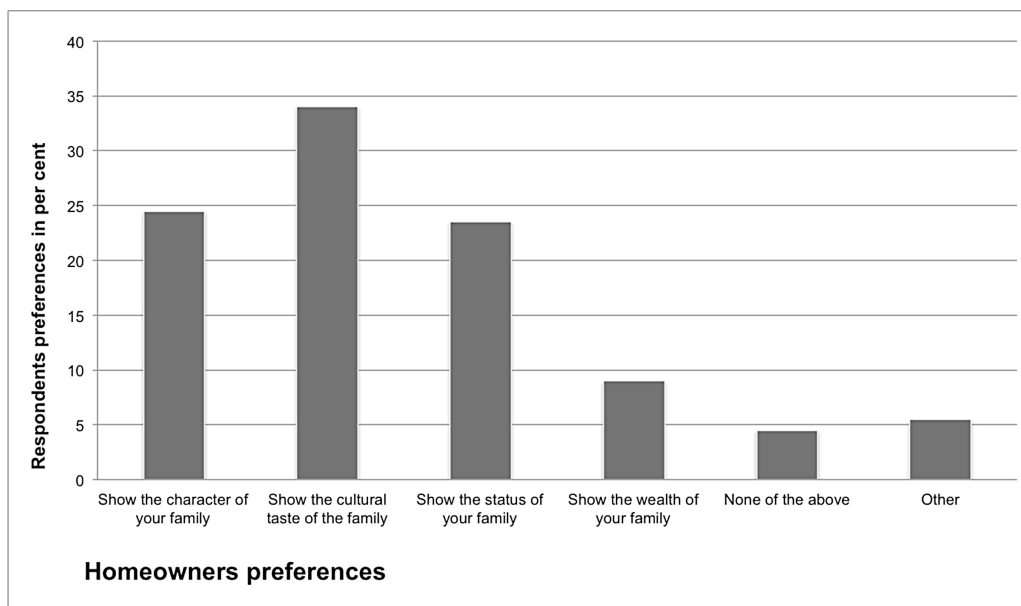


Figure 4-5. Homeowners' preferences

According to the architects interviewed, some clients are aware of their spatial requirements and some others do not even have a basic idea of how an architect could help them. People are deceived by the appearance of the building, and do not understand the relationship between design and material. Some client's requirements of the vernacular are superficial as they tend to use traditional elements mostly for appearances.

When studying the economic and related factors, the questionnaire feedback clearly suggests people's idea of their house. Contrary to the literature review, most of the

homeowners wanted their house to reflect the cultural taste and character of the family and relatively less people wanted to show their family's wealth (**Figure 4-5**). This is an interesting fact which needs to be further investigated as the visual documentation and observation reflect the use of elements and materials which are more demonstrative of their affordability and wealth and less climate responsive or utilitarian.

Contrary to the feedback from the owner questionnaire, the feedback of architects, builders and resource people reflects other dimensions of people's aspirations. According to the historian interviewed, "The middle class always desire something they cannot achieve. For this false prestige they struggle their whole life. Their house is the most important desire in life for which they take a loan which they will be paying off their entire life" (Respondent no.29).

The nature of expression and significance given to appearance varies among higher middle class to middle or lower middle classes. Furthermore, there is a clear difference between the aspiration of traditional and new middle class. Higher middle classes have higher aspirations. Many of them would like to get their house designed by a professional. Earlier housing was planned to last for 100 years as a long term investment for generations to come. In the past, all they wanted was a simple, basic house, now they have too many requirements. The earlier concept of saving is changing and young owners want to spend, enjoy and show off and only think a future 15 -20 years ahead and would prefer to spend money on themselves (Respondent no.68).

The questionnaire feedback clearly suggests that micro requirements are reflective of a client's social background and play a crucial role while finalising the spatial organisation. Surprisingly, not many architects find it important to know the social and cultural background of their client while designing their houses. However, the questionnaire feedback of the architects suggests that there is a huge gap between people's requirements and architects' perception.

4.4.2 Neighbour Interaction

Traditionally the sustainable features of the Agrahara typology had included community oriented open spaces with emphasis on communal living. Most of the homeowners are of the opinion that the caste and food habits discourage them to mingle with their neighbours. When specifically asked about their relationship with neighbours, owners feel that the lifestyle has changed and nobody has the time to build a relationship with neighbours. One of the resource persons interviewed argued that “ladies still maintain relationships and men find talking to others embarrassing” (Respondent no.08). The interview feedback reflects that there is a limit to the degree of community and homeowners have a desire to limit contact but without being unfriendly.

Further questions related to their frequency of activities also reflect their changed perception and attitude towards relationships. Most of the middle class would like to meet their friends and attend functions compared to visiting family members and meeting neighbours. While finalising the house design, family activity is given more importance than personal activity. There is a clear decline in the significance of community activity and an increase in personal activity while finalising the house design. Furthermore, the importance given to space between neighbours is declining.

In traditional housing, guests were given prominence and an uninvited guest was treated as gods. In the present context, homeowners' opinion is divided: many feel they have become selective and the hospitality varies based on the guest (Respondent no.61). They maintain the bond between friends and family members and when it comes to proximity, they are conscious of privacy and with improved mobility, they prefer to stay away but retain a good relationship with their family members. The same sentiment was expressed with regards to their relationship with their neighbours. Though the compound is a physical barrier for them to interact with their neighbours, to retain cordial relationships and to ensure privacy, they don't mind the gate being a hurdle to cross every time.

4.4.3 Neighbourhood Interaction

There is a clear decrease in involvement in community activities. During the interview, homeowners were clear about the value they attach to relationships. Apart from family responsibilities, Mysoreans tend to help others. Their involvement is very high when it is their friends and extended family and their interest declines as one moves outwards in terms of helping neighbours, to community activities, local activity and activity at city level (**Figure 4-6**).

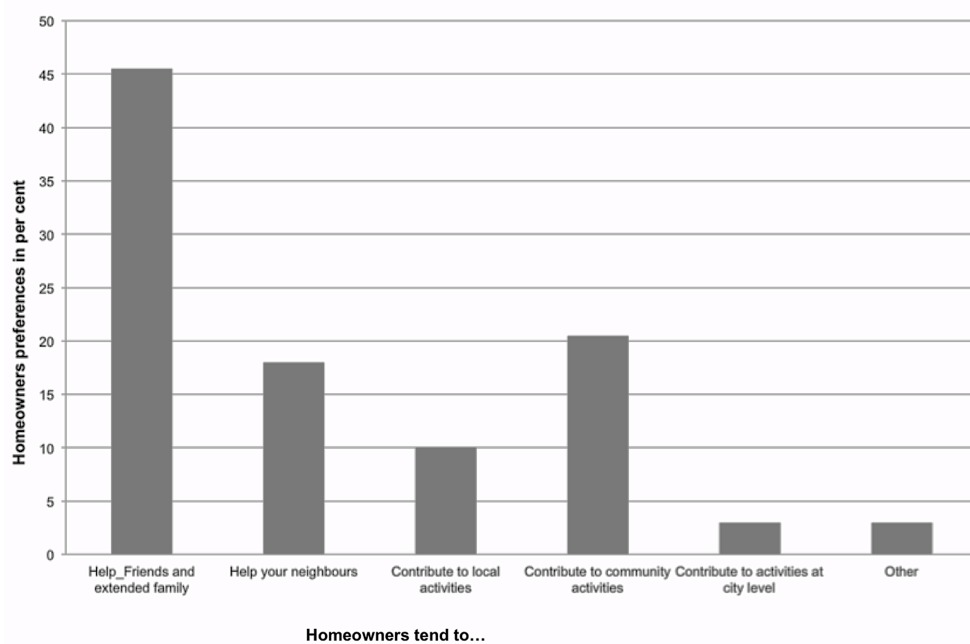


Figure 4-6. Homeowners' responsibilities

The reason for some of these changes was attributed to the changed social culture by most of the respondents (Respondent no.26). This is coupled with and enabled by affordability, where people have become wealth conscious and ready to spend. Another major change is in the priority of the community, and importance given for community activities and associated spaces. Now individual requirements have precedence over community needs and emphasis has shifted to cater for individual needs. A direct reflection of these on the built environment is the way spaces are used, where private spaces are given more importance and where energy is invested in terms of imported materials.

The summary of this social reconfiguration is that homeowners give least preference to their neighbours while finalising the house design. Though architects also expressed the same priority for neighbours while designing, they placed greater emphasis on climate during their design process. Another significant factor is that local issues like vastu or the cultural heritage of Mysore are not significant factors for homeowners while finalising their house design.

4.4.4 The role of Discretionary expenditure

Economists and sociologists have argued that consumption is shaping middle-class culture and identity significantly. According to the respondents' feedback, the economy has transformed middle class homeowners living conditions and affordability. According to one homeowner, “life has changed, money is more important now” (Respondent no.32).

During the survey, when asked what they would do with their money ‘in the case of a substantial increase in their income’, most importance was given to saving and education and the least number of homeowners expressed their interest in shopping (Figure 4-7). A nationwide survey by the National Council of Applied Economic Research (NCAER) also confirms this spending pattern of households (Chatterjee, 2008). This in a way reflects their values that would, in turn, be crucial factors while aligning people’s preferences towards sustainable strategies in the later stage of the research.

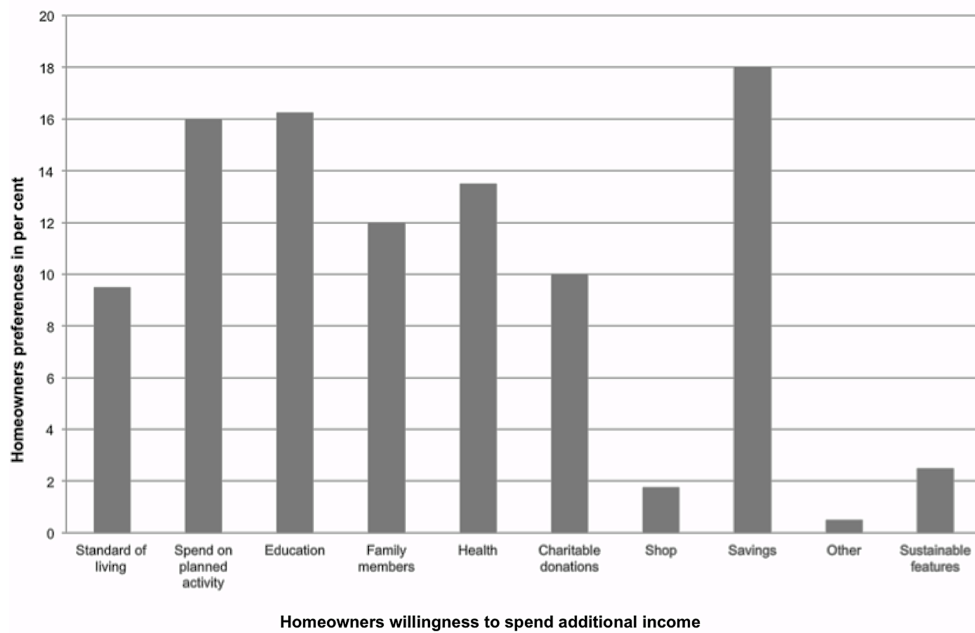


Figure 4-7. Spending pattern

In the case of constraints, homeowners compromise on quality of materials: nearly one third of the respondents would prefer to compromise on furniture whereas only 9 % would prefer to compromise on appearance (Figure 4-8). This shows the significance attached to elevation. In most cases homeowners prefer to have a big house so that they can show others that they are wealthy enough to afford such a big house. The spending pattern of the middle classes shows a clear increase in the money spent on food and household goods. One fourth of the income is spent on food and people tend to save nearly 20 per cent of their income. Among other activities, people spend about 10 per cent of their income on shopping including restaurant and leisure activities, and nearly the same percentage on fuel. Use of personalised transport over public transport is evident as they spend nearly 10% of their income on fuel. The cost of using public transport calculated during the fieldwork would amount to less than 2% of their earnings.

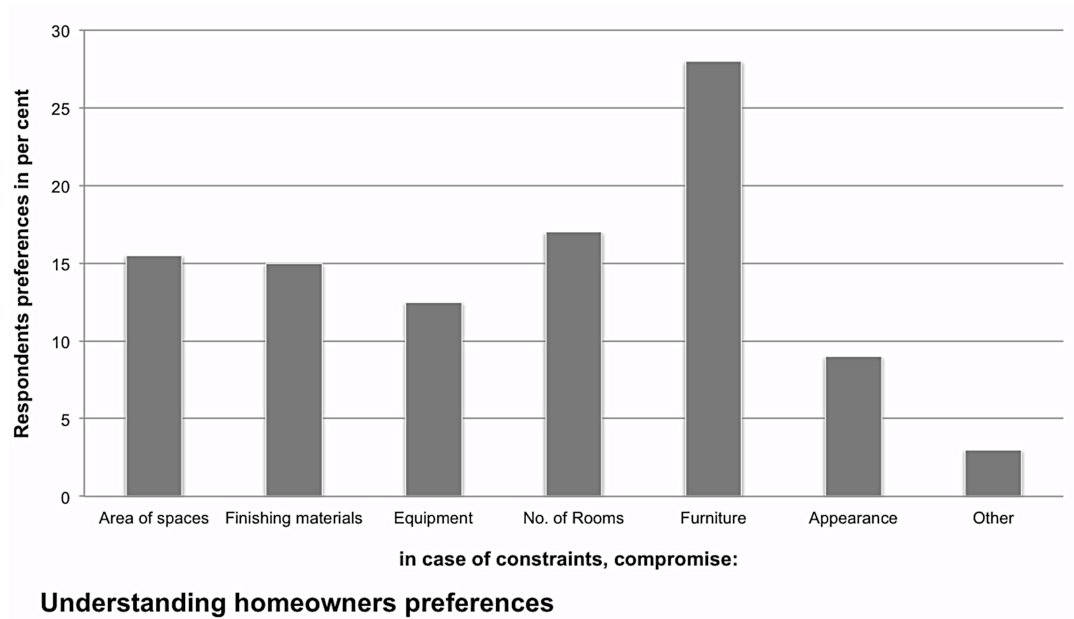


Figure 4-8. Building elements respondents willingness to compromise

During the interview most of the middle class homeowners expressed their strong preference for light, ventilation and basic requirements. This supports their reasoning of privacy and light as the main reason for moving away from the traditional housing typology. The basic requirements coupled with the necessity to live with unknown neighbours of a different class and culture, force homeowners to maintain space between buildings.

4.4.5 Building: construction and materials

One of the key findings of the fieldwork is the changes to the construction process. The house construction process at Mysore works at different levels. Potential Middle class owners usually have three broad choices. First, they approach the architect for the design of their house. The architect guides them through the whole process as laid down by the code of conducts of the council of architects.

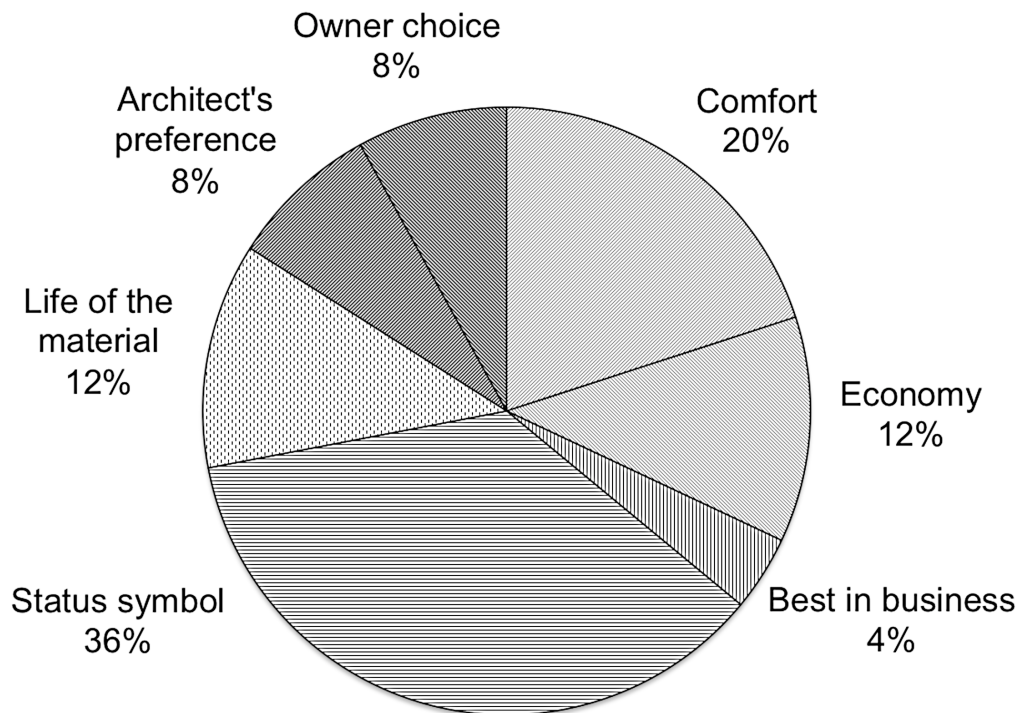
Second, the potential owner approaches a builder to build their house, wherein the builder takes the lead and organises an architect for the owner. In most cases, the

builders work on a turnkey basis, where builders develop their own design based on their previous experience and the sample plans are published by development authority (HUDCO, 1987, CITB, 1987). Of late, builders are approaching architects for creative design solutions to meet their clients' needs.

Third, the most commonly used practice is where potential homeowners appoint a contractor who builds the house for them. These contractors are mostly elevated skilled labours and tend to use very simple designs developed by incorporating features of their previous works and clients' expectations. Developers tend to work on a relatively large project whereas contractors provide services from only labour service, where the owner provides the required material, to full material and labour supply for the house projects.

According to the results of the first set of fieldwork, more than 80% of middle class homeowners used to get their house built by these contractors, where the contractors suggest some plans and owners make decisions based on their experience (of their neighbours or newly built houses). The scenario is changing where more middle class are consulting architects. Understanding this process is very significant because contractors and architects make a huge difference in terms of any decisions made.

In the process of material selection, comfort and economics have not been significant factors. For instance, when it comes to choosing the flooring material, more than utility, appearance and showing what one can afford are given more importance (**Figure 4-9**). In the case of timber, the life of the material is considered as crucial (**Figure 4-10**). This aspect is further examined by understanding homeowner's priorities in case of constraints. Among the homeowners studied, most are ready to compromise on the furniture for their home, whereas the fewer respondents are willing to compromise on the appearance of their house, which suggests their strong preference for appearances.



Architects understanding of homeowners preferences

Figure 4-9. Flooring_ Material selection process

People's expectations and choice are very evident, as most of the middle class homeowners interviewed would prefer to have better quality material had they more money. Their strong preference for appearances and the amount spent on elevation is evident according to one interviewee, "in the row or cluster houses built by The Housing and Urban Development Corporation Limited (HUDCO), people feel they are monotonous and would prefer sites so as to establish their own identity" (Respondent no.10).

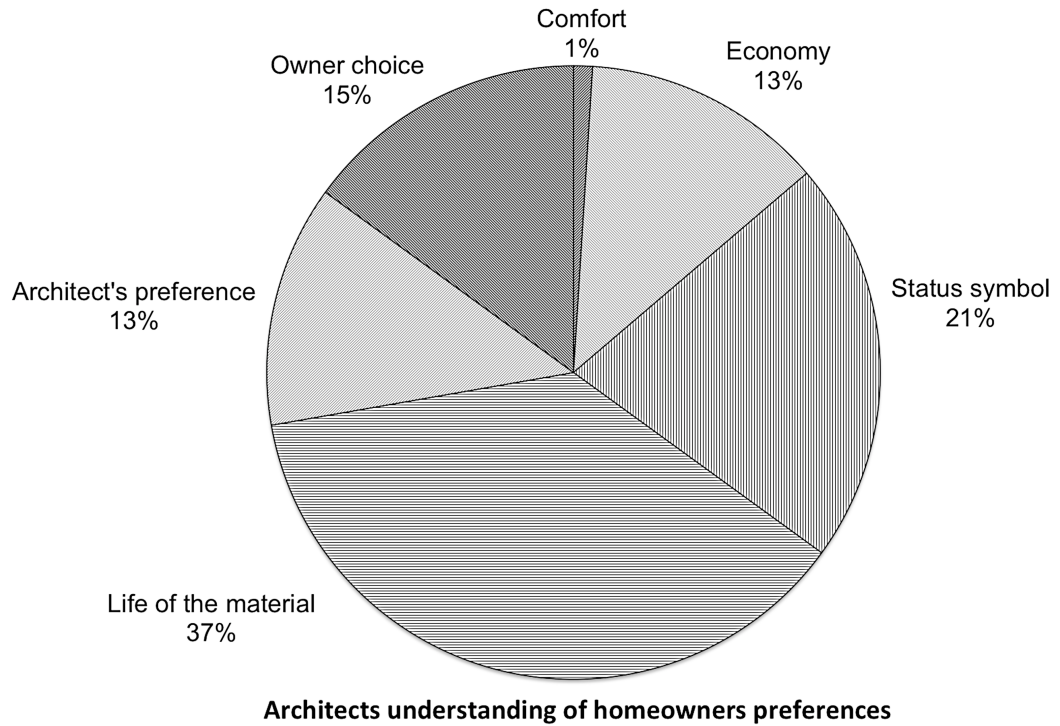


Figure 4-10. Wood work_ Material selection process

According to one architect interviewed, before 1980s most of the middle classes could only afford to build their houses when they reached their 60's. Whereas now many young people are building their home (Respondent no.22). The obvious fallout of this is the shift in the focus, where emphasis is now more on the bathroom and kitchen and materials are imported based on homeowners' exposure or influence by the media.

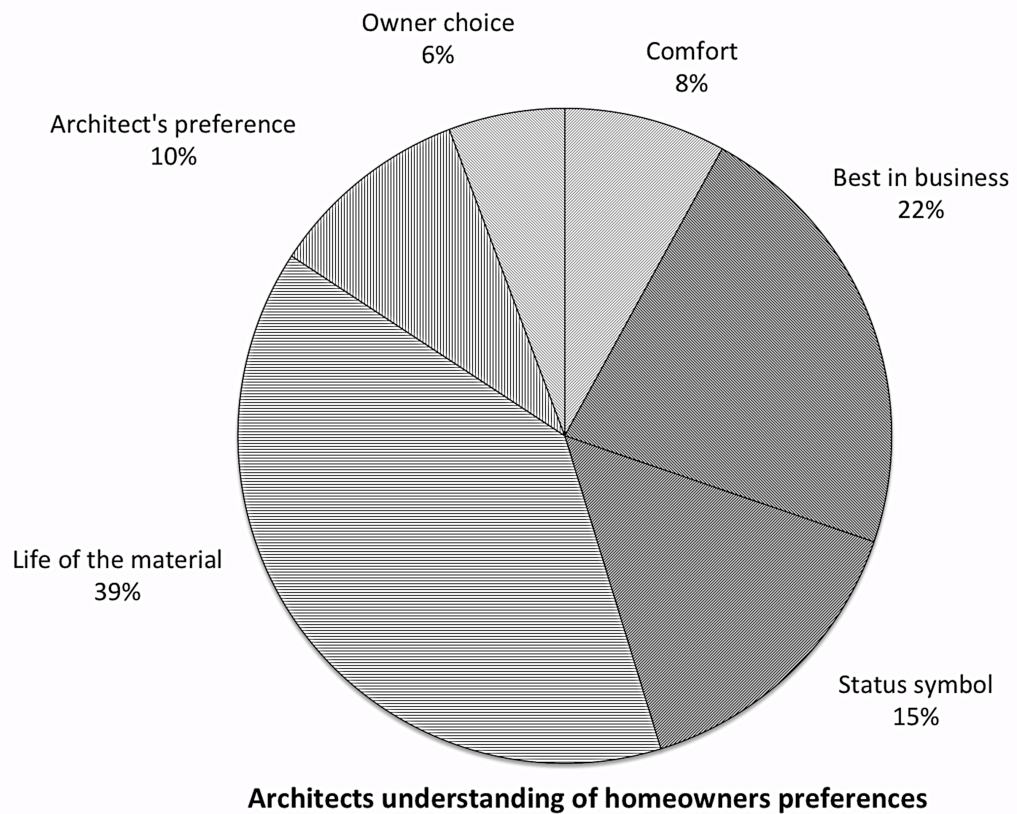


Figure 4-11. Electrical fixtures_ Material selection process

People of Mysore give very high importance to their house and they consider owning their house as life time achievement. They tend to spend more money on finishes and appearance to reflect their affluence. The feedback of respondents indicates that lack of information, awareness and appearance has pushed owners to go for imported materials.

These responses clearly reflect homeowners' aspirations, which are forcing people to spend more money. Most respondents expressed that the expenditure for almost their entire house had overshoot their budget and owners had to take out a loan to finish their house. The reasons for this could be attributed to preparedness of the architects and builders and, in extreme cases, homeowners' choices: they are no longer interested in cheap alternatives and refuse to opt for traditional materials like red-oxide flooring and stabilised mud blocks from a nearby village.

4.4.6 External space and boundary

The traditional typology was known for its sustainable features including the efficient use of external spaces and the interaction of neighbours. These spaces were very effective for informal meetings, gatherings and were also used as play area by children.

Contrary to this established practice, plotted development has now encouraged people to demarcate and protect their territory. With most of the new houses built away from the street with a gate between house and street, the Jagali has lost its significance. According to an architect interviewed, “Homeowners do not like unknown people overlooking the Jagali spaces. The urban fabric has changed. Fast traffic and dust has resulted in Jagali and overlooking places being obsolete.”

(Respondent no.21). According to one builder interviewed, nowadays, importance is given to landscape and outside spaces are used effectively as a private space compared to public Jagalis (Respondent no.65).

When the specific concern of interaction and lack of play areas are being highlighted, respondents argued that children do not play outside. Reduced family size has an impact on the need for smaller houses. Now, building regulations force owners to leave setbacks from the site edge and build no more than 60% as ground coverage. Unfortunately, key players, including architects, consider external spaces as negative or left over space, and thus tend to violate up to 25% of the ground coverage regulation. Due to political pressure, the development authority will allow homeowners to regularise their unauthorised construction by paying a prescribed fee (Karnataka, 1994).

When specifically asked about building regulations and their impact on the design process, most of the owners admitted that they would have built their house differently in the absence of bylaws, but strongly feel that they would have left space between neighbours even if there weren't such regulations.

4.4.7 The building compound

The way the external spaces are treated and used has clearly changed over a period of time. Lesser importance for external spaces and concern about safety has forced homeowners to cordon off themselves by erecting compounds with walls. Every owner interviewed felt strongly that having a compound is a must and although the initial reason was for security and demarcation, it has now become a symbol of prestige. Interview feedback suggests that these compounds are used for psychological security, protection of property, to define one's territory and for legal purposes. They prefer social differentiation and this is a very effective tool and the height could be varied based on needs and their relation with neighbours.

Legislation and policy have been established as one of the crucial factors which were instrumental in a sustainable built environment in Mysore before the 1950s. The planning guidelines and building regulations in the pretext 'to promote public health, safety, and general welfare of the community' insist on space all round the plot and discourage sharing party walls in most of the plotted development (MUDA, 1996).

In the present context, planning is not encouraging interaction with neighbours and the tendency is always to leave the minimum prescribed space and to build independently and secure individually. This aspect is further reinforced by homeowners giving least preference to neighbours, relatives and important facilities like school when choosing the location of their house (**Figure 4-4**).

4.4.8 Mysore: A critical context

Mysore is known for its development plan and efficient infrastructure up till the 1950s. People were asked to narrate their experience and perception of Mysore. A brief summary is provided below.

Mysore is growing haphazardly and people have started to feel that it is becoming overcrowded. According to the people interviewed, there is a clear transformation in

the food habits, lifestyle, and health of the middle class Mysorean and it has implication at individual, society and city level. Mysore had a very good, friendly and social culture. It is changing drastically and TV is also contributing to the process. Family members do not share their time in common areas and individual's room has become their world.

Initially MUDA constructed houses for the Mysoreans whereas it later started distributing plots (MUDA, 2008). According to the senior engineer who worked for MUDA in the 1980s, MUDA had also built row houses with shared party walls, which had provision for the owners to expand the first floor (Respondent no.6, interviewed on 3 July 09). In another scheme MUDA had provided basic requirements and open space which could be used to expand the house in future based on their financial situation (HUDCO, 1987).

During these days, development was more of marking of the layout by MUDA engineers, marking sites with 4 stones and taking out small trenches along the road. No development works like roads, drainage, services and infrastructure, were carried out. This was a major drawback, as even today one cannot find metalled road and water supply in some of these layouts. In the recent projects undertaken by MUDA, they are developing the layout with all basic amenities (Karnataka, 2006). According to one developer, MUDA do not even know the demands of the city.

4.4.9 Attitudes to the Sustainable Built Environment

There is a clear gap between awareness and expectation, for instance, although homeowners feel comfort is the most significant aspect while finalising their house design, they have expressed least preference for climate while finalising their home design.

Their understanding of the climate responsive design is further examined by understanding their general knowledge of the relation between house design, the

construction process and its implication on thermal comfort inside their house. The spatial organisation, opening configuration and building materials are the cause of the increase in temperature inside the houses. However, more than 60 % believe it is climate change which has increased the temperature inside the house, whereas only about 15 % people have the understanding that it is change in use of material and about 5 % of people feel it is the change in orientation, design pattern and layout planning which are cause of a rise in temperature (**Figure 4-12**). People’s understanding of climate change is triangulated in the follow-up interview, where most of the respondents identified excessive use of fuel as the major reason for global warming.

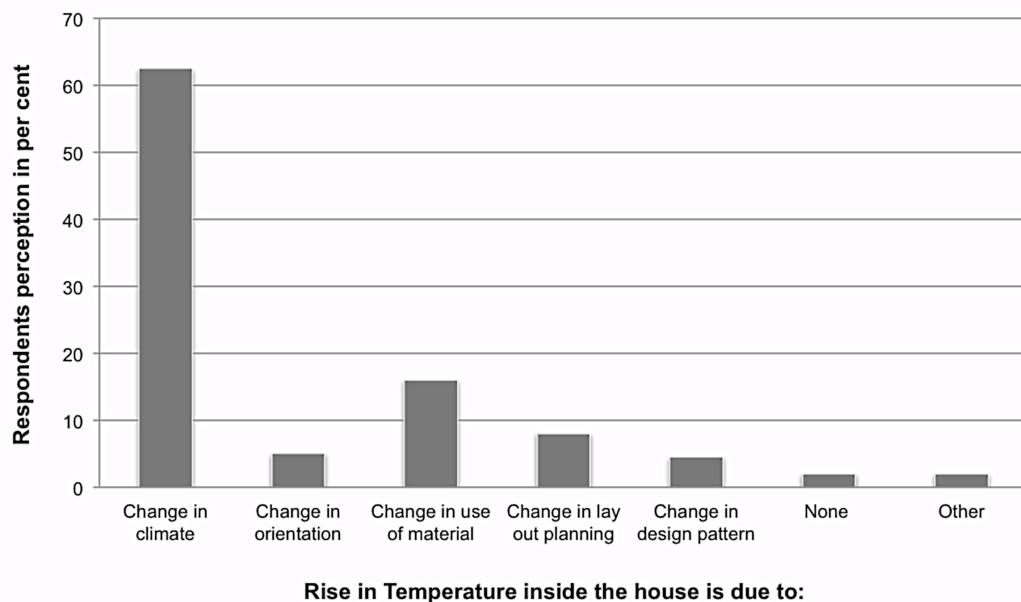


Figure 4-12. Respondents’ awareness

Middle class homeowners indifference about their role and responsibilities at the national level is evident wherein up to 60% of the middle class homeowners feel their voting will have very little or no impact in the democratic process (**Figure 4-13**).

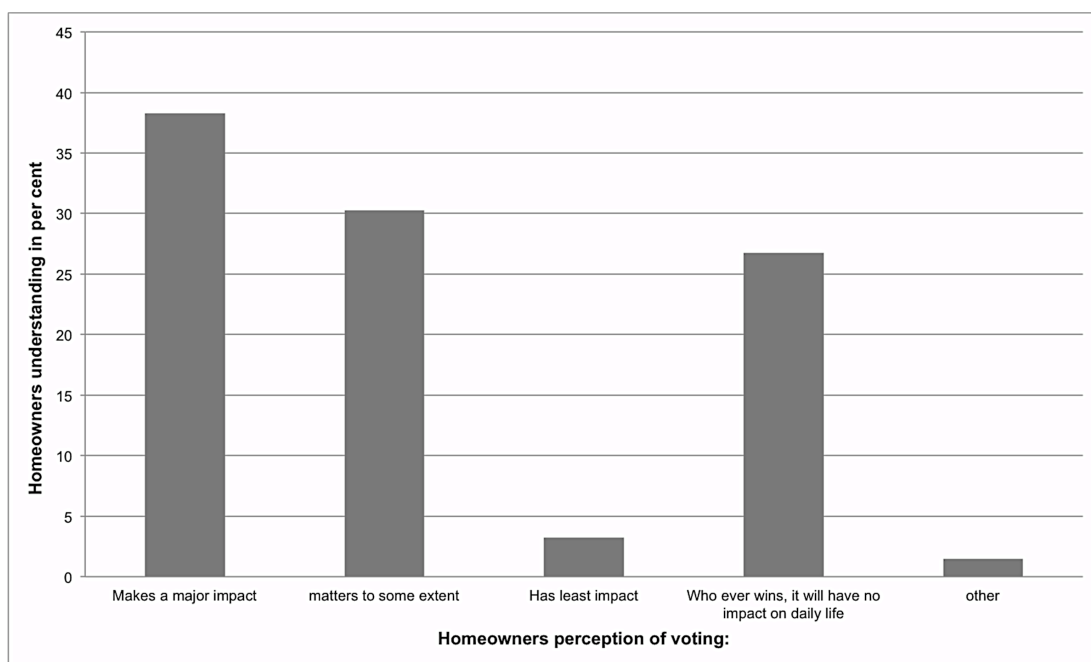


Figure 4-13. Respondents' perception of voting

Middle class demographic concern and interest in public life and knowledge of their rights are investigated by asking a simple question about the responsibility government has for the public's health and education. Among the respondents only 19 % are aware of the system and feel the government of Karnataka is responsible for the system, whereas 17 % have mistaken the government of India as responsible and nearly 50 % think it is the responsibility of both governments (**Figure 4-14**).

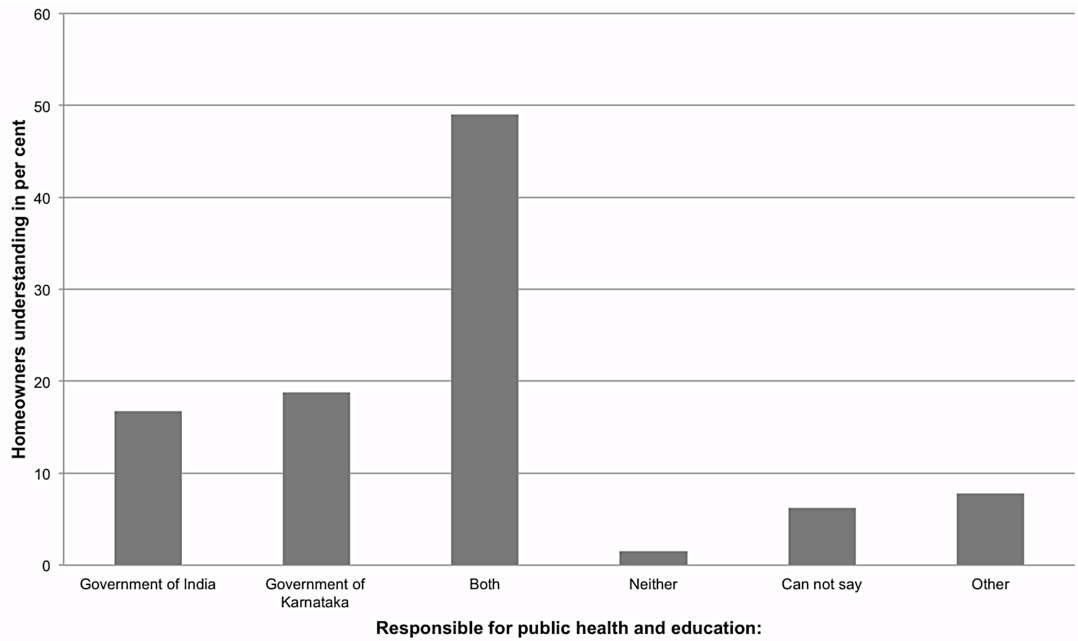


Figure 4-14. Respondents understanding of their government system

4.4.10 Sustainable features used in houses:

CFL bulbs and solar water heaters are used in most of the houses. Other sustainable features like rainwater harvesting, groundwater recharging, solar power and waste disposals are not very popular in Mysore and are used by less than 10 % of the residences (Figure 4-15).

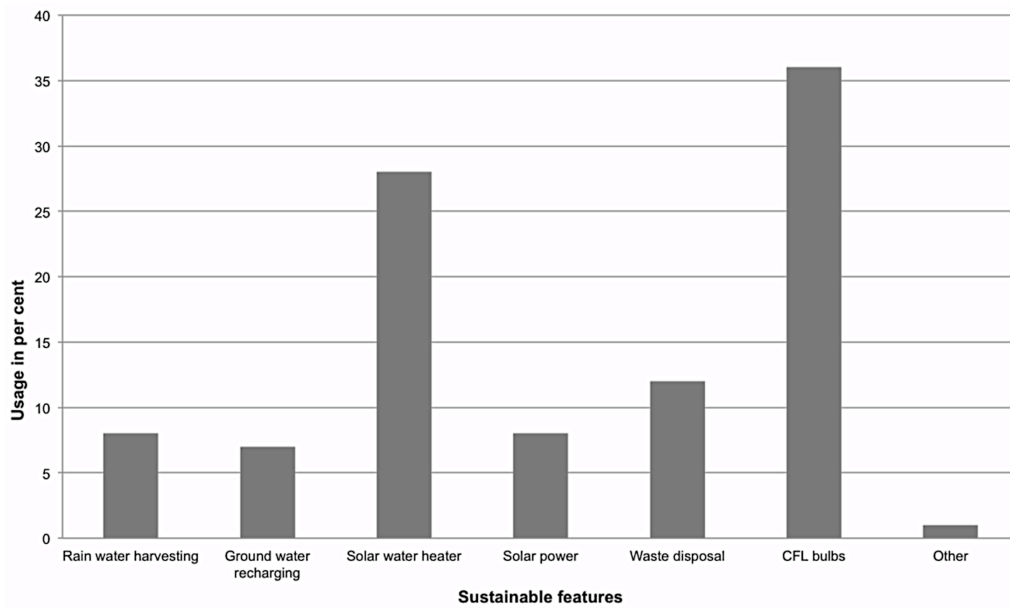


Figure 4-15. Sustainable features adopted in the house

When respondents were asked to reflect on how they can contribute to sustainable housing, they discussed aspects like better utilisation of natural resources and reusability. Material processes – which are critical to sustainable housing – were given least importance. One builder observed that *“it is important to understand the value of land. We only speak of economic returns, it is important to understand it in terms of environment. It is not just carbon, it is ecology that should be holistic, ecosensitive housing would address most of the issues”* (Respondent no.67).

Another contributor is the life span of the house. Earlier houses were built to be used for hundreds of years by generations of families, whereas now, young owners are keen to build according to their tastes and to plan for a short span of 10 – 15 years. This will have a greater impact on resource consumption with a drastic increase of the embodied energy and carbon emissions.

Finally the respondents were asked to reflect on the issues related to the sustainable built environment. According to many respondents, awareness is a crucial factor and, for instance, many homeowners do not understand the concept of energy costs and carbon reduction. According to one builder, there is a practical problem of commercial viability as he feels the profit margin will be reduced by one tenth where

he uses sustainable measures in building. With activities moving inwards and with larger land footprints, there is a clear increase in consumption of energy and its implication on sustainability.

4.5 Interpretation of fieldwork

The observation and analysis of middle class homeowners of Mysore clearly reflect their socio cultural, economic characters. The earlier section also provides an understanding about the house construction process and the use of external spaces. In this section, the above findings are related to the built environment. In order to analyse the impact on neighbourhoods and housing, the information collected through interviews, questionnaires and literature are examined for key indicators of sustainability from macro to micro scale that comprise:

- Community living,
- Building siting,
- Building entrance,
- House planning,
- Finishes and façade.

4.5.1 Communal Living

Commentators such as Leela Fernandes and Verma have argued that economic empowerment supplemented by exposure from the media has transformed the culturally rooted people to explore redefined values and this has a major impact on an otherwise sustainable lifestyle (Fernandes, 2006). In the case of Mysore, lifestyle and redefined values along with occupation have a bearing on the housing typology. Earlier housing patterns were developed based on the strong 'joint family system'.

Shared spaces were given most importance with community socialising and dining. This resulted in spacious, multipurpose central areas used for most of the day and lesser numbers of smaller rooms. The data collected at Mysore clearly shows a

movement away from the joint family system. People are moving away from family-based occupations, resulting in occupation-based sharing of common spaces becoming obsolete and people drifting towards owning individual houses. Fewer respondents living in a joint family household has resulted in most commonly used spaces in shared family compounds no longer being relevant, whilst private spaces are assigned higher value. According to many of the architects interviewed, clients prefer separate rooms designed around particular activities like the computer or television.

A key dimension of social interaction of an Indian family is the guest. While understanding the transformation of house design, the role of a guest and neighbours are examined in today's context to understand the changing cultural and social values. According to one respondent, a guest is equal to a family member and they treat guests equal to their family even today. Another respondent strongly felt that hospitality and respect depended on the social or economic status of the guest. This change in attitude towards guests and neighbours has clearly been reflected in their redefined housing typology (CITB, 1987). For instance, the traditional 'Jagali', which overlooks the community area, were welcoming spaces for guests and neighbours as the layout was developed based on their socio-cultural background. Work-related mobility has increased substantially among skilled and unskilled workers with different socio-cultural backgrounds. This has resulted in redefined requirements. Community areas are replaced by an introverted house design, where fencing each plot for one's identity has become more of a physical barrier for neighbours and guests.

The change of community living and social values has a major impact on sustainable housing. Independent houses rather than clustered housing have increased the dwelling footprint by 50 % (Satish and Brennan, 2010). This has a clear implication on the proportional increase of the resources consumption and results in higher embodied energy. Use of individual spaces over shared spaces has resulted in the consumption of higher operational energy of a household. The resultant energy consumption has further increased the carbon footprint of the dwellings.

Changing family patterns along with change in work pattern contribute to an increased carbon footprint. The nuclear family as opposed to a joint family tends to accumulate more space per person and therefore demands more energy during operation and in embodied energy.

4.5.2 Building Situation

The City of Mysore benefitted from considered, planned development for growth even during the colonial period. The coming together of Swadeshi narratives of self help [and self determination] ensured a preference for localised material sourcing and responsive planning configurations (Vandana, 2008). Post-independence, social change encouraged by the state development authority promoted middle income to favour plotted developments in the Anglo-Saxon model.

In 1904, the monarch Krishnaraja Wadiyar proposed the first development plan for Mysore to mitigate the issue of health and hygiene and decongest the central fort area that was the centre of political power. Agrahara (small Brahmin villages) that were prevalent 150-200 years ago were used as prototypes for these new residential layouts (Issar, 1991). Typically residences were distributed around an open space or aligned linearly with a shared party wall (terraced) built right at the edge of the road. People shared their leisure activities and entertainment with their neighbours in these informal spaces (**Figure 4-16**). This inherently environmentally responsive built environment derived from the social classification based on occupation had clear advantages of shared security and social interaction.



Figure 4-16. A typical Agrahara

Planning, housing and built environment practices changed drastically after independence. As one town planner recalls, “European-modelled, plotted development started as part of town and country planning in Bombay (Mumbai), Madras (Chennai), Delhi and Calcutta (Kolkata). Later development authorities implemented them in other cities” (Respondent no.01). According to an executive engineer responsible for urban housing development, in the initial stages of the City Improvement Trust Board (CITB), government allotted some sites free of cost for those who bought houses from CITB, away from the city centre. According to a respondent, during the 1980s, CITB sold 50 feet x 80 feet plots with the house of 1400 square foot area for Rs. 40000 (£500). Today, a plot in the same area costs nearly ten million rupees (£125000) (Respondent no.38).

Changed social and cultural values played a crucial role in adopting new housing typologies. Changed social conditions meant that people started to associate the strengths of community living as weaknesses. For instance, shared facilities were interpreted as leading to a lack of privacy. Interview feedback suggests that the respondents identify issues like sanitation, ventilation and maintenance as key reasons for moving away from cluster and row housing to plotted developments. The research indicated a consensus that householders would only experience good conditions of light and ventilation if they were living in a detached house.

A shift in perception is reflected in the questionnaire feedback, where respondents give highest priority to building location, which mostly relates to land cost and least importance to interaction with and proximity to neighbours, family and friends. Thus, homogenous interactive spaces are replaced by individual plots, which are further emphasised by gated compounds that become a necessity to establish territory and status (Figure 4-17).



Figure 4-17. New layout, individual plots

When asked about revisiting the vernacular and traditional modes of shared space, the responses indicated that building designers and procurers felt it a challenge to work against a consumer preference. Respondents' feedback shows that a sense of possession of ownership is evident among homeowners. One householder remarked, "we cannot have a common wall (party wall) because of compatibility between neighbours. Neighbours could be emotionally closer but houses have to be physically separate. House has to be a single entity. A group house does not sound like a whole house" (Respondent no.33). The current housing typology at Mysore has moved away from community planning and inherent sustainable practices. There was an organisational approach and strategy that was sustainable and this has now been overtaken by increased affluence.

Community living encouraging shared facilities and the use of locally sourced materials has resulted in low energy consumption for transportation at land level. Environmentally responsive design resulted in comfortable interior spaces which required very low operational energy at living level. Modified social and cultural values along with aspirations have resulted in the desire to own individual plots and build Anglo-Saxon model houses.

Additional construction for independent houses and individual security to protect the property in the form of compound has increased the consumption of building materials, with implications on sustainable features. In spite of higher land value, being away from city and workplace, middle classes are spending more money to own a plot which has increased their dwelling footprint. Unsustainable housing is achieved at high cost reflecting the social values people attach to owning an individual house.

4.5.3 Building Entrance

Entranceways are always more than just a threshold to the interior of homes. In the past, people used the semi-open raised spaces, forming the entrance, as a climate modifier, which naturally became a place of social and community interaction throughout the day. This smooth transition space from street to the interior of a home is very different in contemporary plotted development. This transition will be examined in the following section.

Traditionally, there has been a very fluid boundary between public thoroughfare and private interiors. Physically, the Jagali acts as a transition between interior and exterior spaces (Figure 4-18). People shared their leisure activities and entertainment with their neighbours in these informal spaces (Satish et al., 2011).



Figure 4-18. Jagali, entrance transition

In the case of contemporary plotted development, housing set back from a plot line has no clearly defined use for the outdoor ground (Figure 4-19). Building form no longer encloses and defines external space to encourage outdoor activities. Privacy is given priority over community, where each building is self-contained and introspective (MUDA, 2007). Roads, independent of houses, consist of pedestrian ways and are clearly segregated from the protected individuals' private property, which is supported by local planning legislation (Fernandes, 2006). Although in a purely functional sense these layouts are well worked out, it is a clear departure from the relative social sophistication in the operation of courtyard and Jagali forms.



Figure 4-19. New houses: compound before main door

Density and mode of transport has a bearing on these Jagalis. Changes in density and transport modes mean there is greater movement of vehicles and people on the streets. Hence, noise and pollution, along with the movement of unknown people, make the semi-covered Jagali difficult to use for a major part of the day.

One architect stated, "... now the application of Jagali is restricted to farmhouses. It was effective when the well-known people use to overlook the community spaces. Now the fabric has changed and hence it is obsolete" (Respondent no.29).

Climatically driven, the inviting Jagali which acted as a series of bioclimatic transitions from outside to inside the house is now replaced by a clear demarcation between roadway and plot. Almost all the respondents viewed compounds as more of a psychological security, offering protection of the property and defining territory.

According to practising architects "compound walls are also used as a tool to symbolically express their client's prestige" (Respondent no.18, interviewed on 30 June 09). When asked about the need for physical demarcation, one respondent said "for privacy and cordial relation, earlier people wanted one another; now people do not need others. We do not want to have problems when we eventually have children, so a compound has been built" (Respondent no.36). Citing this when the

concern of moving away from climate responsive spaces is expressed, 70 % of the interviewed architects suggested that they follow the trend and did not see themselves as having a role in setting sustainable attitudes with the clients. An architect summed it as, “we cannot complain, we have to go with the trend, it is a question of how well we can adjust to the new situation” (Respondent no.17). One respondent strongly expressed the view that “the emphasis on a compound as a barrier is to ensure their children do not mingle with other children from different social backgrounds” (Respondent no.20).

Earlier interactive, participative open spaces have now become individualistic. This is supported by planning regulations which divide space into roads and individual plots (MUDA, 1996). Though the concept of open space has regained importance, it is no longer public. According to a builder “importance is given to external spaces. Sometimes it is used as part of the internal space. Mostly it is a private space” (Respondent no.51). With the redefined lifestyle, the time spent in these open spaces is subjective as the interview feedback of respondents in terms of their daily routine clearly suggests the least amount of time spent by either individuals or families in these open spaces.

Mysore enjoys a mild and pleasant climate and observation during the fieldwork suggests that people are able to spend more than 50 % of their time in climate-responsive Jagalis. This, along with the daily routine around daylight has resulted in the least consumption of operational energy. Most of the respondents interviewed showed no preference for spending some time during their daily routine in these spaces which reflects the inward shift in social activity. This has not only increased the consumption of embodied energy to facilitate these indoor activities, it has also increased the operational energy of these spaces which was otherwise non-existent. Furthermore in newer developments, the effective use of open space has drastically changed to gated private spaces which reflect the specific concerns and aspirations of emerging householders.

4.5.4 House Planning

In the past, spatial configuration and construction materials used in domestic buildings were localised with low energy impacts. There are implications in a drift away from multifunctional spaces to specific rooms for discrete activities. The selection of building materials and assemblies is also examined in this section as we find they are governed by the projection of status as well as satisfying functional requirements.

Before independence, traditional housing in Mysore was constructed with thick mud walls and terracotta tile roofs. Though mud blocks did not last as long as fired bricks, as they were protected by lime plastering with the skills available to maintain, they were efficient. The houses had small openings towards shaded areas (Figure 4-18) By 1987, this was completely replaced by brick walls with cement plaster and reinforced concrete roofs (CITB, 1987). Spatially, a relatively large central hall was used as an internal meeting area. Very few spaces inside the house had a fixed purpose (Ikegame, 2007). Most spaces were multifunctional and it was the occasion that decided the use of the house, for example, the central hall was used for socialising, working, sleeping and dining (Figure 4-20).



Figure 4-20. Internal multipurpose space

Housing design changed to a, European Model, partitioned space for clearly defined functions from previously flexible layouts (CITB, 1987). Influenced by the Anglo-Saxon model, importance is given to larger openings and privacy while defining spaces. All respondents expressed their concern for good light, ventilation and privacy as crucial aspects, along with affordability as a priority during the design process. It is the declared desire for light, ventilation and privacy that encourages householders to move away from cluster development to individually plotted schemes.

While analysing the adoptability of these housing typologies in Mysore, most of the interviewed architects and builders believe the European model of building organisation reflects their client's aspirations. More than 60 % of the respondents feel their house reflects their social background and character. 10 % of the respondents believe it is their status and wealth which gets reflected in their house. The fieldwork reveals that more than 95 % of the respondents are residing in houses built according to a European model. This reflects the redefined requirements and expectations of the households.

At national level, economic liberalisation has provided an opportunity for individuals to aspire to wealth across the class structure. The middle classes are the biggest beneficiaries of this phenomenon. According to Satish Deshpande, the middle classes have consolidated their social, economic and political standing through globalisation (Deshpande, 2004). Not only did economic liberalisation encourage upward mobility for the middle classes, it also supported the notion of progress for the lower classes to aspire to economic development (Fernandes, 2000a).

The resultant impact on housing is evident at Mysore. According to one practising architect, the average age of a commissioning client is much younger than the previous generation and this has a greater impact on design, as they are open to new ideas, design, materials and technology. Concern about the change in attitude is reflected in what one builder had to say: "the concept of a house as a 100-year lasting asset is changing, and people are considering only 15 to 20 years. Though this is

good for industry, it has to be examined from the sustainability angle” (Respondent no.54), as the finishing materials and building skin materials would be replaced and remodelled. In this context, clients’ attitudes can be summed up as one architect puts it, “now people are trapped by the appearance of the building, they do not understand the relation of comfort to design and materials usage. Their desire is beyond basic requirements; frequently they want to show off. Some clients expectations of traditional architecture is met superficially” (Respondent no.06). The significance of shift in planning is evident, when a builder interviewed says that “over a period of time there has been a clear shift from homes designed for minimal living space to viewing the buildings as a commodity to show one’s wealth” (Respondent no.43).

Economic liberalisation and increases in personal wealth have stimulated middle class segments to import materials and redefine their personal spaces. An aspiration to demonstrate wealth has resulted in the use of environmentally insensitive materials with high embodied energy. Two representative instances of this are, the use of marble transported from sources 2000 km from the city, and large glazed areas with imported timber frames. There is an evident increase in the size of individual houses and more materials used for internal walls. This has clearly resulted in increased embodied energy and operational energy.

4.5.5 Finishes and Façade



Figure 4-21. Typical new house interior

A key characteristic of the emerging Indian middle class is that their earning power is much greater than their parents and often expresses itself in home construction and interiors (**Figure 4-21**) (Saavala, 2003). In tracing the use of household items which people use to associate their needs and status, there is a clear increase in the use of energy intensive items. When we track the crucial aspects and significance given by the middle class homeowners at Mysore based on the feedback of the respondents, it has shown exceptional increases in most aspects like washing machines, ovens, air-conditioning, car and travel abroad compared to 15 years previously (**Figure 4-22**). According to a respondent “aspirations have forced the middle classes to spend more on finishes and burden themselves unnecessarily” (Respondent no.33).

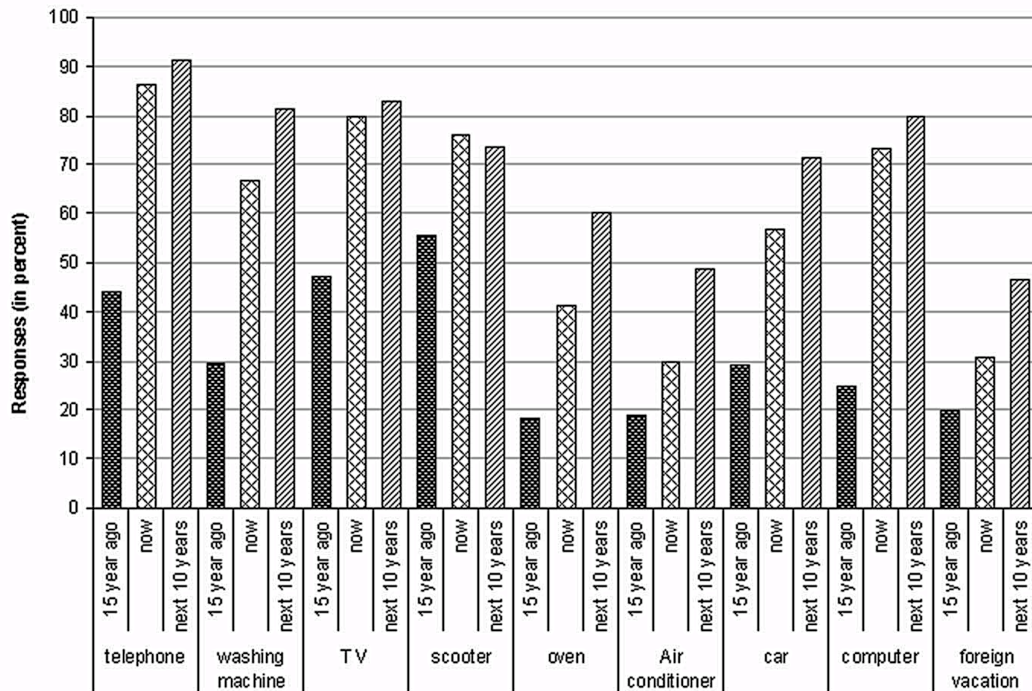


Figure 4-22. Significance of household items and their influence on respondents

In terms of spending pattern, more than 70 % of the respondents seek to invest additional money on better quality of materials. According to the feedback from the practising architects at Mysore, more than 55 % of their clients are aiming for the most expensive, imported and best material which will reflect their status during the selection process of finishing material for flooring, elevation, electrical fixtures, plumbing fixtures and woodwork (**Figure 4-9, Figure 4-10, Figure 4-11**). This is in contrast to the traditional Mysore, which encouraged local crafts and promoted locally sourced materials as part of their early development strategy (Vandana, 2008).

Though more than 60 per cent of the respondents assert they want simple, utilitarian housing, they visually contradict themselves by the care shown for external finishes and the quality of material used in the interiors (**Figure 4-21**). For instance, the houses of these interviewed people have marble flooring or granite tiles cladding for the front side of the house, wherein both cases do not reflect the utilitarian value of the materials. According to a scientist from 'The energy research centre' (TERI) who

was interviewed, “middle classes, not being satisfied with what they have, are striving hard to achieve luxury” (Respondent no.69, interviewed on 11 Aug 09).

Furthermore, there is a clear difference between the traditional ‘Gandhian’ middle class demographics and recent, more materialist additions. An architect remarked, “Traditional middle class homeowners would prefer bigger spaces (Figure 4-23) when compared to the people who have climbed the ladder of economic success. This so-called “newly arrived” middle class prefers high quality finishes announcing their arrival” (Respondent no.32, interviewed on 11 July 09). As one respondent sums it “exhibitionism is the important characteristic of middle class homeowners... Hypocrisy is evident while they keep Geeta, Gandhi and other great books in the showcase, where none of these were read” (Respondent no.34).



Figure 4-23. Typical old house interior

The impact of a recent desire to project affluence is evident in the selection process of materials and finishes. Most of the materials and finishes are either imported or processed with high energy resulting in consumption of higher embodied energy. For instance, Italian marble for flooring, Australian Sal wood for door and window frames take up very high amounts of energy for transportation, ceramic and vitrified

tiles used for cladding consume high energy in the manufacturing process increasing the embodied energy of the materials. Effectively all these factors demand high energy and, due to house design and lifestyle, are drastically drifting once sustainable housing to an unsustainable built environment.

The middle class homeowners' inclination to use more electrical goods has increased the need for operational energy. A representative instance is their use of air-conditioning: Traditional built forms did not require mechanical ventilation (Hyde, 2008, Fathy, 1986). Changed built form necessitates the use of fans, which could consume about 80 watts energy for a dwelling area of 120 square feet whereas the aspiration to use an air-conditioner demands 1000 watts of energy for the same area (Lall and Ruchi, 2008). The survey demonstrates middle class homeowners' inclination to use these items more extensively in future, which may require an excessive need for operational energy. The consequence of increased operational energy is resultant of both changing geometry resulting in new building typology and lifestyle change resulting in extensive use of internal space.

4.6 Conclusion

This work has verified the increasing lack of sustainability in the contemporary middle class housing particularly when it comes to issues like appearances, use of the compound, use of materials and the desire to be separate and not share a party wall with neighbours.

The outcome of the first set of fieldwork can be broadly summarised into

- Issues of form and fabrics
- Issues of social and cultural considerations

The issues of form and fabrics

- The operating energy
- Consumption of materials
- Use of plot and compound
- Orientation and façade

This study has demonstrated that these concerns are due to the lack of concern for increased energy consumption and treatment of the compound. Furthermore, the flexible nature of the traditional house compared to the prescription of the spaces and its impact on orientation in the modern housing typology led to unsustainable practices.

Issues of social and cultural considerations

- Aspirations
- Neighbourhood
- Safety and security

These are issues that arise due to the aspirations of the homeowners, and growing interest to demonstrate their wealth. There is a clear move from multi-purpose shared

spaces and community spaces to individual buildings, which has resulted in higher energy required for transportation, embodied energy and operational energy. Emphasis on privacy has resulted in the use of further resources to protect property.

The outcome of the fieldwork clearly suggests that the issues of social and cultural considerations influence the issues of form and fabrics. Reformed social and cultural needs have resulted in climate responsive spaces like Jagalis becoming redundant. The outcome of the fieldwork suggests that now the middle class homeowners believe that lower class people will live in these Jagali house typologies (Respondent no.47). Improved affordability coupled with reformed aspirations have contributed to building bigger houses. These, along with homeowners' emphasis on having the best, most expensive, imported materials for finishes to reflect their status, usually does not contribute much to the performance of the building, whereas, imported building materials have resulted in the consumption of high embodied energy. Extensive use of electric utilities and air conditioners extensively has resulted in excessive use of operational energy. These are driven by a sense of aspiration and ownership.

Finally, the first phase of this research has laid out the significant factors which have a bearing on the sustainable housing features for the growing middle class homeowners. These conclusions are useful to narrow the research questions and examine specific areas for further research. This research is more about examining the sustainable housing features for growing middle classes and thus focuses on one part of the house where the implication of homeowners' aspirations for sustainable housing practices can be acknowledged and possible changes to sustainable strategies can be made.

The next chapter examines the sustainable housing opportunities feasible at Mysore and more importantly has been instrumental in developing tools for the second set of fieldwork, where peoples' perception and choices are tested at Mysore.

Chapter 5: Transition space, Boundary condition: Focused study area

5.1 Introduction:

The previous chapter established the fact that only the very poor might consider a house as ‘merely a shelter’. For the aspiring classes a house is more than a home, becoming a symbol of affluence and success. There seems to be a generational aspect to this as younger generations progress beyond their parents. Middle class homeowners’ changed expectations have not only moved away from the traditional housing but towards unsustainable practices. To examine the impact of people’s aspirations on housing, the study area was narrowed down to an important part of the house, which not only enables one to understand middle class homeowners’ aspirations, it will also help to examine their preferences and relate them to their fundamental values.

This chapter elaborates on the process of narrowing the research area to one part of the house – the boundary condition and transition spaces – which not only reflect the change in attitude and lifestyle of the middle class, it also reflects both socially and environmentally unsustainable practices of the present typology. As a process of narrowing the research area to boundary conditions, extensive research is conducted to understand the notion of boundary, its significance, concerns and its implication on sustainable housing.

The emphasis of the research is on social values and lifestyle of homeowners. Thus this chapter takes a look at different housing typologies before reflecting on its relevance for the middle class homeowners of Mysore.

In India, architects like Doshi, Baker and Correa’s work reflect climate responsive design. Their housing projects also respond to the social and cultural context. These projects are also examined to understand the relevant housing typology in the

modern context. Finally, housing typologies, which are different from typical plotted development and vertical development, like apartments, such as ecovillages developed by developers near Mysore, are also examined. This information was helpful to understand the prevailing condition and also to narrow the research to a specific area.

5.2 Comparison of Settlement Typologies

In the Indian context, sustainable housing is not merely reinventing the low carbon housing typology but it is more understanding the social and economic context of housing to ground the aspirations and values of the middle class homeowners with the clear underpinning of their socio-cultural values (Skea and Nishioka, 2008).

The traditional housing in Mysore and sustainable strategies adopted were discussed in chapter 2. Community-oriented social living and sharing of facilities and activities were the crucial factors for traditional housing to be sustainable.

Self-reliance and inclusivity are at the heart of the ecological utopia envisaged by Marius de Geus. In his book, 'Ecological Utopias: Envisioning the Sustainable Society', he traced the different utopias narrated by different people like Thomas More, Henry Thoreau, Peter Kropotkin, Ebenezer Howard and Bernard Skinner and modern trends narrated by Ernest Callenbach and Murray Bookchin (Geus, 1999). The underpinning factor among all these theories is the emphasis on inclusive social participation and community living.

Individuals' personal aspirations and priorities over those of the community are pulling society in another direction. Economic globalisation has further increased the interdependence of society and consumption-oriented societies have made these utopian concepts even more challenging to implement. Normally, sustainable settlements and sustainable development are looked at as single, one-off bounded settlements. In the present context, ecovillages and cohousing are considered environmentally responsive and socially inclusive communities.

“Cohousing” refers to an architectural approach based on lifestyle considerations and sociopetal design features, regardless of the type of property ownership (Jackson, 1998). The most significant of them are ecovillages developed during the 1960s. Robert and Diane have defined these communities as “a human-scale, full-featured settlement in which human activities are harmlessly integrated into the natural world in a way that is supportive of healthy human development and can be successfully continued into the indefinite future” (Diana, 2012, Robert, 1993).

These villages are reduced to a “human scale” where every member is deeply interconnected because of proximity and size, which makes them feel safe, empowered, seen and heard (GEN, 2012). As a social group, this works efficiently as each member is responsible for and supported by other members (Diana, 2012, Tobin, 2005). These communities are successful due to the community participation and social interaction of the residents. Physically, these are isolated, relatively small settlements.

An example of an ecovillage is in Findhorn, Scotland. Different sustainable strategies like the use of local building materials, local stone and straw bales, sewage treatment, wind turbines to generate electricity and sustainable social values, have been implemented (Findhorn, 2012). The major challenge with these communities is that they are isolated, with very less interaction with the external world.

The concept of an ecovillage is consistent and similar features can be observed in the case of the ecovillage in Auroville, India, near the study area (Auroville, 2012). The main objective of the master plan includes a mechanism for sustainable developments that harmonises both the needs of the environment and of economic development. Sustainable development is well-conceived in terms of limiting the projected population to 50,000 people by 2025. Furthermore, by interlinking the town with the connecting villages, the master plan is worked out with a green belt around it (Auroville, 2001).

The main concern of these ecovillages is that they are isolated communities with a clear barrier from the outside world. They tend to be driven by people from the middle classes. Sometimes, as in the case of Findhorn and Auroville, they draw likeminded people from across the world, which has a higher than average air flight footprint.

These communities have been mostly set up away from urban life and secluded from the daily requirements of the middle class. The greater challenge is that these communities represent the co-habitation of like-minded people. This low-profile, unassuming housing typology contrasts with the aspirations and the views of the middle class homeowners of Mysore.

EcoVillages near Mysore

Of late, these eco communities have been part of the urban fabric of Indian cities. There are very few gated communities in Mysore and they cater only for upper class people. The main shortfall of these gated communities is their unsustainable lifestyle. Some of the concerns of these gated communities have been tackled by a couple of EcoVillages, which have cropped up near Mysore and Bangalore.

One such project is 'Eco Earth: Birdsong, an EcoVillage by the river...' (EcoEarth, 2009b). Birdsong is proposed in phases in a landlocked area of 100 acres near Mysore on the Bangalore-Mysore highway. These ecovillages are intended to be socially, economically and ecologically sustainable communities²³. They are united by shared ecological, social or spiritual values (ECO-EARTH, 2009a).

Another project 'Good Earth Orchard' (GoodEarth, 2009) is located in the outskirts of Bangalore and caters for 60 families. Emphasis is placed on larger open spaces

²³ To overcome challenges of the resource driven gated community and high density, high pressure urban living, 'Eco Earth' has proposed a new lifestyle to benefit both environment and man. According to the organisation, they have borrowed the idea from the 'ecovillage' with a vision to create and inspire sustainable earth communities. These developments are of the size of a small village that encourages its members to live sustainably.

which are lacking in the urban Bangalore residences (GoodEarth, 2009); this has resulted in the higher dwelling footprint.

Architects have responded to the climatic condition of Bangalore while designing the outdoor and semi-outdoor spaces. According to them, these spaces are designed to be effectively used for different activities throughout the day (respondent no. 59).

These projects and similar ones sprouting near Mysore, work purely because they are away from the city and it would not be feasible to replicate for the middle class homeowners in the city area. The project also has a larger land cover compared to the dense development in the urban area. The key dimension of sustainability, economy, is not adequately addressed, which makes these projects not affordable for middle classes. In spite of all this, it caters for hardly a few hundred households compared to the 800,000 Mysore population. The cost of a house in these communities, twice to thrice the cost of the house in typical plotted development, and location, away from the city centre, has discouraged middle class residents to choose these ecovillages as a viable housing typology.

Another form of gated community prevailing in Indian major cities are vertical communities, which are similar to gated communities in all respects except that the residences are grouped together in a tower block. One such project is the one recently undertaken by 'Sankalp group' developers (Sankalp, 2009b). The 'Sankalp central park' luxury apartment has all the amenities and facilities of sports, entertainments and relaxation. The project has a very low foot print of 22 per cent in 13-acre land, which is predominantly well-landscaped. These 3BHK (three Bedrooms, a Hall and a Kitchen) apartments are aimed at the higher middle class and the affluent society.

Mr Jagadeesh Babu, developer and proprietor of Sankalp group, strongly feels that these projects cater to the aspiring, empowered young home buyers and NRIs (non-resident Indians) who buy either as an investment or for their parents (respondent no. 42). Though he stressed the importance they are giving to the culture, climate of Mysore, their advertisement and brochure suggests their emphasis on an international

lifestyle (Sankalp, 2009a). The whole project, conceived and designed by a Singaporean architect, an expert in high density luxury apartments, has been effectively used as a promotion tool. In the front along with the aerial view of the project, they have pictures of Mysore Palace and Singapore skyline (Figure 5-1). Closer inspection clearly shows there is no relation between the Mysore architecture to the proposed scheme and as emphasised in their promotion, it truly reflects ‘the international style’ in the sense that this project could be implemented anywhere including Singapore.

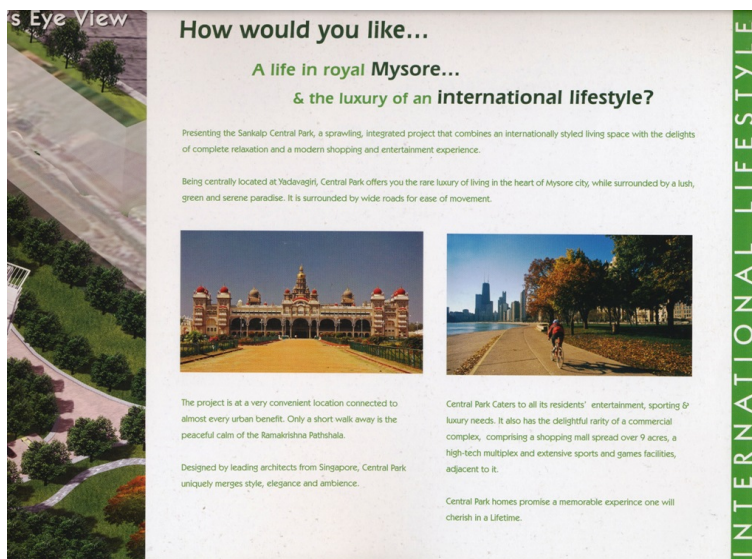


Figure 5-1. Promotional Brochure: Sannklap central park

Another example is from Sree eco tech private limited (EcoTech, 2011). This 45-acre development is proposed about 30 minutes drive from Mysore. They have proposed technical features as vaulted roofs, exposed soil block walls, an ingenious rainwater harvesting system and optional solar lighting (EcoTech, 2011). This project proposes many sustainable features and according to the developers, many people are showing interest in these projects.

The requirements of home buyers indirectly gets reflected in their advertisement as the first sentence starts as “... township that combines world-class infrastructure with traditional health-system facilities” (EcoTech, 2011). Further emphasis of (mention)

Walling, gating, security (24x7) in the first three sentences clearly reflects the requirements and concerns of the homeowners.

Proximity of these townships plays a crucial role while finalising the house location for the middle classes due to poor infrastructure and transpiration link. Rakesh Jain, architect of this project, acknowledges this concern and feels it is still in infant state. While understanding the demographics, he mentions that most of the home buyers are from Bangalore and they have bought it mostly as a property investment and do not intend to stay here (respondent no. 62). Not many people from Mysore have purchased plots and are planning to move in to this township. This is a major concern in any real estate development in India as plot and property are considered as the safe and best investment and this will have a negative impact on the neighbourhood.

Architects have effectively used the climatic condition of Bangalore while designing the outdoor and semi-outdoor spaces. According to them, these spaces are designed to be effectively used for different activities throughout the day.

These projects and similar ones coming up near Mysore, work purely by being away from the city and would not be feasible to repeat for middle class homeowners in the city area. The project also has larger land cover compared to the dense development in the urban area. The key dimension of sustainability, economy, is not adequately addressed, which makes these projects not affordable for middle classes. In spite of all these it caters to hardly few hundred households compare to the 800,000 Mysore population.

Homeowners' values and attitudes are discussed in chapter 2. One of the key concerns expressed by homeowners during the fieldwork is safety and security and that was quoted as a crucial reason for moving away from the traditional typology to a gated individual property. Furthermore, middle class homeowners expressed ensuring safety and security as some of the reasons for gating their property and were unanimous in choosing a gated community as their most desired housing typology. Since the aim of this research is to understand their aspirations while developing

sustainable housing strategies, this section examines the concept and relevance of gated communities for middle classes.

5.3 Gated communities

It can be argued that globalisation has in many situations accentuated the difference between the rich and the poor. As a result, a very high section of society has the spending powers, which essentially insulates them from the rest of the world in general and the poor in particular. When we look at the fragmentation of society, there are a number of factors which influence the selection process of middle class homeowners. Infrastructures, whether they are for legal, energy or maintenance purposes, were mostly not provided for at all in developing countries like India at any given time.

Crime and violence, along with issues such as material inequality and racial, ethical, class or cultural divisions on one hand and failure of the local government to cater for the needs of the cross-section along with the market strategy of the land developers on the one hand and promoters on the other, has inspired the middle class and upper class to opt to live, work and shop in the privately guarded, security conscious fortified enclaves (Jayne, 2006).

The gated communities are contemporary phenomena, which saw their inception in the USA as the American dream of owning a larger home in the suburbs on a smaller parcel of land. These gated communities saw rapid growth in the 1980s and were extremely popular for the notion of exclusivity and the sense of security they have created among the middle and upper class people of America. According to Low, these gated communities fulfil the dreams of middle class Americans by protecting their family from danger and crime, yet provide open and friendly neighbourhoods (Low, 2006). The concept of gated communities is fast spreading to other parts of the world for similar reasons and is influenced by regional contextual values and concerns.

5.3.1.1 Defining Gated Communities

Cities are failing to provide the basic necessities for civilised life, notably physical safety. According to David Boaz, the rise of communities that increasingly rely on their own, private services is a peaceful but extreme response to the failure of big governments (Nicolaidis and Wiese, 2006). According to Edward, gated communities are residential areas with restricted access such that normally public spaces have been privatised. They create physical barriers to access and privatise community space, not merely individual space. The new developments create a private world that shares little with its neighbours or the larger political system (Nicolaidis and Wiese, 2006). At built environment level, the walls and gates are visible barriers that have social and psychological as well as physical effects. In practical terms, gated communities restrict access to streets and thoroughfares (Low, 2003, Sonia et al., 2010). They include new developments and older areas retrofitted with gates and fences, and they are found from the inner cities to the exurbs and from the richest neighbourhoods to the poorest (Blakely and Snyder, 1997).

The most encompassing and widely accepted definition by Blakely and Snyder defines gated communities as “walled or fenced housing developments, to which public access is restricted, often guarded using CCTV or security personnel, and usually characterised by legal agreements, which tie the residents to a common code of conduct (Blakely and Snyder, 1997).”

The primary function of gating, to secure and protect homeowners, has been achieved in different ways including walls, fences with secured entrance (Low, 2006). Recently, technology is being used for security in the form of alarms, guards, closed-circuit television (CCTV) security and card-controlled access (Sonia, 2010, Bagaen and Uduku, 2010, Bagaen, 2010).

According to Karina, the reasons for the growth of gated communities are “crime, the fear of crime and insecurity; the search for a gated sense of community identity, place and belonging in cities; the search for increased privacy and control, both

economic and social; a specific lifestyle; status, prestige and elitism; and a growing lack of trust and confidence in the performance of local councils” (Karina, 2010). Although research clearly suggests the fear of crime as the main reason for the homeowners to flock to gated communities, causes for the arrival of the gated community could be classified into structural and subjective. Economic, social and political concern results in structural reasons. The rise of insecurity, government’s inability to address the concern of the middle class homeowners’, social inequalities, and the process of social polarisation on one hand and wrested interest of developers to promote gated communities as activities of new international trend and novel American dream along with speculation of property value appreciation on the other, could be attributed as reasons for middle class homeowners’ preferring the gated community (Sonia, 2010).

The subjective reason deals with the attitude and aspirations of the homeowners and looks beyond the basics of safety and fear. According to Sonia, desire of better lifestyle, search for social homogeneity, status and exclusivity including avoidance of city problems are the crucial attractions of gated communities (Sonia, 2010). It is the desire and motives which influence relatively different income group towards gated communities. Scholars have identified other factors like sense of order and cleanliness, high quality services, limiting social contact with strangers and through traffic, as reasons for homeowners to opt gated communities (Alan, 2010). In one sense, gated communities are the ‘privatisation’ of community taking control for security away from the state and controlling this directly. In a similar way to the Ecovillages it brings together like-minded people , who in this case share similar levels of economic success and aspiration.

The need for security of the middle class homeowners is further reinforced by the news and media coverage of everyday events, which aggravates the fear of violence and terrorism (Low, 2003). Some scholars argue that “gating is an overreaction to the real level of crime in an area compared to the perceived level of crime” which is influenced by the media coverage in the USA (Atkinson and Blandy, 2006).

Economics, along with private consumption and governance, shapes the gated communities (Georg, 2005). In her research about status consumption pattern in the less developed countries Tuba looked at these gated communities as more of a status consumption and in the case of Ankara, Turkey, she argues that moving away from the city towards a more expensive gated communities was primarily to protect people from the fear of crime and insulate them from the city and the poor people they had left behind. The middle class homeowners use these gated communities to construct a new lifestyle, and it has been a crucial part of status expression (Tuba and Douglas, 2010).

There are scholars like Barton & Silverman, Blakely & Snyder, Nelson and McKenzie (see (Eran, 2004)), who argue that these gated communities – also known as common interest communities – are driven by the mutual interest of developers, government and homeowners. Developers are interested as it benefits them with high profit; the government is interested as this helps it to privatise infrastructure and reduce public cost. Homeowners find it attractive as they can control their neighbourhood character and aesthetic and for the provision of recreational amenities and community services (Eran, 2004).

5.3.1.2 Requirements, Types:

Though the gated community was an extreme response to the failed performance of government (Nicolaidis and Wiese, 2006), in America, it is not only security but other issues like recreation and lifestyle which attracted the affluent to gated communities. Along with security zone communities, Blakely and Snyder have identified two other types of communities, namely: lifestyle communities and prestige communities.

Security zone communities have been set up in response to the deteriorating feeling of security. In this case, the gate has a more practical function of enhancing the sense of safety, and often is set up by residents rather than by developers (Blakely and Snyder, 1997).

While analysing ‘the psychology of gates, security and fear’ Minton, discussed the notion of security and how high walls and gates psychologically provide a sense of security for people and thus a demand for gated communities (Minton, 2009).

According to Bagaeen and Uduku, fear and privacy have influenced the development of gated communities. Paradoxically, Simon Ashwell feels that despite the obsession with security, fear of crime is not the main reason for people to live behind gates.

According to him, it is a more abstract sense of psychological security which contrasts favourably with the unstable external environment (Minton, 2009). Apart from fear of crime, there are aspirational motives, such as the perceived exclusivity of gated communities, which is perceived as attributes of social status that gated community life can ascribe (Bagaeen and Uduku, 2010).

Lifestyle communities are the club realm of common interest. Here the gate serves to define the division of services within and outside the place. Prestige communities are the product of social differentiation. Here the gate is more symbolic, marking the quality of the environment. (Purely residential and thus, defining the boundary of service is not an issue).

The concept of gating is beyond physical, and Brunn (2006) has mapped them as, gated communities, gated lives, and gated minds. Gated communities are the physical areas with restricted access protected by gates and a range of other security measures. Gated lives are people living in gated communities, which also include those who live separated or segregated lives based on fear or problems related to ‘fitting in’. Finally, gated minds are the individuals who portray minds or behaviour that is full of barriers or gates that separate them from others around them, including characteristics such as dislike, hatred and contempt for others (Brunn, 2006). Brunn points out that these relations are not straightforward and they are overlapping. His work raises the important question about the relationship between the social space (gated minds) and physical space (gated space).

5.3.1.3 Contextual variation:

While moving from the original North American model, there are specific conditions that take place in developing countries such as South America, Africa (South Africa especially), which means GCs have an overtly defensive function. There is a difference between US and developing countries such as South Africa, Latin America and South Asia, which have shown fast economic development. In these countries, unlike in the case of America, the sense of security, social security and urban infrastructure has not been developed parallel to the economic growth and hence the primary objective would be to provide physical and psychological security among the homeowners unlike the recreational facilities of developed countries. Contrary to the requirements of developed countries, the reason for gating in Latin America is extreme fear of crime. In Mexico, concern for security and fear has changed the lifestyle of the residents with self-protecting behaviour and being vigilant in public spaces. In this context, the access controlled gated communities have become the norm rather than the exception, which provides all the services and amenities like recreation, shops, and offices (Diana, 2010).

In the case of Argentina, for example, there is a marked rise in the increase of crime rate between 1980 and 2000. Fear of crime is identified as the main reason for moving into gated communities. Economic liberalisation, privatisation of public companies and the attraction of foreign investment has promoted the development of gated communities, which varies from private security to exclusive services based on affordability (Sonia and MÓNica, 2010).

According to Uduku, the rationale for preference for gated communities in Africa and developing countries is different from that of America and Europe (Uduku, 2010). Though the option of choosing one's neighbours (community) is the prime motivator, in either case, class exclusivity is more important in the west compared to concerns for security in developing countries. In Africa and developing countries, homeowners are motivated by a perceived sense of security, followed by exclusivity and class cultural benefits (Uduku, 2010).

In the case of Lagos, the economic capital of Nigeria, housing states are developed with walls and central entrance gates. Another type of visible development is the use of the gate as a roadblock. Residents use double fortification of a gate as a roadblock and the gating of individual houses. Various levels of security reflect the owner's wealth and income. Being the most dangerous city of Africa, residents pay to have private security guards at the estate entrance (Uduku, 2010).

In the case of Saudi Arabia, expatriate professionals and their families usually prefer gated communities. Though safety was the prime reason for gated communities in Lebanon during the civil war, it changed drastically and the focus has shifted to provide a 'modern global environment' in the post war era (Bagaen, 2010). A similar trend can be observed in Indonesia, where security has been the issue because of racial tension, whereas recently, exclusivity has become the primary concern followed by stability with least importance given to a sense of community (Bagaen, 2010).

5.3.1.4 Indian perspective

Though lifestyle and prestige replaced by crime and security are the criterion for the development of gated communities in the developing world, India is sandwiched between the requirements of the safety, security and expression of prestige and affordability. Among many benefits of globalisation and economic boom, India is now tapping into the NRIs as a potential resource. There is an evident interest from these NRIs to participate in the glory of flourishing India. India has benefited from the short-term visit of these NRIs in the hospitality industry and real estate is growing from their long-term investment. With the current economic conditions, career and economic opportunities and the desire to be closer to family are attracting many NRIs to return to India for good (Wadhwa, 2009).

Though India is progressing and developing very fast, its benefits have not reached the cross-section of people on one hand (Das, 2006) and it has failed to provide the

basic infrastructure and services along with civic amenities including security for the common man. India still has predominantly poor people with an empowered, recognisable middle class, and few but very rich people (Saavala, 2003, Sridharan, 2004), who are shaping the requirements of the housing.

Due to the lack of infrastructure and affordability, it is the security – physical, social and psychological – which forms one side of the coin and the affordability of the middle class and the affluent (Sengupta, 2008) and their changed attitude and aspiration to express and distance themselves from the ‘others’ forms the other face of the coin which shapes the housing typology of the middle class homeowners of India.

5.3.1.5 Significance

Exposure and awareness of the benefits of these gated communities and the ground realities of urban social and civic concerns have been the driving force for the middle class and the affluent Indians to select the housing typology. In spite of economic success, the local bodies have failed to provide the basic services and utilities. Homeowners are more concerned about services and utilities while selecting their house. For instance, the poor services, utilities of the city: poor water supply and power supply for the residents, unsafe play areas for the children, and unsafe pedestrian ways, have forced the homeowners to find their own solution.

Further, along with concern of stray dogs (Misra, 2008) on one hand and petty thefts (Property, 2008) by chain snatchers on the other hand, have forced the people to consider an alternative housing typology which could provide them with all the facilities and more importantly emulate the ambience of the developed country to which they aspire.

In this context, these gated communities of India are a strange combination of emphasis on lifestyle and also attending to the basic needs and concerns of the people.

5.3.1.6 Features

In India, these gated communities are usually located on the periphery of cities (Outlook, 2008) and are very well-maintained inside the gates. They are mostly known for the facilities they provide and they invariably come with security, power back up, sanitation services and a children's play area (Property, 2008).

The high end of the gated communities which caters for the upper or more wealthy classes, provide facilities like a swimming pool, a clubhouse, a badminton court, a tennis court, a gymnasium, and a health club. Gated communities also come with the luxuries of five-star hotels such as well-manicured lawns, golf courses, cricket pitches, jogging trails and shops (Outlook, 2008). In some cases, the facilities go to the extent featuring an international school, a man-made lake (PTI, 2008, Anjali, 2008), and some even have a helipad, which is used for a helicopter shuttle service to the airport, and doubles up as an emergency service (PTI, 2008). In India, these gated communities are the epitome of comfort and luxury and as one author points out, "it has the convenience at a press of a button and a scan of your finger tip" (Anjali, 2008).

5.3.1.7 Historical Context

The concept of defining the boundary and securing the territory can be traced from the Vedic Age, where the city was planned based on a different typology to suit the geography and requirements with the common factor of fortifying the city from external threats (Gowda, 1972). These cities also reflect the division of the people and their housing based on the social class. This concept can be traced even to villages and group of houses, where the boundary was well-defined by the wooden posts and beams known as vedikas and entrance, Torana, which influenced the torana and vedika of Buddhist stupas and furthermore in terms of the Gopuram and courtyards of temples. These external spaces have also found its significance in the later Islamic architecture in terms of elaborate doorways (Darwaza) and an emphasis on landscape in the foreground of the building (Tillotson, 1998). This strong

influence of religion and culture supported by climate has played a crucial role in shaping the transition space of the dwelling's elaborate entrance details.

As the houses were sited based on the social requirements unlike the economic affordability in today's context, there was an invisible line defining each of these social groups and their residences, which were known as mohallas in the city of Mysore (Parsons, 1930, Mahadev, 1975). Zooming further down leads us to one of the housing typologies known as vatharas. Vatharas are a group of houses within a compound, where they have individual habitable spaces but share toilets and courtyard space (respondent no. 23). They are usually enclosed by a compound and this used to be one of the typologies used for joint-families with one defined entrance for all the houses within the compound providing security for the residents along with a degree of privacy (respondent no. 29). The spatial organisation of these entities was clearly a reflection of people's requirements, social activities and climatic condition.

Although this sustainable housing was climate responsive and culturally rooted, it had its own drawbacks. Due to party walls and shared facilities, people felt a lack of privacy and concern for light and ventilation. The reconfigured family system which moves away from a joint family to nuclear family and the parallel introduction of plotted development in post-independent Mysore, has forced people to aspire to an independent house. This particular case of moving away from vernacular housing to plotted development has been the general feature of post-independent India (Prasad, 1998).

5.3.1.8 Current context

The social dimensions had dictated the housing typology of pre-independent India, and it was clearly the guiding factor in the housing fabric. There is a distinct shift from social, family-based housing to the economy-based typology.

There are many concerns of middle-class people in the city. Important ones are: sporadic water supply (once every three days); power cuts (only six hours of power per day), in most of the areas across the city and further acute shortage in summer (Property, 2008); everyday civil problems such as uncollected garbage and security fears of break-ins and the constant intervention from salesmen (Misra, 2008). The middle classes are concerned that they cannot walk freely because of stray dogs and chain snatching (bag or purse snatching) incidences (Misra, 2008). Unfortunately, the priorities of local authorities are totally different and they are faced with the major task of providing basic services and minimum facilities for the poor.

Middle classes are fed up with the problems of the city, and they are not in line with the philosophy of the sovereign state of India, which still believes in the socialist model (Misra, 2008). Contrarily, middle classes have moved away and do not follow the policies of the government and do not bother to support the community outside. They have secluded themselves from the urban mess and are concerned that the government is not protecting their interests (Varma, 2007). As Narayana Murthy, founder chairman of Infosys, said: “if the government fails to provide, people make their solution” (Anjali, 2008). If gated communities are the known place for NRIs, lifestyle and prestige statement for the affluent, it is the basic concerns of urban life which have driven the middle class Indians towards gated communities. More importantly, according to the residents of these gated communities, middle-class people did not embrace these places out of choice but out of force (Misra, 2008). It is the basic services, facilities along with basic requirements which have attracted them here.

According to Payal, living in gated communities is the secession of middle-class people (Payal, 2008). Most of the people choose to live in gated communities so as to fulfill their requirements of controlling their environment (Misra, 2008). And they protect themselves by having an impenetrable territory. In a way, the Indian model is a contrast between global living inside and ordinary outside (Anjali, 2008, Miranda, 2004).

Though gated communities start with the basic requirements, they have been conceptualised, promoted, and advertised as high-end havens for affordable upper-middle class residents. The advertisements show luxurious finishes, and the gated communities are projected as classic houses with a white finish to reflect their elegance (Elizabeth and Paul, 2009). These gated communities are constantly promoted as a symbol of a high-class lifestyle, are internationally designed by international architects and promoted as a world-class community with a superior civic infrastructure (Outlook, 2008). To emphasise this luxurious element further, they are given famous names and addresses such as Hamilton Court, 10 Downing Street, Beverly Hills, Orange County and The Acropolis (Outlook, 2008).

Their claim of a healthy social life is addressed in a strange way in these economy-driven communities. In a way they address the complicated mix of social and cultural practices as these gated communities promote and celebrate Halloween and Valentine's day which were never heard of a decade ago (Outlook, 2008). In the wider context, Indian cities and the residents neither face the challenges and crimes as do Nigeria or Latin America to be concerned about security, nor do they have the infrastructure and services to live effortlessly in the suburbs unlike America.

In this context, it can be concluded that the gated communities of India have been pushed to the foreground by the developers as an alternate housing typology for their gains and NRI and affluent people look at these projects as an investment opportunity and a good place to live. On the other hand, the upper-middle class homeowners opt for these communities for the sense of security it provides for the family as well as its provision of basic facilities.

5.3.1.9 Implications _ Sustainable concerns:

The positive implications of the gated community are evident: they provide psychological comfort with the opportunity for social interaction with selected people. This concept has its own negative implications. These community residents remove themselves from public political life. They have least empathy for the people residing beyond their walls that increases the development of gated minds and show least interest in the democratic system, and this is not healthy in the larger interest of society (Alan, 2010). These gated communities are governed by societies with social values unlike those which shaped the communal living which were socially sustainable. This legal framework invariably weakens the social ties and the prevailing research suggests that most of the homeowners are not aware of these implications before purchasing and staying in these gated communities.

The homeowners of these gated communities, who have distanced themselves from the city's issues and concerns, would not be interested in the locals around them, leading to the social inequality and an unsustainable pattern of land distribution (Guy, 2006). Furthermore, the expanses of gated communities mostly happen on fertile land and locations, which demand a large and expensive network of services and infrastructure to serve these new urban areas. This linear growth also undermines the protection of the environment and increases the carbon emissions as a consequence of expanding motorways and the intensive use of private transport (Sonia and Mónica, 2010). However, some scholars have argued that gates produce a sense of community and belongingness due to common interests and similar experiences (Luigi, 2010). Luigi's study proves that the physical barrier of gating adversely affects the relationship with the wider neighbourhood. These gated communities do not encourage social interaction and integration with the social groups living outside the gate.

These gated communities pose a negative impact for residents both inside and outside. These gated communities force the society into a two-tier system: the

‘haves’ being separated spatially, socially, intellectually and economically from the ‘have nots’ (Evan, 2006).

Gated communities exclude children from outside the community. Furthermore, if one looks at the larger interest of society and the city, these gated communities are safe for some but not for many. This is not good for the nation as residents of these communities are not interested in the larger interest of the nation. These gated communities may have some environmental benefits but would have an adverse affect in terms of social contrasts and economic impact. These gated communities are bubbles isolated from each other and larger urban areas and they lack being part of the big picture in terms of sustainable regional development strategies.

This section has identified different parameters encouraging homeowners to opt for gated community living. Furthermore, in the case of constraints to live in a gated community, homeowners have resorted to the other extreme of a walled plot. The underpinning factor for their choice is concern for their safety as well as socio-cultural values. The complex socio-cultural practices in India have greater impact on sustainable housing at the exterior of the houses and spaces between the houses and in front of the house.

The notion of security, privacy and aspirations needs to be addressed. Expressions of wealth and affordability are intertwined in the fabric of middle class housing. It would be too simplistic to isolate security from other factors as it would not provide effective strategies for sustainable housing. To narrow the research question and identify the focused research area, the next section examines the significance of boundary conditions and transition spaces.

5.4 Boundary conditions and Transition space:

After globalisation and economic liberalisation, housing master plan layouts evolved radically. The first fieldwork study and earlier research clearly demonstrates that an affinity to communal living has been replaced by the importance given to location, affordability and proximity to amenities by the middle class homeowners. With an emphasis on economic mobility householder members are increasingly likely to co-exist among unknown neighbours from different social, cultural and regional backgrounds. A fluid set of social and cultural boundaries at neighbourhood level, has been replaced by more tangible, clearly defined physical boundaries, defining individual territory.

Mysore, like most Indian cities, is also influenced by land value and multi-storey development. Visual documentation during the fieldwork reflects the morphology of housing pattern in the central part of Mysore. Figure 5-2 shows a representative street pattern. The 'Jagali' house in the centre of the photograph was built before 1940 and clearly reflects climate responsive design and construction. There is no boundary between the road and the main door, with an informal seating area in the front. The second house on the extreme right, built around 1980, shows some continuation in retaining part of the Jagali, whereas emphasis is to use the maximum available plot and expand vertically and build two storey houses. There are signs of moving away from climate responsive socially inclusive houses with use of larger openings with less space left outside for social activities.



Figure 5-2. Phases of development

More recent development as reflected in the house on the far left (Figure 5-2), reflects prevailing design values. Though the street is just 7 metres wide, the house is three storeys high and more than 11 metres tall. There is a clear demarcation of boundaries. Emphasis is on privacy and the high wall along the street edge clearly reflects the demarcation of private space from the street. Open space is the minimum space enforced by building regulation. In this typology, there is a clear disconnect from the street and its surrounding community.

The issues related to housing are complex and multi-dimensional. To find a practical solution and to work with a bottom-up approach, a focused study area is chosen which is most representative of the majority of issues involved in both housing and sustainable agenda. Furthermore, this is the area, where there is a clear move away from the prevailing sustainable strategies to a more European model plotted development.

The literature study and first set of fieldwork feedback clearly demonstrate the significance of transition space in house and in the climatic condition of Mysore, which is most congenial for outdoor activities and thus the space and activities are

community-oriented. Furthermore, the culture of people to extend Jagali as the living space of their house also reflects the significance of social and cultural impact of transition space in houses.

The first set of fieldwork clearly demonstrated that these boundary conditions and activities around these spaces have changed and moved away from sustainable strategies, among many changes and developments. The issues related to boundary and transition space are complex and multi-dimensional. This not only reflects the economic and political scenario, it also demonstrates the aspirations of the people. Boundary condition and transition spaces are examined more closely before concentrating on a focused study area.

5.4.1.1 Transition spaces

Transition spaces have been an important part of the house since prehistoric times. These spaces play a crucial role in the built environment as social, cultural, climatic and spatial aspects of transition spaces overlap with sustainability agendas. Understanding of transition spaces cannot be limited to mere materiality of the space and its components. It has to be looked into beyond material as visual, functional, social, climatic, and psychological interpreter of one's needs and aspirations. This is shaped in response to cultural and social requirements of the people on one hand and as a climatic modifier along with other static issues such as laws, regulations and security on the other.

As with any location, in the case of India, while unfolding the country's socio-cultural aspects, one stumbles upon the notions of family, and that of enclosure, which plays a crucial role in understanding the notion of transition spaces. This study intends to overlap the understanding of the universal notion of transition spaces and socio-cultural attitudes of Mysorean middle classes and in the process unblock the elements from the study of Mysore and identify the key elements which are critical to the process of sustainable built environment.

Against this background, it is intended to explore further the meaning of boundary, the understanding of the notion of boundary, its different dimensions and to contextualise it in the Indian perspective.

5.4.1.2 Defining the Boundary

“[T]hat’s what I feel, an outside and an inside, and me in the middle, perhaps that’s what I am, the thing that divides the world in two, on one side the outside, on the other the inside, that can be as thin as foil, I’m neither on one side nor the other, I’m in the middle, I am the partition, I’ve two surfaces and no thickness” Samuel Beckett (Georges 2008).

Boundary is considered as the first step of human intervention in the physical landscape, which guards the practicality of individual life, and which can define a space of relative permanence. The composition of boundary and threshold, whether real or metaphorical, a structural component or a spatial configuration, is an issue for architectural theory and practice.

“Boundary” is defined as a line which marks the limits of an area; a dividing line (Hoad, 1993). It also means “that which bounds, divides or separates,” (Gove, 1961) or “something that indicates a border or limit” (Morris, 1969). The term boundary could be used in different dimensions. In the case of the physical landscape, it is used/defined at various levels of granularity. For instance, it may be used to describe the shape and size of individual plots; in others, it may be used to describe the configuration of much bigger units, such as urban blocks, census tracts and districts (Rashid 1998).

In architecture, the boundary is represented by the façade, the entrance, the wall, the window, the door, the threshold, the perimeter of a site or area, a building’s footprint or volume. In city planning it takes the form of roads, canals, hedges, gates, walls, signs or built structures, or simply a dividing line of water and land, prairie and forest, plain and mountain (Blaisse, 2009).

In the social context, the boundary defines the manner in which the individual and collective come together in the world of action. The character and disposition of boundaries signal our relationship to the world outside, or how we perceive our relationship to nature (Rashid, 1998). Boundary plays a crucial role in defining security both in the physical and symbolic sense. According to Reinhold Niebuhr “the fence and the boundary line are the symbols of the spirit of justice. They set the limits upon each man’s interest to prevent one from taking advantage of the other” (Niebuhr, 1943).

5.4.1.3 Dimensions

The notion of boundary has been interpreted in its literal dictionary meaning by scholars such as Suzanne and Kennedy (2004), who have argued that boundary could be viewed as a resolution of a specific tension that exists on either side. Suzanne looks at the tension prevailing at different levels: between individual and family, between family and community and between community and individual (Suzanne and Lennard, 1977).

The nature and treatment of boundary condition has altered drastically. Traditionally, jagalis acted as the in-between space between interior spaces and the exterior community. This invisible boundary was in response to the homeowners’ socio-cultural requirements.

For the modern house, the windows are considered part of the boundary. The window was originally a device to allow light to penetrate, to breach the boundary. This reveals the way in which the inside and the outside are interconnected or related. J.Hill, referring to Le Corbusier, considers the house as “a mechanism for viewing” and, referring to Mies van der Rohe he considers the window as a way to make the context perceived in a designed or conscious way (Hill, 2006).

Though spatial proximity plays a crucial role in the built environment, according to Rashid (1998) relation does not depend on spatial proximity only. Intervening boundaries could be effectively used to either stretch or dissolve the distance. This is useful while creating unity out of diversity in public spaces. Proper use of boundary is critical as an over defined boundary may be as harmful as a lack of boundary.

According to Rapoport (1982), urban form may be considered, at least partly, in terms of the articulation of boundaries — i.e., which elements or domains are linked, and which separated; and what barriers or rules define their levels of interaction, inclusion or exclusion. The significance of boundary and continuity of elements are echoed in the writings of Krieger: *“Making boundaries is akin to stabilising the city so that its virtues remain across generations rather than seeming to be temporary, not like those houses that gather feet and go away. So create edges and boundaries. Make them very strong. They are akin to making a defined environment, a series of places of stasis which, in all of our cities, are the places that we most enjoy and love”* (Krieger, 1991).

5.4.1.4 Spatial organisation

“A door is a door is a door. Or is it? Could there be something more to entrances than the functional division space? From time immemorial, the door has acted as the boundary of mankind’s protected and secure sources of food, shelter and warmth. Beyond lies the outside world, with its unknown dangers. Every door is at once a boundary, shutting off one area from other, yet it is also a connection between outside and inside. Part of the mystique of doorways is that they are in-between places where the inside and outside worlds come together, where private and public meet, where the known and unknown conjoin. The unexpected knock at the door can change lives forever” (Slessor, 2002).

While performing as a barrier to limit and protect one's territory, boundary also enables interaction among the members of the society and built environment. As Arendt has argued, "to live together in the world means essentially that a world of things is between those who have it in common, as a table is located between those who sit around it; the world, like every in-between, relates and separates men at the same time" (see (Rashid, 1998)). Though on the one hand, the permanent visible presence of the boundary separates and protects people from falling onto one another, on the other, it allows for a unity, because separate individuals can relate to it and thus create a common world out of difference.

The necessity for apparent separation for the purpose of bringing together perhaps finds its first expression in the Sophist, where Plato wrote: "The isolation of everything from everything else means a complete abolition of all discourse, for any discourse we can have owes its existence to the weaving together of forms" (see (Rashid, 1998)) We can find a similar theme in the Timeaus, where Plato identified similarity and differentiation as two of the three basic elements out of which the whole universe is created (see (Rashid, 1998)). Thus, for Plato, the demarcation of the boundary became an important act in his ideal city.

The role of boundary as a unifier is well-described by Arendt in his writing: "What prevented the polis from violating the private lives of its citizens and made it hold sacred the boundaries surrounding each property was not the respect for private property but the fact that without owning a house a man could not participate in the affairs of the world because he had no location in it which was properly his own. . . . Even Plato, whose political plans foresaw the abolition of private property and an extension of the public sphere to the point of annihilating private life altogether, still speaks with great reverence of Zeus Herkeios, the protector of borderlines, and calls the horoi, the boundaries between one estate and another, divine, without seeing any contradiction" (see (Rashid, 1998)).

In the Indian context, like elsewhere, the development of traditional architecture and its spatial organisation was in response to the climate and the requirements of the people. One of the resultant outcomes is enclosure of a different nature.

Elaborate doorways are a hallmark of Indian architecture. This practice can be traced from the torana and vedika of Buddhist stupas and further in terms of Gopuram and temple courtyards. Entrance ways has also found its significance in later Islamic architecture in terms of elaborate doorways (Darwaza) and emphasis on landscape in the foreground of the building (Tillotson, 1998). This strong influence of religion and culture supported by climate has played a crucial role in shaping the transition space of the dwelling's elaborate entrance details. As Prasad has argued, the street was considered as part of the house and most of the activities were conducted in these transition spaces (Prasad, 1998).

Like temples, the main sanctuary is very small space and it is signified by the elaborate details around and the entrance ways. As the street was considered as part of the residence, it was connected to the residence in all respects. The street was maintained as part of the house, used for playing and drying household items. As these streets were narrow, it was efficient in sheltering the semi-covered areas and the street itself for most of the day.

A close look at the entranceways unfolds different spatial and functional activities. Apart from providing shade to the street, these buildings provide public (semi public) space to sit. Importantly, there was no physical boundary differentiating the houses unlike modern plotted development, whereas there were many architectural devices on the house front which activate the transition space between the house and the street.

According to Sunand Prasad in a typical Indian house we can identify most of these elements on the interface between building and street (Prasad, 1998): 1. The raised platform makes clear separation from the street while allowing a flexible degree of

interaction with it. 2. Square platform of seat size. 3. Entrance arch. 4. The chajjas. 5. Balconies, galleries. 6. Niche in the wall for lighting.

One can easily relate these elements in the case of Mysore. Due to climatic requirements, sloped roofs with terracotta tiles have replaced balconies and chajjas. Based on the house typology, we can find the raised platform known as Jagali or square platform in front of the main entrance door and a niche in the wall for lighting.

These climatic modifiers and social interactive spaces have changed drastically in the post-colonial housing layouts. Now streets are much wider to accommodate cars and buildings are set back from the street edge. Most importantly, the entrance door is not interactive with the street and is located independently of the street and surrounding site.

5.4.1.5 Social aspect

The pre-industrial (early years of the twentieth century) architecture of India served the physical and spiritual needs of the people. At a physical level, it demonstrated the understanding of the local climate, available material and construction techniques. Doshi has argued that “at the spiritual level, the built-form conveyed total harmony with the regional lifestyle in all its daily as well as seasonal rituals, unifying the socio-cultural and religious aspirations of the individual and the community” (Ameen, 1997). There are cultural and aesthetic expressions which can be identified as distinct and belonging to a particular social entity. There are social values and customs which find expression in the lifestyle, costumes and architecture (Ameen, 1997).

Many sociologists and social anthropologist have discussed the significance of socio-cultural issues in the built environment. Amos Rapoport has highlighted the importance at city level, while Suzanne and others have discussed these issues at the neighbourhood and individual dwellings level.

Rapoport suggests that the choice of which boundaries to use and how to arrange them in different physical domains demands an understanding of the prevailing socio-cultural system and its behavioural, spatial and symbolic components (Rapoport, 1977). According to Rapoport, to understand the status of the physical boundary in the landscape of contemporary cities requires an understanding first of the basic socio-cultural and socio-political dimensions of these cities, and then of how these dimensions are realised in spatial forms (Rashid, 1998).

When we focus on a neighbourhood, the boundaries are not limited to physical aspects but could also be visual or psychological. According to Suzanne, at the family level we can experience boundaries at two levels. First, at micro level it is about an individual and the boundary is more of privacy and interaction from and with family. This could be as simple as a pool of light falling on one's reading chair which gives privacy for one's reading area to most specific one as a wall defining one's room. At the next level is a dialogue between an individual, family and others (Suzanne and Lennard, 1977). Here boundary is experienced in its thickness, imperviousness and distance from family spaces.

The feelings that the family has about its orientation toward its neighbours and its neighbourhood may be expressed by the orientation of the front door (toward or away from the street) and in the relationship between the house itself and its neighbourhood (attractive or exciting places nearby). Boundary plays a crucial role in defining the sense of comfort for visitors and strangers. It is the spaces, the transition before entering the house, which defines the nature of the space. As Suzanne has identified, it puts people in an emotionally difficult experience, in the process of overcoming obstacles and looking for clues (Suzanne and Lennard, 1977), which leaves the visitors with a thought process of reception and hospitality by the owner (Kennedy, 1953). According to Suzanne, one would have a (unique) experience based on the way the transition is accomplished in the processes of crossing the boundary (Suzanne and Lennard, 1977).

In the Indian context, the experience of transition of spaces and their usage has changed drastically over time. The Indian peasant works outside and also performs many personal activities outdoors including socialising because of the relative mildness of climate. Thus climate reflects the lifestyle of the place. The external spaces surrounding a dwelling are used as extensions of the house and the distinction between 'outside' and 'inside' gets blurred. Private activities are performed in spaces that are semi-public in character (Pramar, 2005). In the earlier layouts (mohallas), the street was very much part of the house and used as a multipurpose area like the courtyard inside the house. During special occasions like weddings, the social quality of street was intensified and acted as a communal courtyard where the whole city becomes the house (Pramar, 2005).

As Sunand Prasad has identified, nowadays there is a difference in the way the house is positioned. Now the house expresses itself as an object, where the wall, a gate and a nameplate will mark the edge of the street. The car on the drive glimpsed through the gate is an essential part of the scene. Moving away from the earlier strong social interaction, the house now makes no functional contribution to the public realm (Prasad, 1998).

In the case of Mysore, social interaction is evident in the earlier housing typology. The street was effectively part of the whole scheme where the semi-open space overlooked these streets and these semi-open Jagalis and the building itself were used to protect and shelter the people moving on these streets, which was more welcoming. Like most of the Indian cities, even at Mysore, now the housing typology has changed drastically; roads are independent of houses and thus in the social sense it is detached from the individuals' activities.

5.4.1.6 Psychological aspect

In the cultural ambience of India, the concept of threshold and boundary has plays a crucial role. It is being effectively symbolised in several ways including religious rituals, mythology, paintings and literature.

The concept of boundary or threshold has been deliberated beyond the physical entity as the edge of the town at a larger scale or as an entrance at a smaller scale. It is extended to the in-between dimension such as dawn or dusk. Reflections of these are evident in the associated activities and rituals, which are connected with the mornings and the evenings. A representative example of these is the activities which take place in the transition spaces at dawn or dusk (Jain, 1998).

At a global level, the metaphysical dimension of the boundary or threshold has been further elaborated to include other dimensions like belongingness and ethics.

According to Heidegger, the boundary is important because it marks the beginning of the sense of placeness. In “Building, Dwelling, Thinking,” he writes: “A boundary is not that at which something stops, but as the Greeks recognised, the boundary is that from which something begins its presencing” (Rashid, 1998). This sense of presencing, according to Heidegger, involved an act of differentiation between a specific place and a sea of unbounded, unlimited space, without which a phenomenological existence would have been impossible.

In contrast to Heidegger, in *The Human Condition*, Arendt defined the necessity of placeness from a political point of view. She proposed three distinctive features of the public realm with direct relevance to the sense of placeness: 1) that the public realm was where things or actions were made visible and accessible; 2) that the public realm was what everybody held in common; and 3) that the public realm was what allowed human beings to acquire a sense of immortality (Arendt, 1958). Points one and two express pragmatic conditions whilst the last is somewhat romantic.

In *The Philosophy of Symbolic Forms*, Ernst Cassirer wrote that “there can be no boundary independent of what it bounds – it exists only in the act of division itself, not as something which could be thought before this division and detached from it” (Cassirer, 1966). For Cassirer, then, the boundary is not a passive divider, but something intrinsically related to the object it defines. Such a view suggests that the problem of proper conceptualisation of the boundary is to be determined through the action which puts the whole in relation to its parts. Put another way, Cassirer’s concept implies that in physical-spatial domains such as the built environment, the problem of the boundary must be resolved with respect to various actions and processes incessantly occurring in these domains. Hence, any understanding of the built environment requires an exploration of how societies create the need for specific spatial concepts, and how these concepts are materialised through the creation of various types of boundaries.

Earlier, the demarcation of boundaries had been a matter of ethical responsibility. A new sense of morality was devoid of any kind of permanence and shaped by the social conditions of the place. As Rashid has argued, the boundary now denoted their real, distinct separation. This either led to the collapse of the physical boundaries, or resulted in the preservation of the autonomy of the boundary (Rashid, 1998). One way to disentangle the “ethical” from the “moral” may be to disentangle the “public” from the “social” — which, as Arendt would argue, is possible only by understanding the “non-private” part of the private realm, and without which, as John Locke has pointed out, “the common is of no use”. For example, in the ancient Greek world it was not the interior, but the exterior appearance of the “hidden” private realm which was important for the city, and which appeared in the realm of the city at the boundaries between one household and another [see (Rashid, 1998)].

In the Indian context, the street section of an *Agrahara* (or *mohalla*) provides physical as well as psychological shelter. These spaces overlooked by houses create an enclosure in which people feel psychologically secure. These spaces, defined and composed physically by different elements, also possess a symbolic function. The quality of these fronts would express the status and culture of the family.

5.4.1.7 The threshold

Though threshold is used as a synonym for boundary in architecture and the built environment, Walter Benjamin strongly opposes this view and sharply differentiates from border. According to him, threshold is a zone of change, passage, and ebb and flow are embedded in the word *schwelle* (to swell) (Georges, 2005). Benjamin goes on to explain how even the doorbell that reigns over the apartment gains its power from the magic of the threshold where a shrill sound announces that something is crossing the threshold.

Thresholds, like doors and windows, as well as devices that permit the bridging of space towards the exteriors can be considered as the markers of the boundaries. These elements separate and communicate either side simultaneously (Blaisse, 2009). (The former creates the condition of the latter). Michel de Certeau has focused on the notion of the “in-between” and “spaces between”, which creates a middle place. According to him, these middle spaces are the spaces where things can happen, a happening, a performance, an event or a narrative, for instance—an incident (Georges, 2005). The “spaces between” have the power to become symbols of exchanges and encounters.

To cross the threshold is to unite oneself with a new world. The degree of ritual necessary may express the degree of difference experienced by the family between inside and outside. Separation rituals include brushing feet, removing shoes, coat and hat and washing. Incorporation rituals include shaking hands and embracing (Suzanne and Lennard, 1977). From the outside, the boundary may also express the image that the family wants to communicate to the outside.

According to Laurent Stalder “The threshold separates the public and private sphere, private and common property and self-determined and over-directed action. As an architectural element or spatial configuration, it highlights historically specific, culturally determined zones of transition, in which certain gestures and activities are performed” (Stalder, 2009). These social and cultural aspects interwoven with physical facet define the threshold. This is well-argued by Georges, who says “walls,

fences, rivers, do not create a nowhere but a somewhere: that is, places that mediate. Borders, frontiers and thresholds are not abstract lines drawn on a map, or dotted markings on the floor, or strings pegged out between two points. Any limit or border has a mediating role, permits communication, and allows for passage. The limit articulates between things and beings, between one and another, between the limited and the limitless, between the known and the unknown, the sedentary and the nomadic” (Georges, 2005).

Houses form part of the street system in a typical Indian city. The connection between the house and street is very strong and not just an entry. There are elaborate efforts to emphasise the threshold which signifies several elements. These thresholds could be as small as a wooden member, which forms part of the door frame, or an extended one which could be large enough to accommodate certain activities (Jain, 1998).

In the case of Mysore it is further emphasised and elaborated upon by the effective use of Jagali. Several rituals and sentiments were always associated with the idea of crossing the threshold. This resulted in an extra effort to define and express the element of entry to a house. Alcoves²⁴ for lamps, Rangoli²⁵ at the entrance and other auspicious symbols were integrated into this element.

5.4.1.8 Legal aspects

The use of boundary and its significance could be traced from the Greek period. In the ancient Greek world it was not the interior, but the exterior appearance of the “hidden” private realm which was important for the city, and which appeared in the realm of the city at the boundaries between one household and another. According to

²⁴Alcoves were primarily small niches used to keep the oil lamp. This functional element at the entrance was decorated to express their tradition and culture.

²⁵Rangoli is a colourful design drawn on the floor near the entrance and is meant to be sacred and welcoming for the Hindus.

Rashid, “the law was originally identified with the boundary line, which in ancient times was actually a space, a kind of nomad’s land between the private and the public. Though the law of the Classical Greek polis transcended the ancient Greek understanding, it retained the original spatial significance of the boundary” (Rashid, 1998). In “The Human Condition”, Arendt has discussed about boundary during those days as “It was quite literally a wall, without which there might have been an agglomeration of houses, a town, but not a city, a political community. Without it, public realm could no more exist than a piece of property without the fence to hedge it in; the one harboured and enclosed political life as the other sheltered and protected the biological life process of the family” (Arendt, 1958).

It is worth noting the change in emphasis of use of boundary over a period of time. From being the organiser and used as defining space then, boundary is now used to define and protect one’s wealth. This contrast is well-captured by Arendt, wherein he has remarked on contrasts between premodern and modern thinking about the importance of the boundary: “While it is only natural that the non-private traits of privacy should appear most clearly when men are threatened with deprivation of it, the practical treatment of private property by premodern political bodies indicates clearly that men have always been conscious of their existence and importance. This, however, did not make them protect the activities in the private realm directly, but rather the boundaries separating the privately owned from other parts of the world, most of all from the common world itself.

The distinguishing mark of modern political and economic theory, on the other hand, in so far as it regards private property as a crucial issue, has been its stress upon the private activities of property owners and their need of government protection for the sake of accumulation of wealth at the expense of the tangible property itself. What is important to the public realm, however, is not the more or less enterprising spirit of private businessmen, but the fences around the houses and gardens of citizens” (Arendt, 1958).

As a summary of this focused research, it can be concluded that boundary plays a crucial role in developing a sense of permanence and order in the society and built environment. It could be summed up as boundary being the most elementary cognitive tool used to map the built environment. It is the most elementary physical act of differentiation and physical act of permanence in the built environment (Rashid, 1998). And, it is the most elementary visible tool used in the organisation and act of initiating a process of growth in the built environment.

5.5 Boundary conditions and its implication for sustainable housing

It has been argued that the pre-industrial architecture of India reflected the physical and spiritual needs of the populace. At a physical level, it demonstrated an understanding of the local climate, available material and construction techniques. Doshi has argued that “at the spiritual level, the built-form conveyed total harmony with the regional lifestyle in all its daily as well as seasonal rituals, unifying the socio-cultural and religious aspirations of the individual and the community” (Ameen, 1997).

Contemporary analysis suggests a crucial change has occurred in that housing boundaries are no longer in a communal realm. Closer inspection reveals that the key change has been the way the house boundary is defined and the values and changes taking place at this interface. Correa (1991) argued that the climatic conditions of most Indian cities allowed for the use of open and semi-open spaces for social interaction (Correa, 1991). Correa identified specific Indian conditions, which aid sustainability. They use natural light for most part of the day and construct very minimally, which reduces embodied energy. He has identified four major elements as: 1. Internal private spaces, 2. Area of inmate contact (the front door step), 3. Neighbourhood meeting places and 4. Principal urban area (Correa, 1983, Correa, 1991).

Correa has used the term ‘usability coefficients’ to quantify the use of space, its size and number of people using that space at a given time. According to him, in a traditional Indian context, these open and semi-open spaces will always have very high usability coefficients due to the nature and way these spaces are used (Correa, 1983). However, the notion of threshold is a theoretical construct used in sociology, anthropology, and architecture, primarily in a western context. It is nonetheless relevant in interrogating modern urban conditions in India.

A prevalent housing typology developed across India has viewed open space more as a setback between houses and the street than as shared resources (CITB, 1987, HUDCO, 1987). These new typologies have been criticised by Indian architects. For instance, Charles Correa highlighted the “brutal mismatch between the way (Indian) cities have been built and the way people are compelled to use them”. Similarly, Doshi observed that the open spaces resultant of regulation do not encourage desired social, cultural or economic activities (Kaza, 2007). According to Doshi, these open spaces sustain life by performing important utilitarian (ventilation, parking, movement), socio-cultural (spontaneous group activities, festivals) and perceptual (characterisation, identity, iconic status) functions (Kaza, 2010, VSF, 2012). There is consensus among architects that utilitarian functions should provide the basic minimum functional criteria, while social functions should be given highest priority, and perceptual functions the lowest priority (VSF, 2012).

This research is thus focused on these boundary conditions, which reflect the change in society that the virtuous link between building form, bioclimatic response and social structures in the household may be broken. It is important to understand the climate and social response underpinning the sustainable agenda as argued by Doshi and Correa, whereas the move to individual plots has been inevitable.

This research therefore examines whether contemporary expectations regarding aspirations, security and privacy have anything to offer sustainable design strategies and if any of the more traditional approaches to threshold and form can be incorporated in the design of new housing.

The first fieldwork study reflected the issues involved at the transition place, which is used to emphasize the boundary condition, is more complex and involves issues of varied nature. The study reflected the complexity of issues involved, in terms of key players' feedback. For instance they tend to use this space as an opportunity to display their wealth and status. Homeowners prefer to have control over space and access of public in their personalised space. Their concern for safety and protection with perception of fear forces them to consider these gates as the first layer of security. The concerns at this stage are of varied significance like the desire to protect flowers, plants, avoid stray animal entering the territory or to discourage sales people or unwanted neighbours from entering their plot.

Furthermore, most of the elements identified above have been replaced by new elements in the prevailing typology. Again, most of these changes can be traced as unsustainable. To further examine the different aspects involved at boundary condition, element analysis of different activities involved at transition space has been carried out. This process helps to clarify different issues involved and the varied preferences of the homeowners. The data collected during the element analysis are coded and analysed for their implication on the sustainable agenda.

Element analysis of the boundary condition of the prevailing typology clearly reflects the concerns expressed during the fieldwork. Element analysis of a typical traditional typology is shown in Figure 5-3. The literature study and fieldwork feedback has been instrumental in analysing the different factors influencing the boundary conditions. The interview feedback from the users, stakeholders and resource people were coded and identified as factors of influence at the boundary area. A closer examination of the transition space reflects different aspects which play a crucial role at this level. All the issues identified have been grouped together based on the commonalities into broad categories which can be further tested later. The factors identified include climate responsive design, building materials, transition from street to threshold space and interiors, openings and social concerns like security, demonstration and interaction. Representative visuals are triangulated with the

literature study and the questionnaire feedback to identify key elements of the transition space.

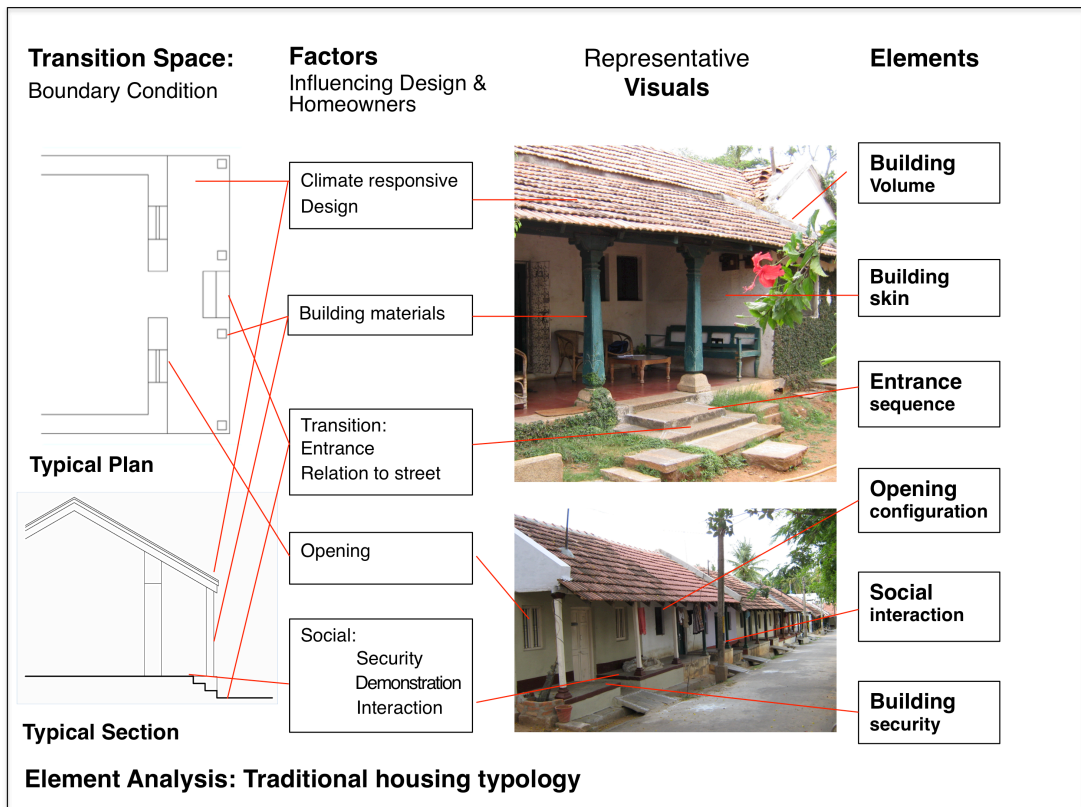


Figure 5-3. Element analysis: Traditional housing typology

A similar exercise was carried out for the prevailing plot typology. As shown in Figure 5-4, the issues of significance at the boundary condition are identified and drawn. While grouping the issues identified, they are overlapped onto the traditional typology so as to trace the changes and difference among these typologies over a period of time. These elements are analysed independently to understand the rationale of these elements in the boundary condition of a particular typology. These factors are qualified by a visual representation collected during the first fieldwork. These have been drawn as a representative model to qualify the factors identified; these factors are documented from different houses from Mysore.

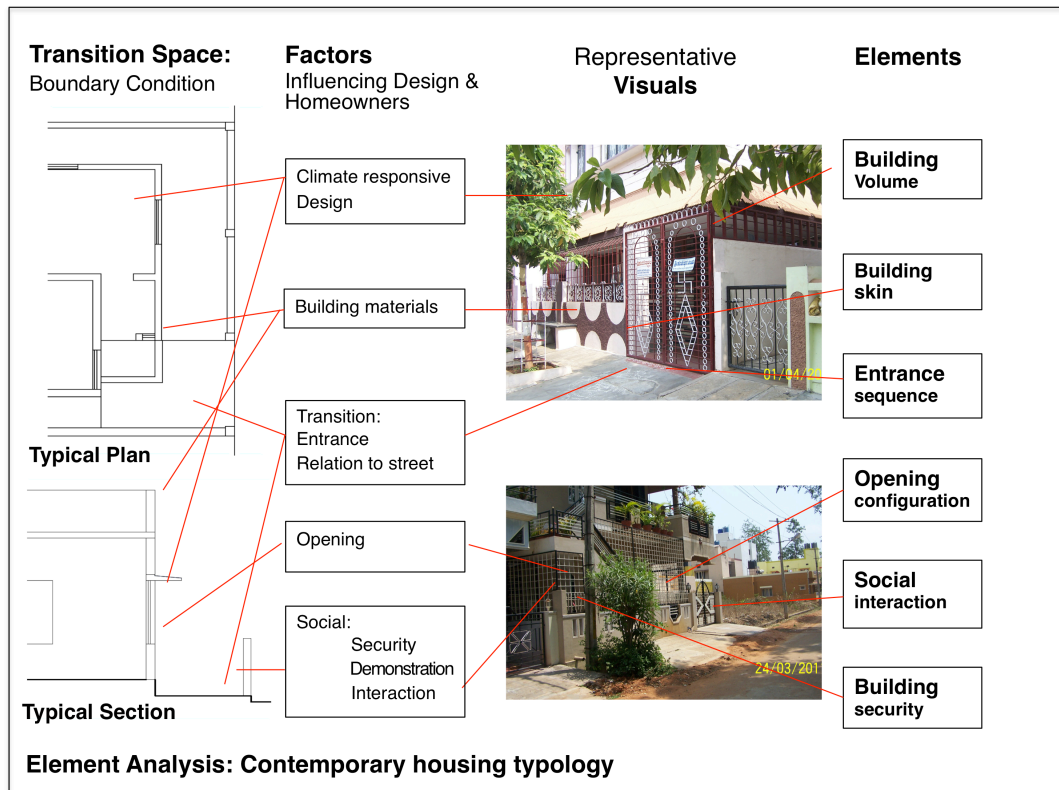


Figure 5-4. Element analysis: Prevailing plot typology

To sum up, there are drastic alterations in the transition space, the way it is defined and used over a period of time. A quick reflection based on the initial research suggests that the factors identified in these typologies also reflect a sustainability agenda. Agrahara Typology demonstrates the elements are sustainable in nature, whereas most of these factors have been modified in the new typology, which has an implication on the sustainable agenda.

Elements of the agrahara typology reflect sustainable features. For instance, the invisible boundary along with the Jagali transition space enhances community interaction and is socially sustainable. The effective use of jagali space along with the use of climate response materials enables agrahara typologies to use the least amount of embodied energy and maintenance energy. In the case of the contemporary typology, the defined boundary not only increases the embodied energy, it is unsustainable as the spaces between the buildings are not used

effectively used and the high wall in between the houses are not supportive of neighbours' interaction.

Based on the element analysis of both typologies (Figure 5-3, Figure 5-4), modification of these factors in the new typology and its implication on sustainable features, six major elements are identified to cover the issues related to boundary conditions. They are: volume, entrance, opening, security, interaction and skin. The issues addressed in each of these elements are discussed below.

5.5.1 Building Volume:

This looks at the overall spatial configuration between the entrance and door. There is a clear difference from the Jagali typology to the present plotted development in terms of semi-open space, definition of boundary, the wall between the street and the house. This element looks at these issues, more as a description of events between street and entrance door. Volume also identifies the different parameters of defining boundary conditions.

5.5.2 Entrance Sequence

Entrance specifically deals with activities between the street and the entrance door. The transparent, open type direct access from street to internal area through a raised platform, Jagali, has been replaced in the prevailing typologies. This element looks at different parameters followed and factors which influence the activities between the street and the main door.

5.5.3 Opening Configurations

This is one of the critical elements which reflect a clear departure from a small, climate responsive opening being replaced by large, celebrative openings. Homeowners prefer wide openings for different reasons. For instance, interview feedback suggests that the choice of a wide opening is more of a western influence,

and the notion that wide openings will improve the appearance of the house. Homeowners feel it is well-lit and ventilated and wide openings are used to demonstrate or depict one's character. Different type and size of openings play a critical role in sustainable strategies.

5.5.4 Building Security

Concern of security is the crucial concern of homeowners. Threat, both perceived and real, will have direct impact on the way the boundary and openings are treated and protected. Issues involved are complex and hence the options also vary from the totally open socially interactive security concept, to high-rise, gated and grilled insulated typologies.

The way boundary is treated for the concern of security will have a direct impact on embodied energy consumed. Perception of safety will also have impact on the sociability of the semi open spaces and interaction among the community. Concerns of perceived threat, safety are addressed in this element.

5.5.5 Social Interaction

Interaction among neighbours and homeowners is the crucial part of the boundary condition. Again, from the totally open, permeable interactive typology, plotted typology looks at a different level of privacy and flexibility for one to interact at different levels. This element addresses different typologies based on the degree of interaction among the community.

5.5.6 Building Skin

Skin used for the elevation is either construction material used as masonry or cladding for the entrance and front side of the building. Jagali typology had climate responsive construction system and building materials, which are replaced by different materials and a construction system which has no relevance to the climate

and sustainable agenda. The choice of material is independent of building typology. This element focuses on the material choice, preferences of homeowners and its implication on sustainable housing.

The elements identified in this chapter are used to develop models to reflect different housing typologies. These models are tested for sustainability performance and also for people's preferences and acceptability.

It is not possible to address all the issues related to housing while understanding people's preferences and its implication on sustainable housing. The six elements identified in the focused study area cover most of the issues related to boundary condition and reflect the people's preferences and variation in performance among typologies. This process of element analysis is useful to identify independent parameters which have impact on the performance of the transition space. Elements identified are also useful while comparing among different typologies and can be further tested and validated using environmental simulation software.

While examining people's preferences for different boundary conditions, these six elements are used to define different alternatives which are tested during the second fieldwork study. People's preferences are tested for four different boundary conditions, which are considered to have varied acceptability and sustainability criteria. These elements are useful while developing the models reflecting different typologies. Four models are prepared by altering the six elements discussed. Boundary conditions are altered in the models by altering these six elements, while retaining all other aspects of the house consistent across different models. The process of identifying different models, their performance and methodology adopted to understand peoples preference including observation and analysis are elaborated in the next chapter.

5.6 Conclusion

In conclusion, the traditional Jagali typology was not only climate responsive, it also provided an opportunity for social interaction and community participation. This sustainable typology has been replaced by plotted development and thus provides a good opportunity to understand people's aspirations and its implication on housing typologies. An element analysis of traditional, aspirational and contemporary models clearly demonstrates people's varied preferences over a period of time, which are triangulated with quantitative information.

Middle class homeowners' choices are tested and validated for the identified building elements in the transition space. Extensive fieldwork is conducted to test middle class choices and the next chapter elaborates upon the research method adopted, fieldwork research process along with observation and analysis of people's choices and willingness to align towards sustainable typologies for the identified building elements.

Chapter 6: Relating people's attitudes to housing elements – second set of fieldwork

6.1 Introduction:

In the previous chapter, based on the literature review and the first set of fieldwork, the research area was narrowed to a focused study area of the boundary conditions and transition space. Six building elements were identified based on an analysis of the transition space.

Four working models were prepared so as to reflect the sustainable, most prevailing, most aspiring alternatives. These different models are tested to examine the people's preferences during the second set of fieldwork. This chapter elaborates on the research methods adopted and the research process used during the second set fieldwork. Furthermore, this chapter elaborates on the observations during the fieldwork and reflects on people's preferences on each building element identified.

The initial literature review and first set of fieldwork was used to narrow the research questions and finalise the study area (**Figure 3-1**). The outcome of the first set of fieldwork reflects people's aspirations and attitudes towards housing. It also helps one to understand people's perceptions of neighbourhood, use of open space, parks and their interaction with neighbours and relatives. The information is triangulated by the interaction with the people interviewed, archival research and the literature review. This process has been useful to narrow the research area to boundary conditions and the transition place, which reflects the shift in attitude of the people. It also reflects their social, cultural, economic values and their impact on elements of housing. This transition space is also a reflection of climate responsive design adopted and the issues that concern people.

The issues involved at the transition space are complex and it is too simplistic to examine whether the transition space and boundary conditions reflect sustainable characters as one entity. The drawback of this is that it is not possible to look at ‘boundary’ as one aspect and one activity. Rather, this has to be analysed as a series of events, activities and issues. For instance, during the first study, almost all the owners interviewed expressed a strong desire to identify their boundaries and define them with a high gate. As described in chapter four, if the question a general or holistic one, such as ‘would they prefer the traditional Jagali typology?’, the answer would be negative as they obviously do not wish to go back to the traditional typology. So this research differentiates the issues, concerns and rationale of the middle classes’ choices, preferences and decisions.

The issues involved at the transition spaces are complex and overlapping. To understand different issues involved and its acceptability for homeowners and its implication on sustainability, transition space is analysed for each elements. An element analysis of the boundary condition enables us to understand different building elements and issues in the transition spaces and thus the enquiry is more directed at each element rather than the whole transition space, which evidently enables one to differentiate between people’s preferences and concerns.

As discussed in the research methodology chapter (Chapter 3), grounded theory has been the backbone of the research and every stage is revisited and reworked based on the findings. The next section elaborates on the research methodology adopted specifically during the second set of fieldwork.

6.2 Research methodology

In the research for the first study, existing traditional and sustainable practices were established and current trends identified. Interaction with key stakeholders also established representative design and the construction processes and middle class homeowners’ perceptions, aspirations and attitude towards housing. The main aim of this part of the research is to integrate these social and cultural perspectives to a

design response and developed methodology to evolve both social responses and environmental solutions to homeowners' aspirations by understanding the context at which it operates. The outcome will therefore be useful to propose sustainable design strategies that are framed firmly in the preoccupation of the Indian middle classes.

1. The specific methodology employed integrates two different techniques:
The environmental analysis, using Integrated Environmental Systems software, VE-ware, to simulate and predict energy consumption and carbon emissions; and
2. A social survey to ascertain people's preferences and their willingness to align towards sustainable practices.

These two methodologies complement each other as each builds on the other (Creswell and Plano Clark, 2007).

As argued by scholars in the field of sustainable architecture, the social, economic and contextual issues are more critical than the general guidelines at the global level (Mayer, 2004). Architecture is often defined in quantitative, measurable terms. Most of the issues addressed, The Brundtland's report (Brundtland, 1987), would involve a predominantly empiric framework. It is well established that successful sustainable research projects would incorporate a wide range of research methods and approaches. It has also been proven by the works of many scholars that sustainable features are mostly defined in scientific terms (Williamson et al., 2003). Though this approach brings in tangible validity, while working in the built environment, one has to consider other issues like circumstances, values, implicit boundaries of knowledge, the local condition (Brennan, 2011).

Housing has been acknowledged as a social phenomenon with issues involved such as physical, economic, aspirations, attitude and ethics. To understand and analyse the concept of housing and making houses more sustainable not only requires both qualitative and quantitative input, it also requires different methodologies. In this context, exploring sustainable housing for middle-class people is considered as a contextual, multi-threaded approach and a combined methodological approach including the combination of qualitative and quantitative research, using research

triangulation to validate the findings and reflecting on the outcome at every stage with previous research, is considered necessary and appropriate.

Grounded theory acts as an overriding research methodology that enables one to understand and unlock complex phenomena. As in the case of sustainable housing, where the research focus is defined by diverse research fields, it would be most appropriate to use a mixed methodology for the data collection (Teddlie and Tashakkori, 2009, Creswell and Plano Clark, 2007, Bryman, 2008, Bergman, 2008). The triangulation model of enquiry has been considered as the most suitable type of mixed method methodology (Fontana and Frey, 1994, Stake, 1995, Green et al., 2007) and was employed for this research.

The literature review and first study was used to narrow the research questions and finalise the study area (Figure 6-1). The first set of fieldwork reflects people's aspirations and attitudes towards housing. It also helps one to understand people's perceptions about neighbourhood, use of open space, parks and their interaction with neighbours and relatives. The information is triangulated by the interaction with resource people, archival research and the literature review. This process was extremely useful to narrow the research area to a boundary condition, the transition place, which reflected the shift in attitude of the sample (Figure 4).

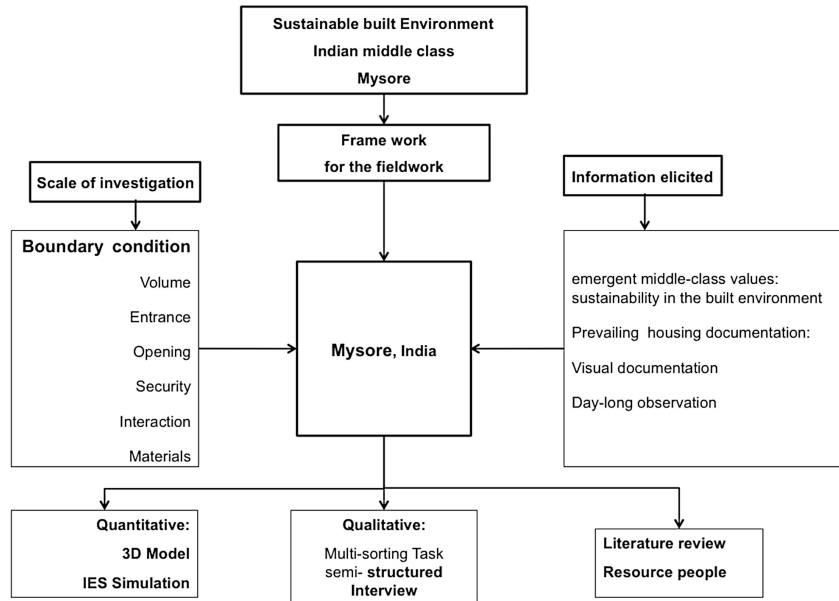


Figure 6-1 Framework for the fieldwork

The main objective is to understand people’s perceptions, aspirations and the implication this has for sustainable housing. This is achieved by studies at two stages; first: different possibilities or alternative boundary conditions are modelled and it is ensured that they reflect the sustainable agenda in terms of least to most. These models are developed to reflect the vernacular, most prevailing and most aspiring alternatives.

Secondly, these models were tested and validated for their sustainability agenda. Furthermore these models were used during the second set of fieldwork to elicit the opinions of the stakeholders on the boundary condition preferences and its implication on sustainability.

The primary aim of the research is to explore suitable strategies which are acceptable to middle class demographics. This bottom-up approach looks at the acceptability as the core and as explained in the grounded theory, this is achieved by eliciting people’s perceptions on one hand and triangulating them with the literature review and the interviews with the resource people.

To sum up, the process of the second set of fieldwork was addressed at four major stages. These involve:

1. Use of a structured interview and questionnaire to produce an alignment strategy;
2. From these strategies layouts and design proposals were designed and tested
3. These samples were studied through an environmental simulation models
4. These models, analysed for energy consumption, were used during the interview at Mysore: Fieldwork Process, Qualitative Study.

The methodologies applied in the first three stages are briefly elaborated upon and the outcome of the fieldwork is analysed while reflecting on the simulation studies of models and building elements identified earlier.

6.2.1 Quantitative study:

From the research described in chapters 4 and 5, a series of four test models were generated for study both with respect to predictive quantitative performance and as a basis for revisiting the fieldwork. The models were organised to test housing market stakeholders' response to a range of sustainable criteria (**Figure 3-1**). The simulation results derive from Integrated Environmental Solutions (IES) were charted and triangulated by the feedback from the stakeholders during the fieldwork (Figure 6-2).

An Integrated Environmental System (IES) VE Ware building simulation software is used to simulate the energy consumption and carbon emission from different models. The elements are analysed separately and independently to develop and simulate energy consumption and carbon emission, which would in total, reflect people's perceptions, their aspirations on one hand and their sustainable agenda on the other. Model development and IES simulation process is explained in the following section. The outcome of the second set of fieldwork and literature research are used to revise the model to align towards sustainable features and people's preferences and willingness to adopt the elements of boundary conditions. The post fieldwork

simulation reflects reduction in energy consumption and carbon emission incorporating people’s preferences and aspirations.

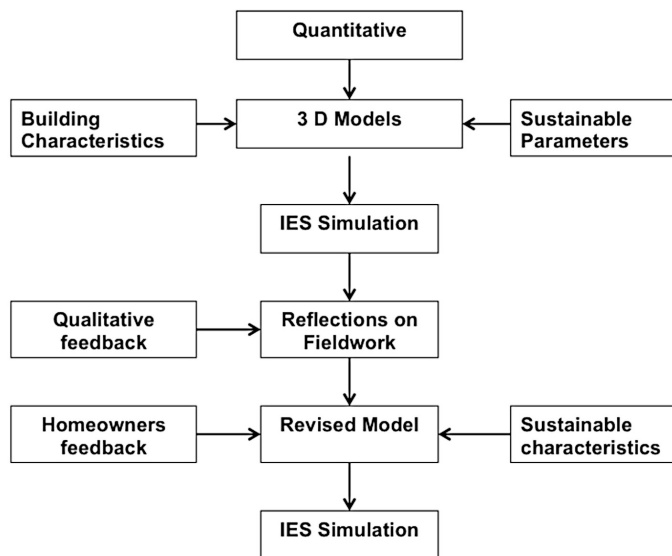


Figure 6-2. Quantitative study structure

The element analysis of the transition space clearly shows the different issues involved at the boundary condition. Previous chapters clearly demonstrate that most of these elements were sustainable in the traditional typology. For instance, in the case of entrance and volume, traditional houses had a semi-open raised platform, which had a clearly established connection with the outside and in the process there was social and community interaction. Similarly, the opening sizes were smaller, more vertical, strategically located to gain enough light and ventilation required for internal activities. Further uses of these semi-open spaces for most parts of the day had resulted in least energy consumption for maintenance and cooling. While tracking the changes, it can easily be seen that these same elements which were sustainable are now being replaced by unsustainable practices. The reasons for this are many; it could be due to changed social conditions, perception of housing, and lack of awareness or houses being used to demonstrate one’s wealth.

Designers have been mostly catering for homeowners’ expectations and, as discussed earlier, legislation has not been regulative and effective. Against this background, the

underpinning factor is to ensure people's participation in the process of sustainable housing. In this process, the first task is to identify homeowners' choices and preferences which will help to identify the elements which can be addressed without altering people's preferences for sustainable strategies.

To investigate the sustainable practices and middle classes aspirations, four models are prepared. The concern is to explore and investigate people's perception about boundary condition, so the identified elements are altered based on the sustainable agenda and people's preferences to derive four models. Furthermore, other aspects – which also play a crucial role and influence simulation results other than the identified elements – are kept constant throughout this process. For instance, the number of occupants and dwelling units are the same in all the models. Even the volume is also worked out to be similar, so that the cooling load requirement is also kept constant.

The four models reflect different boundary conditions. At one extreme a traditional bioclimatic solution that reflects past models of communal living and at the other, a representative model of current private sector middle class housing was constructed. A further two models between these were designed primarily to get a finer understanding of the exact levels of privacy and social interaction that would be embraced by potential stakeholders (Figure 6-8). For instance, drawing conclusions from the earlier research, one model is worked out intended to reflect the ambitions and desires of the homeowners as expressed during the first set of fieldwork. Another model is developed with emphasis on sustainable elements and catering to homeowners' expectations. These four models are clearly defined with spatial, visual and physical characteristics (Figure 6-8).

These models are evaluated both qualitatively and quantitatively. Qualitatively, parameters like community interaction and cultural requirements, demonstration of wealth, and concern of security are elaborated. Quantitatively, parameters like, land footprint, embodied energy, carbon emission, opening size, climate responsive features, and source of material are analysed.

There are many other factors which will impact the performance of the house and boundary condition. In this research, all other factors which could potentially alter the performance of these models other than the identified six elements are kept constant. Other effective strategies to reduce energy consumption and carbon emission, like double glazing or insulation or cavity walls to reduce the conduction heat gain are kept constant. The rationale is that some of these materials and construction methods could be adapted to any given models. For instance, cavity wall construction and double glazing will provide insulation and reduce the conduction heat gain and thus cooling load substantially. Furthermore, this could be applied to any of the four models developed, which could easily alter the sustainable strategies of any given model. As this research is not focused on interior spatial organisation and finishes or materiality of construction; construction materials and construction techniques, all these are kept constant. However, construction materials used for the front elevation have been identified as one element of the boundary condition; it is examined more as a skin than the construction or structural material.

These four models are prepared for four typologies which include the most prevailing and well-established vernacular typologies. The first study and the literature review have been used in terms of perception, aspiration, attitude, values and aspects, which shape the social and cultural requirements along with input from key players such as architects, builders and government officials.





| | | Model 1 | Model 2 | Model 3 | Model 4 |
|---------------------|--|--|--|---|--|
| Typologies | | Jagali Typology | Jagali + Plot | Plot + Gate | Plot + High Gate |
| General description | |  |  |  |  |
| Volume | Different activities and their features are highlighted. Each typologies represent most desired to most prevailing and also vernacular typology. | There is no demarcation of private spaces and public areas. Sharing party wall either in a row or arranged around the open space. | The plot is defined more as a very low hedge to retain the permeability of the Jagali typology. A representative model of combination of traditional and current middle class housing. | This most prevailing model has physical barrier between street and inside plot. The height of the wall is about four feet, where the homeowners can still retain some connection with street and neighbours. Portico defines the main entrance. | this most aspiring model has clear definition of internal and external part of individuals space. High wall, gate and elaborate portico emphasis the status of the person. |
| Entrance | Main relation of street and entrance door, different activities between the two are explored. | There is a smooth transition from street to main door through a semi-open raised area (Jagali). Jagali is used for most parts of the day. | Similar to Jagali typology entrance with additional space in the front with hedge to define one's plot area. | Owners tend to place the main door close to the street and the additional open space near the main door is used for parking two-wheel and four-wheel vehicles. | Main door is recessed inside the individual property and not visible from the street. There is no relation between street and main door. |
| Opening | Larger openings will increase conduction gain and increase cooling load. Different alternatives are worked out based on the window size and two more models are developed to examine peoples' preference of overlooking shared spaces. | Very small, just enough light inside. | Narrow openings, enough light for the interiors. | Wide openings, no relation to direction and requirements. | Very wide openings. Spanning most parts of the wall. |
| Security | Concern for safety and both perceived and real threats are reflected the way the boundary and openings are protected. Different level of security are represented in each model. | Social security; compact community and new members are identified by people. Least materials used for security other than the regular wooden door. | Emphasis on social security. Steel door as additional security to the main and rear door. | Compound used as a psychological barrier and main door has steel shutter. In most of cases, a steel grill is used for the portico area. | Compound itself acts as first level of defence. Very high individual security. Entire plot or most of it is covered by a steel grill. |
| Interaction | Interaction among neighbours and homeowners is the crucial part of the boundary condition. Different typologies represent the degree of interaction among community. | Community-oriented. Common open space. Visually connected with each other. Kids can play and people can use the Jagali for various activities. | Scope to use open space for most of the day. Developed more to suit the prevailing plot typology. Scope for interaction among neighbours. | Scope for interaction with the neighbours and street activity. There is a clear physical barrier and visual connection. Owners have the option to interact with the neighbours. | Both physically and visually cut off from the neighbours. Importance for privacy. No interaction with neighbours and not involved in community activities. |
| Skin | Skin used for elevation is either made of construction material used as masonry or cladding for the entrance and front side of the building. The choice of material is independent of building typology. However, peoples preference of each typology is listed. | Use of locally sourced materials. Use of mud blocks. | Emphasis on use of locally sourced materials. Use of brick and mud blocks | Combination of local and imported materials. Mostly plastered, entrance area and street side clad with stone or tiles | Use of imported materials. Emphasis on aesthetics and cost of the material. Extreme use of polished granite and imported materials and also cement tiles. |

Figure 6-3. Building elements: Models description

The models prepared reflect the prevailing typologies (Figure 6-6): which has an approximately 4-feet-high compound between neighbouring plots. The front and rear of the plots are built with a minimum setback of 1 metre or as required by the Mysore Urban Development Authority regulations. Most of the aspiring ones (model 4) tend to have a very high wall that insulates them from the external world and there is extensive use of imported material and ostentatious finishes and large openings. The earlier Agrahara typologies (model 1) are the early typologies with a raised platform in the front with small openings and use of locally available material, overlooking the street. Finally, based on the feedback from the first batch of fieldwork, a combination of climate responsive and aspirational typology (model 2) was developed (Figure 6-8). The general characteristics of all these four models (Figure 6-3) are described below and these are later reflected upon.

6.2.1.1 Model 1: Jagali typology

This model reflects the pre-independence housing typology. Homeowners adopted bioclimatic solutions based on the concept of communal living. These houses do not have a defined plot or boundary, they share a party wall and are constructed either in a linear row or a cluster around an open space. Most of the activities happen in the semi-open and open spaces. Large houses of this typology have a central open space which provides light for all the internal spaces. In the case of smaller houses, light is drawn from the front and rear sides along with cowl tiles in the sloped roof. Front side semi-open space is used more as a transition space from the external public area to total private space inside. Most of the informal activities happen in the semi-open raised space (Jagali). In this sense, the rear open space is used more as an individual private utility area. These open spaces are sheltered by a sloped roof which is in the shade for most of the day and thus provides the most ideal conditions for usage of these spaces in a mild climate (Issar, 1991).

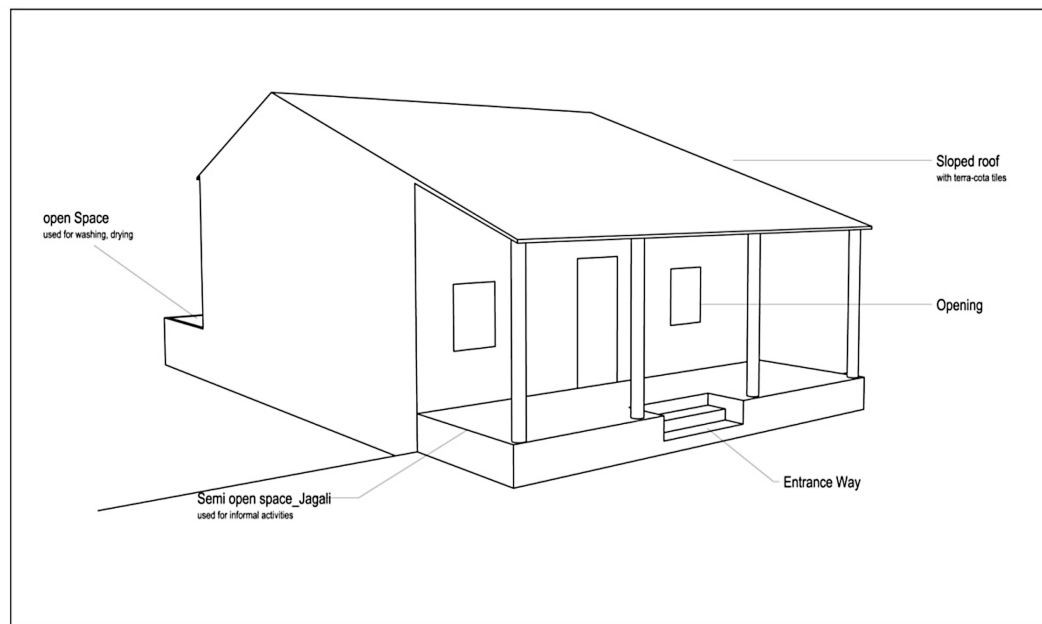


Figure 6-4. Model 1: Jagali typology

The model occupies about thirteen square meters of land area per person as land footprint. Visually, without the barriers between the entrance and the street and the open space beyond, they provide a strong visual connection and thus a safe play area for kids. There is no specific boundary established and strong differentiation of individual territories and this clearly demonstrates the community's values (Prasad, 1998). These houses clearly reflect the earlier way of thinking of middle class demographics; their simple way of living, thriftiness and empathy for the poor. This entrance is more culturally rooted rather than being made of materials simply for show. For instance, a welcome rangoli reflects the rich culture.

The emphasis is always on the use of locally sourced material like clay, stone and timber which have very low embodied energy (Oliver, 2006). Because thick walls with a sloped terracotta tile roof and a small opening to avoid overheating of internal spaces were used, they were ideal for the prevailing climatic conditions (Fathy, 1986, Sundarraja et al., 2009).

6.2.1.2 Model 4: Plot and high gate typology

This model reflects the other extreme which is most popular among middle class demographics. Here homes are isolated from the outside world and emphasis is placed on individual activity and privacy with least importance being given to community living.

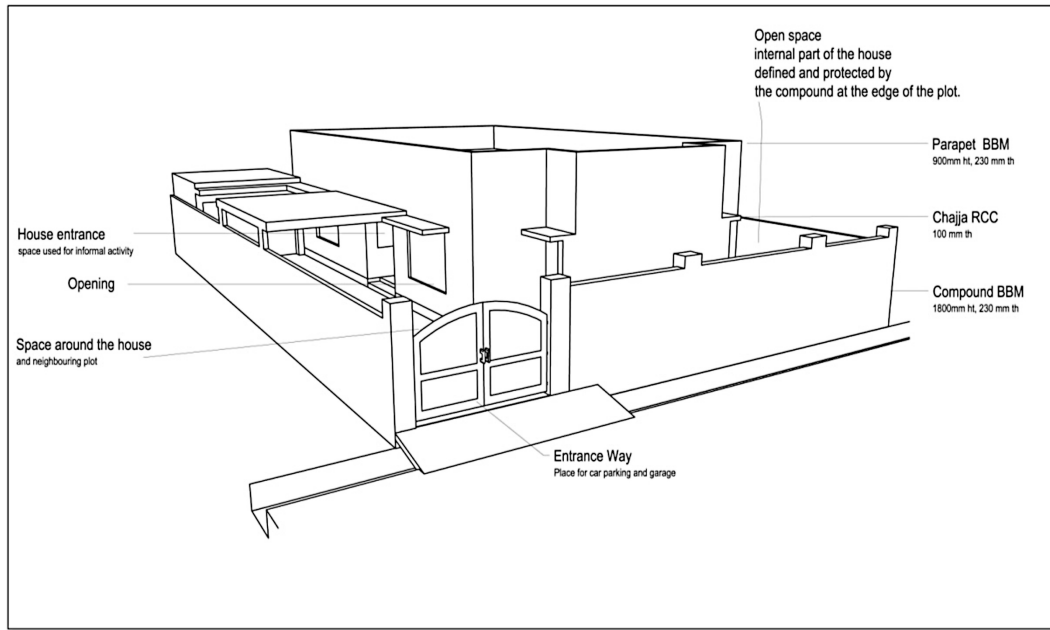


Figure 6-5. Model 4: Plot and high gate typology

These houses have very strong demarcations of boundary, mostly done by raising the wall up to 2.1 metre height and thus insulating residents from neighbouring sites. Being totally cut off from the external world, they have no relationship with neighbours and the street (Respondent no.82, interviewed on 15 March 11). All the activities are introverted and carried on inside the house. These houses have the widest possible windows with ample light. Construction materials used are based on aesthetics rather than local availability or climate responsiveness (Respondent no.78, interviewed on 10 March 11).

The model occupies about forty-three square metres of land footprint per person (MUDA, 2007). Visually it is totally cut off from outsiders and so is physical access denied at the beginning of the plot with a high gate. Open space, which is part of the

setback, is used for personal consumption and is isolated with a high wall; Open space is no longer part of the community and lacks interaction (Respondent no.72). The high compound also acts as a first level of security and mostly the whole house is guarded by providing mild steel grills. The house is more than the place to live in and is used to demonstrate one's wealth and personality. In this regard the compound is used to display one's taste and wealth rather than being used as a mere security barrier (Respondent no.76).

Most of the time these homes are insensitive to the climatic condition: very large openings result in excessive heat gain, which demands a high cooling load to bring the space to a comfortable condition. Emphasis is mostly on the use of the most expensive materials available and hence the homes have a very low sustainable agenda as they have very high embodied energy, including long transport distances, (Reddy and Jagadish, 2003). Furthermore, as most of the activities are performed inside involving mechanical devices, the energy consumed for operation and maintenance is very high.

6.2.1.3 Model 3: Typical Plot Typology

The other two models are defined by being the extremes of the most and least sustainable on one hand and least aspiring and most aspiring on the other. The typical plot typology reflects the typical typology of middle class housing prevailing at Mysore. These houses are built independently of each other with provision for light and ventilation from all the sides.

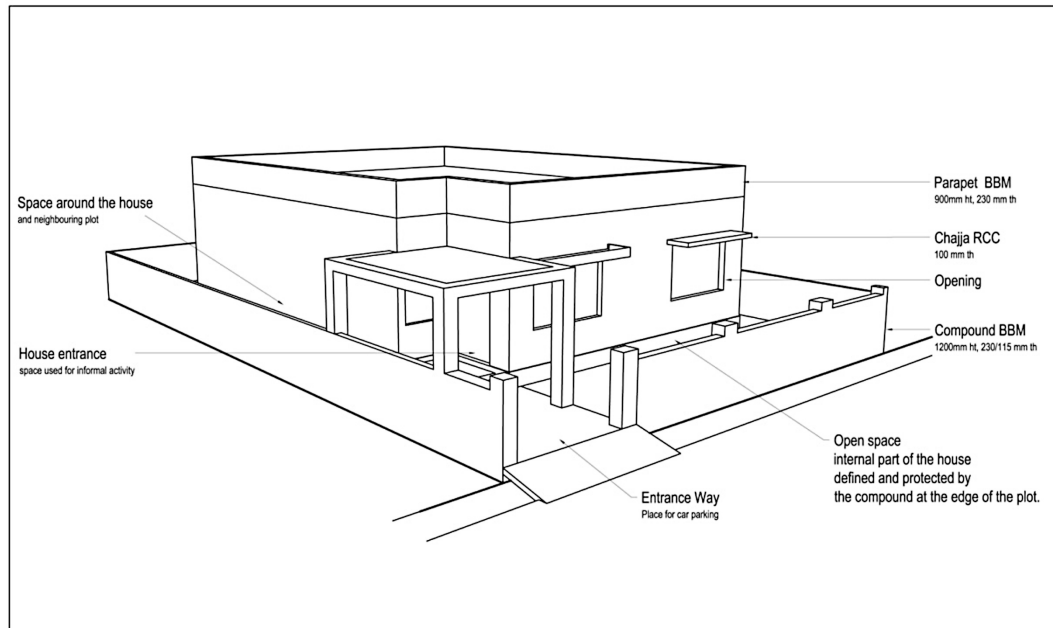


Figure 6-6. Model 3: Typical Plot Typology

This housing typology was introduced to Mysore around the independence period and was formally promoted during the urban development expansion in 1960s. Such houses were popular as they provided much required privacy and independence from the then prevailing Agraharas (Model 1) (Respondent no.6). Most of the time they are not sensitive to bio climatic requirements and what started out as simple European model housing, now stretches to the extremes of material usage, expression and demonstration.

The model constructed typically represents an about four feet high wall along the territory and a similar high gate clearly demarcating the street and pavement, the public area from the plot, home and the private territory. In this typology, emphasis is more on defining one's territory. As the open spaces are divided into smaller parts of individual properties, these spaces are left more as a formality and minimum setback requirements. The open space in the rear side, close to rear entry is used for activities like washing, drying clothes.

This model occupies about twenty seven square metres of land footprint per person. Visually, because of the high wall being only four feet high, in most cases, homeowners still feel connected with neighbours though there is a clear physical demarcation marking plots. This low wall provides homeowners with the opportunity to interact with neighbours and engage with the people on the street if required. Socially, this model provides more control to the homeowners as they interact with whom wish and there is clear departure from the community-oriented social connection to independent living. There is scope for interaction but external spaces do not engage the community as they did in Agraharas (model 1).

The compound walls are used more as a psychological barrier and as most homeowners strongly feel it helps them keep stray animals away. Furthermore, the main door is protected by the additional security of a steel grille. The external façade and compound are effectively used to express themselves. Use of compound could be defined as a combination of function and expression. Most of the time, spatial organisation and design are independent of climate. Openings are wider and larger and provided without any relation to orientation and requirements. Materials used are a combination of what is locally available and imported and are chosen based on cost.

6.2.1.4 Model 2: Jagali + Plot Typology

This model is developed as a combination of the most sustainable and most prevailing models. Based on the literature and first set of fieldwork, it is clear that middle class homeowners have shown strong preference towards owning a plot and defining this plot. This model is developed with the basic understanding of the fact that opportunity is provided for the owners to define their plots by building a very low wall along their plot.

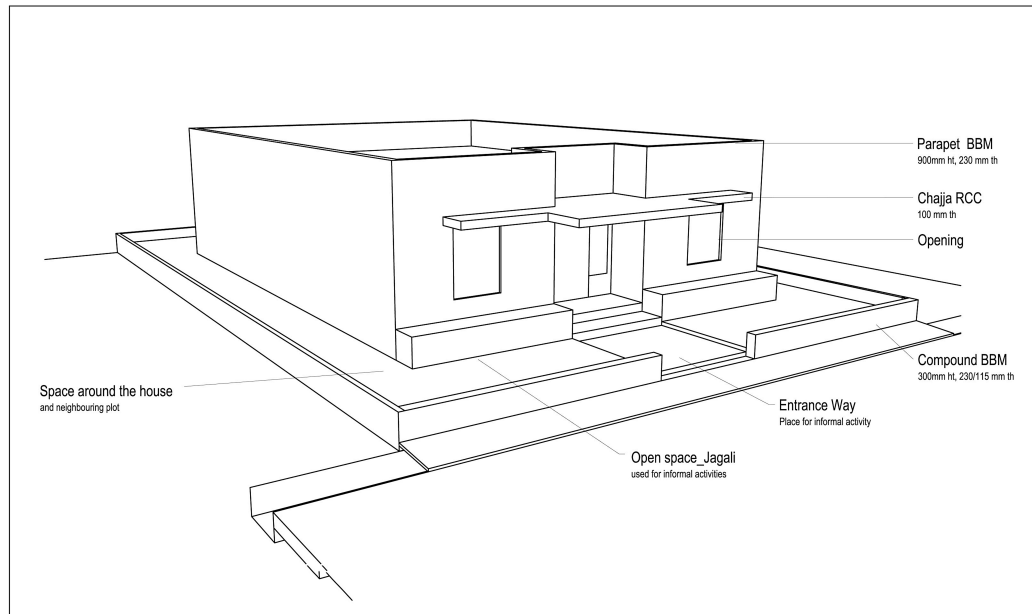


Figure 6-7. Model 2: Jagali + Plot Typology

The positive features of this plot system, defining one's plot, spatial organisation, light and ventilation from all four sides are provided. The positive features of the Jagali typology, social interaction, community participation, smooth transition from public to private space, climate responsive openings are provided. In this case, the boundary is demarcated with a hedge or very low wall, thus still providing permeability from the street or footpath to the semi-open space. The semi-open Jagali form is provided on either side of the entrance.

The windows are more climate responsive and they are narrower and vertical to have enough light and ventilation in the interiors. Due to space between the street and Jagali area, open space is not totally open to the public and provides a sense of ownership and privacy for the owners. This model occupies about twenty seven square metres of land footprint per person.

Visually they allow homeowners to strongly connect with the neighbours and engage with people on street. This, together with the provision of informal spaces like Jagali, definitely increases community participation and social interaction. These models

emphasis the use of locally sourced material and due to active use of outdoor semi-open spaces, they have less embodied energy and maintenance energy.

6.3 Comparative analysis of the design models

The research emphasis is both on qualitative and quantitative methodologies and the models are prepared to fulfil both these parameters. As elaborated in ‘model descriptor’ (Figure 6-8), models are compared for both qualitative aspects and quantitative performances. Furthermore, different parameters like specific boundary condition, physical condition, spatial and visual qualities are compared.





| Typologies | | Model 1 Jagali Typology | Model 2 Jagali + Plot | Model 3 Plot + Gate | Model 4 Plot + High Gate |
|----------------|-----------------------------|---|---|--|--|
| | |  |  |  |  |
| Description | Boundary condition | A traditional bioclimatic solution that reflects past models of communal living | A representative model of a combination of traditional and current middle class housing. Demarcation of boundary with very low wall. Combination of Jagali and plot system. | A representative model of current private sector middle class housing | a representative model of aspirations and high end / upper middle class housing |
| | Physical | Sharing party wall either in a row or arranged around the open space | The plot is defined more as a very low hedge to retain the permeability of the Jagali typology | About four feet high compound. Clear definition of one's territory | Very high compound. Min 6 feet high. Totally cut off from the external world. |
| | Spatial: | Use of semi-open space for most of the time | Opportunity to use open space for informal activity | Clear demarcation of territory. Presently, the space is not used for much of the activities. | Well defined barrier segregating the inside and outside. Open space and landscape areas for personal consumption. |
| | Visual | House and central open space are visually connected. Kids can play and people can use the Jagali for informal gatherings/activities | Developed more to suit the prevailing plot typology. Scope for interaction among neighbours. | There is a visual connection if not physical. Owners have the option to interact with the neighbours. | Insulated and visually cut off from the street and neighbours. |
| Qualitative | Communal / Social | Community oriented. Common open space and other than the rear utility area, there is no individual house open space | Scope to use open space for most of the day | Scope for informal interaction with the neighbours and street. Not much importance for the exterior open spaces and community activities | Totally cut off from the neighbours. Introverted, independent and more importance for privacy. Independent of neighbours and not involved in community activities. |
| | Economics / reflection | More emphasis on culture than economics (Rangoli). More functional | More functional | Combination of function and appears. Skin and compound used for demonstration of one's aspiration. | Skin and compound used for demonstration of one's aspirations |
| | Security | Social security, compact community and known neighbours | More importance attributed to social security | Compound used as a psychological barrier, main door with steel shutter | Compound itself acts as first level of defence. Totally grill and very high individual security. |
| Quantitative | land foot print | 13 Smt / person | 27 Smt / Person | 27 Smt / Person | 43 Smt / Person |
| | Embodied energy | Use of least embodied energy and lifecycle energy | Less embodied energy | | Use of very high embodied energy and lifecycle energy |
| | Embodied energy | 0.47 MWh / SQM | 0.57 MWh / SQM | 0.63 MWh / SQM | 0.78 MWh / SQM |
| | carbon emission | 0.24 t CO2 / SQM | 0.29 t CO2 / SQM | 0.33 t CO2 / SQM | 0.40 t CO2 / SQM |
| | Openings | Very small, just enough light inside. | Narrow openings, enough light for the interiors | Wide openings, no relation to direction and requirements | Very wide openings. Spanning most of the wall |
| | Climate responsive features | Climate responsive, roof, wall, construction and materials were reflective of local climate | Jagali area is shaded and could be used for most of the day | Design is independent of climate | Highly insensitive to the climatic condition. |
| | source of material | Use of locally sourced materials | Emphasis on use of locally sourced materials | Combination of local and imported materials. | Use of imported materials |
| | Security | No/least number of materials used for security other than the regular wooden door | Steel door as additional security to the main and rear doors | Steel grill for the portico area | Entire or most of the plot is covered by a grill |
| Summary | | Most sustainable typology | Some of the features are sustainable | Some of the features are unsustainable | Least sustainable typology |

Figure 6-8. Design Models_ comparative analysis

As identified in the first set of fieldwork and the reflective studies, the way 'boundary' is defined varies drastically. These models are compared as to how the transition spaces and boundary conditions have been defined by six different building elements. In the first section these models are compared in terms of their boundary conditions, physical properties, visual and spatial organisation of spaces. Researchers have identified, among many factors, community participation, social mobility, safe and healthy living with economic viability as the main qualitative parameters of sustainable housing (Winston and Eastaway, 2007, Eastaway and Stoa, 2004, Rapoport, 2001). The four models are compared for each of these qualitative characters like communal living, economic reflection and concern for safety and security.

The qualitative outcome is triangulated with the quantitative performance of each model. The major tangible factors such as land footprint, embodied energy (Reddy and Jagadish, 2003), carbon emission, and heat gain due to conduction based on size of the opening, source of material (Berge, 2009), climate responsive design are compared among the four identified models.

The aim is to reduce carbon emissions and to investigate where one can make the greatest difference rather than targeting a particular figure or standard. In this sense, the models are rated as most or least sustainable models and hence the increment among the models is not critical but what is important is where they stand compared to other models. The rating of models from most to least sustainable is validated by testing them by simulating these models for their environmental performance before using them during the second set of fieldwork.

6.4 Environmental simulation for performance

The models were generated with a similar configuration in terms of built-up area, number of rooms, size of the plot and provision for minimum light and ventilation. To focus the research more on the boundary conditions, all other components such as constructional systems and spatial planning were kept as constants. Each option was

then modelled first in Google SketchUp and then exported into environmental simulation package, Integrated Environmental Systems (IES), to predict energy consumption and carbon emissions. Longitude and latitude were specified for Mysore using hourly climate data from Bangalore, the nearest city to the study area.

These models were validated for their sustainable strategies by triangulating their performance before using them during the fieldwork. Integrated Environmental Systems was used to simulate these models and analyse the peak cooling plant load, total energy consumption and carbon emissions from each model.

There are numerous software packages that can be used to simulate the environmental performance of a building. For instance, Azhar et.al have identified three kinds of software: Autodesk Ecotect™, Autodesk Green Building Studio (GBS)™ and Integrated Environmental Solutions (IES)®, Virtual Environment (VE)™ (Azhar et al., 2010). There are other systems which help in analysing the rating of a building like ‘Leadership in Energy and Environmental Design’ (LEED) and ‘Building Research Establishment’s Environmental Assessment Method’ (BREAM). The main limitations of these systems are that they are developed for western countries and will be efficient in the climatic conditions, requirements and the building construction of these places.

LEED has introduced an Indian version which could be used to assess the sustainability parameters in the Indian condition. Again these are adaptable to major commercial or public utility projects or projects where high technology is extensively used (Gupta, 2009).

IES is a dynamic simulation software which allows one to model a building by inputting form, location, meteorology, materials and building services. The simulation engine then uses real weather data to simulate models over a year in 15 minutes intervals to give a relatively accurate indication of comfort and energy use (IES, 2010).

Since the emphasis is on social sustainability and buildings are typical middle class homes, this research does not intend to measure or compare against a benchmark or absolute standards, rather it will investigate the performance of each model on a comparison basis. In this context, IES has been a very useful tool in analysing the building performance by defining the required parameters.

IES uses climatic data and supports a range of analytical tools for lighting, thermal comfort and resultant energy consumption and carbon emission. To predict energy consumption and carbon emissions, longitude and latitude were specified for Mysore using climate data from Bangalore.

The results of the simulation for each of the four models are shown in Figure 6-9, Figure 6-10, Figure 6-11 and Figure 6-12, with respect to conductive heat gain, cooling load, peak energy demand and carbon emissions for a representative day – May 19 – one of the hottest days chosen to analyse the heat gain and energy consumption due to cooling. The aim of this research is to access the implication of varied boundary conditions in terms of change in energy consumption and resultant carbon emissions.

For the simulation purpose, only these boundary conditions of different typologies are altered while providing an input in IES. For instance, the internal parameters like number of rooms, number of occupants, comfort conditions expected inside the house, minimum light and ventilation desired are kept constant across all the models. Details like size of the openings and their location are altered among the models. Similarly, the construction materials and internal partitions are kept constant, whereas the external finishes – either the cladding or plastering or use of construction material as external fabric – are altered according to each typology. Finally, the boundary condition as the shared party wall, independent plot system, four feet compound and very high compound with high gate details are constructed and inputted into the IES.

The IES simulation engine allows one to alter the input of each typology while retaining some of the features as a constant across all typologies. Furthermore, it allows the comparison of specific parameters among typologies during output. For instance, models could be run to simulate only conduction heat gain, where the internal temperature rise is only due to heat gain by conduction. Similarly, the energy consumption to bring the internal temperature to comfort condition, the cooling load can be modelled (Figure 6-9, Figure 6-10, Figure 6-11).

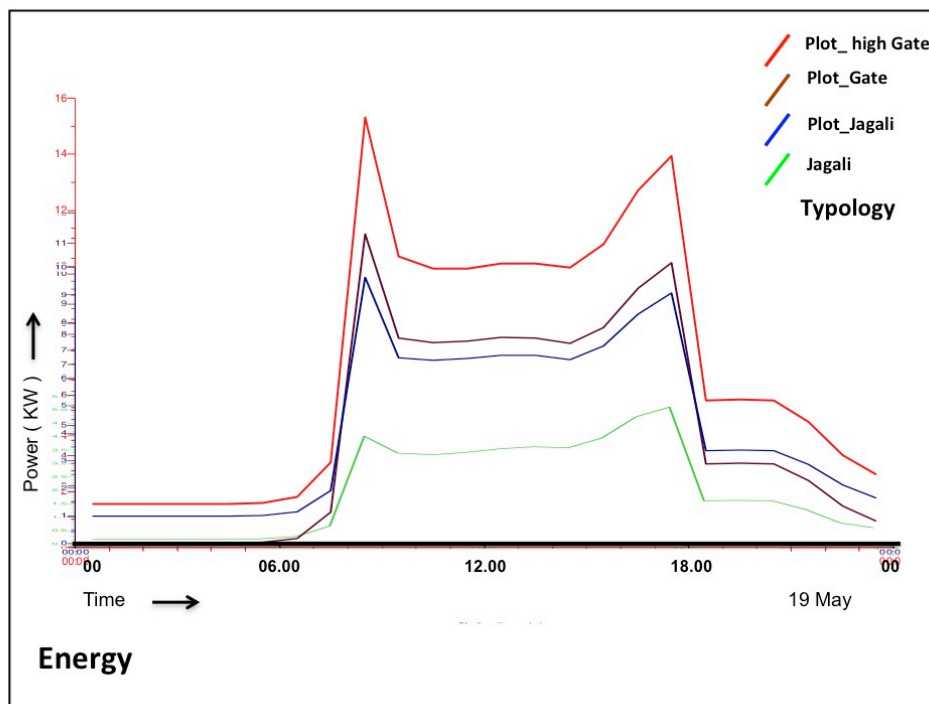


Figure 6-9. IES simulation: Energy consumption

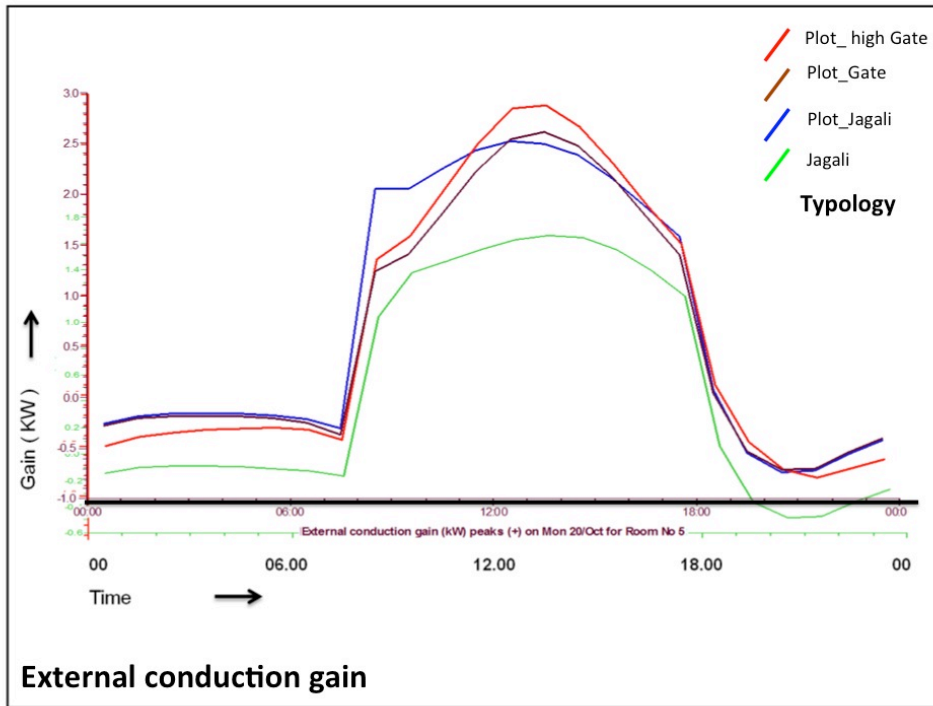


Figure 6-10. IES simulation: Conduction heat gain

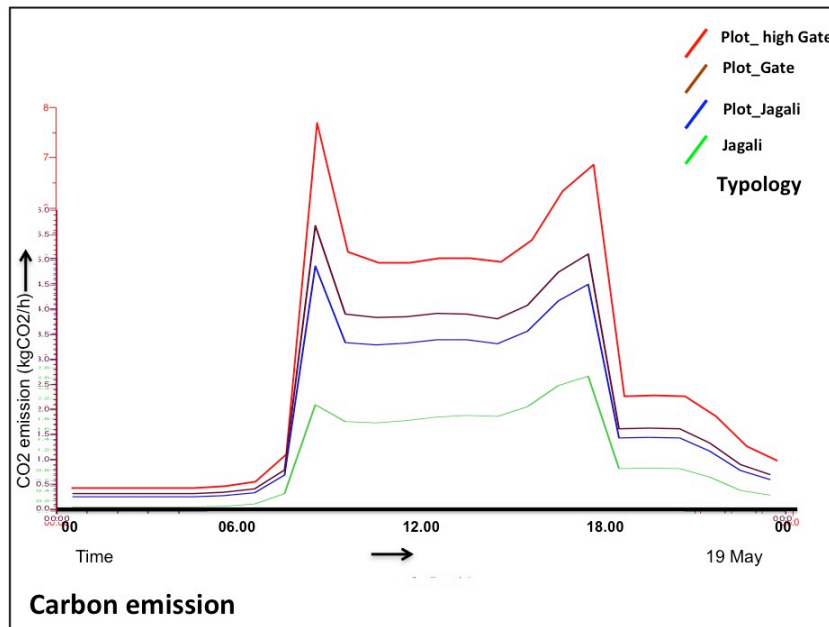


Figure 6-11. IES simulation: Carbon emission

The outcome clearly indicates higher conduction gains, cooling load, energy consumption and resultant carbon emission in the plot and high gate typology (model no) and consistently lowest energy consumption and carbon emission in the Jagali typology.

A key finding is one of increased energy consumption in model four.. It incurs nearly 65% more energy compared to the model 1 that incorporates the Jagali typology. Similarly, there is a difference in the performance of different models. For instance, in the case of energy consumption, the high compound typology requires nearly 300% more cooling load compared to a Jagali house. And even this will increase the conduction gain by nearly 90%. All the results are tabulated and compared in Figure 6-12.

The simulation output demonstrates that changed boundary conditions have an implication on energy consumption and resultant carbon emission. This also validates the hypothesis while developing models exploring different boundary conditions (Figure 6-3 and Figure 6-8). It also clearly shows a direct relation between people's changed preferences, aspirations and its implication on energy consumption and carbon emissions.

Once the models are simulated and energy consumption and carbon emission are quantified, they are tested for their acceptability and preference by the stakeholders through series of qualitative fieldwork.




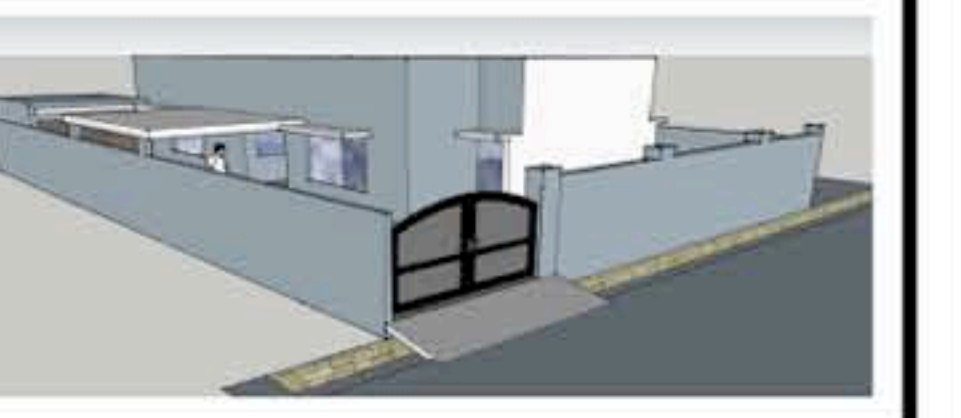
| IES Simulation Result | | Typologies -> | | | |
|------------------------------|--|---|---|--|--|
| Parameters | General description | Model 1 Jagali Typology | Model 2 Jagali + Plot | Model 3 Plot + Gate | Model 4 Plot + High Gate |
| | |  |  |  |  |
| Energy Consumption / SMT | Energy consumed by electrical appliances is considered. For uniformity's sake, it is converted to SMT and all the models are compared to the base results of Jagali typology as 0 | Bench mark | 20 % more than Jagali Typology | 35 % more than Jagali Typology | 65 % more than Jagali Typology |
| Cooling load | This simulation result accounts for the energy consumed to cool the internal spaces to a comfortable temperature of 23 degree. | Bench mark | 100 % more than Jagali Typology | 200 % more than Jagali Typology | 300 % more than Jagali Typology |
| conduction gain | Window size is altered in each typology and with other construction materials being constant, the simulation result reflects the conduction heat gain due to size of the opening | Bench mark | 58 % more than Jagali Typology | 65 % more than Jagali Typology | 90 % more than Jagali Typology |
| Embodied Energy | Source of the material, energy consumed for the processing and transportation are considered to qualify the other simulation results | Locally resourced material and construction system. Least materials imported from beyond 10 miles | Most of the materials Locally resourced and few materials imported from beyond 10 miles | Some of the materials are locally resourced and few materials are imported from beyond 100 miles | Least materials used. Locally sourced and most of the materials are imported from far away |
| Total energy consumption | It includes energy consumed due to electrical appliance, maintenance and cooling load. | Bench mark | 138% more than Jagali Typology | 175% more than Jagali Typology | 275 % more than Jagali Typology |
| Carbon emission / SMT | Total carbon emission due to energy consumed due to maintenance and cooling energy. To bring in uniformity, it is converted to SMT and all the models are compared to the base results of Jagali typology as 0 | Bench mark | 20 % more than Jagali Typology | 35 % more than Jagali Typology | 65 % more than Jagali Typology |
| Summary | | Most sustainable typology | Some of the features are sustainable | Some of the features are unsustainable | Least sustainable typology |

Figure 6-12. IES simulation result

6.5 Qualitative Methodology

The quantitative method adopted provides adequate information about the sustainable parameters of each model. It also helps to triangulate the chart prepared based on the qualitative information derived from the first set of fieldwork and the literature review. With the understanding of the models in terms of their performance, the next step is to test these models in terms of their acceptability. The second batch of fieldwork is conducted to ascertain the preferences of middle class homeowners by interacting with stakeholders, namely owners, contractors, builders and architects (Figure 6-13).

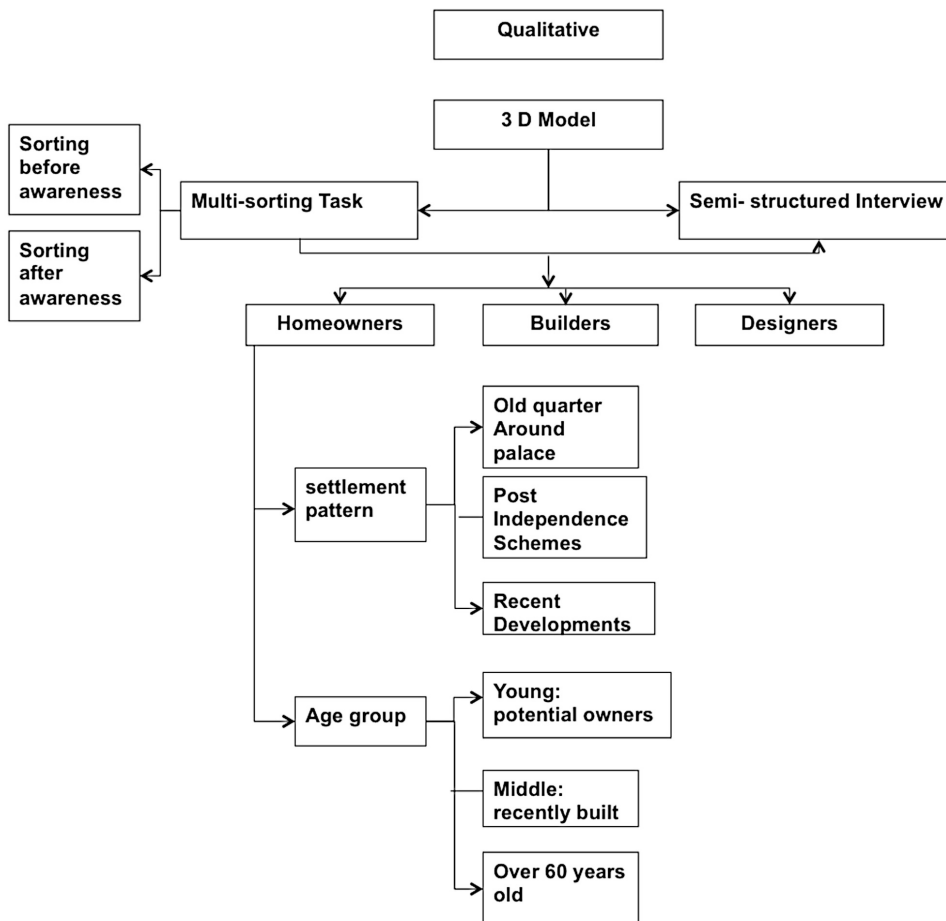


Figure 6-13. Qualitative study structure

During the process of the element analysis of traditional and contemporary boundary conditions, it was evident that there are many variables or building characteristics which could affect the decision process of the participant and hence the methodology should be able to measure these variables.

This process has been identified as correlational design which is different from the active intervention of the researcher in experimental design (Groat and Wang, 2002). In *Architectural Research Methodologies* Linda Groat identifies correlational research as one of the seven research strategies adopted in architectural research. Correlational research is a very useful tool to clarify the relationship among a most complex set of real world characteristics, which are likely to affect the dynamics of socio-physical interaction (Groat and Wang, 2002).

Whyte and Kin have used correlational research in their study of urban plazas in New York City (Groat and Wang, 2002). This process has helped them to understand the naturally occurring pattern of socio-physical relationships. Correlational research has been effectively used to understand the behavioural dynamics of plaza use, the relation between the physical attributes like pedestrianism, social interaction and perceived meanings as attachment and identity.

There are different tactics used in correlational research. Groat and Wang have identified five tactics of collection, coding and interpreting data: surveys, observations, mapping, sorting and archives. A highly effective tool among these, sorting, has been adopted to understand the perception of middle class Mysoreans regarding different elements of boundary conditions.

6.5.1 Multi-sorting Task Analysis

While elaborating on the research process in environmental psychology, Groat argued that it is theoretically possible for the participants either to sort representations of buildings they have experienced directly or pictures which functioned as simulations of the real environments. In most cases the pictures of the

buildings or representative images are used. In her study, Groat used pictures to simulate a real environment (Groat, 1982).

Researchers have argued that sorting allows researchers to conduct surveys without preconception, which will otherwise influence the judgement of the respondents (Rosenberg and Kim, 1975). In the social research area, multi-sorting has been used extensively. For instance, in Crow and Spicers' research of investigating patients' medical conditions, they examined the perception of community and hospital nurses by categorising thirty-five medical conditions (Crow and Spicer, 1995). They could arrive at effective results by a series of card sorting, using a multiple sorting task. While analysing the beliefs and values, Robinson and Ramo employed multiple sorting procedures and multi dimensional scaling analysis. In this open-ended process, participants were asked to sort the belief statement into as many groups and explain their rationale (Robinson and Ramo, 2007).

Uzzell used multiple sorting to examine the travellers experience and their thought towards crime and insecurity (Uzzell and Brown, 2000). Similarly, Mark used semantic differential classification and multiple sorting (Mark, 2010) to examine the use of computer visualisations in urban planning and whether they facilitate effective decision-making and communication within community engagement. In his research to examine public spaces in urban areas, Anirban identified 25 public spaces to interrogate from the chosen four college towns (Anirban, 2008). He used multi-sorting at four levels with open-ended interviews and used naturalistic observation. In the research related to 'images of the past' in Salt city, Ahmed used 40 coloured photographs of older buildings on A4 sheets (Ahmad, 2004). He used recording sheets, verbal responses and background information of the respondent to analyse the data gathered. To analyse people's responses and understanding, he used multiple sorting wherein respondents sorted the photographs based on what they knew, what they thought and actual fact.

In the research examining the comparisons between architects and non architects (accountants) perceptions of modern and postmodern architecture, Groat used colour

photographs as representations and as a technique for multi-sorting. She gave 20 architects and 20 accountants, 4 demographic characters namely: age, sex, race and residential experience. Each group was asked to group buildings of similarity. Next, they were asked to indicate which, if any buildings were recognised, and if so what they knew about them (Groat, 1982). These variations clearly demonstrate the effectiveness of using the multi-sorting task where one has to measure people's perceptions. Moreover this is a proven tool to communicate architecture to non-architects.

The multi-sorting task method was adopted as a tool to communicate the different models prepared earlier to the stakeholders during the fieldwork. The process of preparing cards for the fieldwork as part of the multi-sorting task method and the process of fieldwork and information gathering is explained in the next section.

6.5.1.1 Multi-sorting task cards

Issues or aspects at boundary level are complex and they are both interrelated and interwoven. In most cases, it is difficult to talk about any one element or aspect without drawing inference from other elements. For instance, while understanding or exploring the reason for a particular entrance detail, it is important to highlight the facts related to this element in terms of physical space of concern, visual connection perceived and activities anticipated. If the natural scenario is modelled with colour photographs of an existing situation, there is a greater chance for the respondents to make the choice related to entrance based on other factors like the material or appearance of the entrance way, and what they find in the neighbouring site.

To verify the reliability of the model, it was tested on postgraduate colleagues of different professional and academic backgrounds. They were asked to sort the codes for each element. Soon after the sorting, they were asked to explain their reflections on the selection process and how these images helped them to make informed decisions. One respondent managed to sort the cards, but expressed difficulty in understanding the narrative of focusing on only one aspect. The second respondent

strongly felt it was very difficult to think of elements independently while ignoring other elements visible in the photographs.

Based on the literature review and feedback from the pilot study, cards were improvised to accommodate two major factors. Firstly, real time images or actual building images provided more visual clues than required for the particular task. For instance, when asked to chart the preference of material for finish among stone, brick, plaster, etc. a particular material, say stone, was chosen more for the impressive building it was used for rather than the real material choice as stone. Secondly, the images of the actual building reflect all the elements overlapping and thus it is observed that it is very challenging for the respondents to focus on a particular elements. In some cases, other elements may be over-dominating. For instance, when asked to sort their preferences for opening size, respondents felt their choice was mostly influenced by the aesthetics of the building than merely the size of the opening.

The cards were revised to address these anomalies. Instead of showing the actual building, 3D models of the buildings were created using SketchUp. The area of focus being the boundary condition, to avoid the unnecessary influence, the whole building was not shown. Images are developed to explain the characteristics of the elements of the boundary condition. In this close-up model, the focus is clearly on the elements in question and thus different cards were developed for each element by altering the same original 3D model.

For instance, while asking respondents to sort their preference for each type of opening design presented, the images reflected different opening sizes with minimum information required of the surroundings. In the case of the opening size, the task is to find out from the respondent, their preferences for wide openings, narrow openings, inward looking openings and overlooking open spaces shared with neighbours. All the five preferences were developed with about the same wall area so that only openings and difference in size was explicit.

To make it convenient for the respondents to visualise the information and cards presented to them, all the models had the same feature and the same human figure to give a sense of scale. Furthermore, all the options were depicted or shown from two different viewpoints, mostly the front elevation and a view from about 2.1 metres in height. Again, these views, eye level, and cone of vision were kept constant among all the models.

With this background information, each model was depicted an alternative. To be uniform and consistent, all the monochromatic images prepared were developed using the SketchUp. Only in the case of material choice, realistic images of the different materials are shown. Different cards were prepared to explain each element and only information required for the particular element was highlighted.

These alternative choices of each material were devised from the originally prepared main model. All the elements had a minimum of four alternatives or options to reflect the four models prepared. Furthermore, each element was considered in-depth and analysed against the backdrop of the first set of fieldwork and the literature study to explore potential sustainable strategies. For instance, while preparing alternate models for interaction, openings and two other alternates beyond the four models considered earlier, have been worked out. Provision for sharing open spaces and revised interaction areas were examined by joining two adjacent plots and four plots with two front and two rear adjacent plots. These models were also tested for people's preferences during the second set of fieldwork.

Finally, twenty-eight cards in all were prepared. Each element was reflected by separate cards with alternatives. For instance, In case of volume all the alternatives are presented as six cards, each showing two views of the conceptual detail of each alternative. These cards are coded with the first letter reflecting the element and the second letter the alternative in that element (VH means volume card with high wall and gate alternative card). No other text or information was provided with the cards so that they were consistent and uniform.

6.6 Deployment of the methodologies

Data was collected from multi sort tasking (MST) process, from key players, who included the practising architects, builders, contractors and homeowners in Mysore. Having gained experience from the first set of fieldwork, great care was taken while choosing the practising architects and contractors to conduct the survey. A profile of all the practising architects at Mysore – that is about 25, which were collected from the institute of architects – was carefully studied.

The architects and builders are interviewed to understand their perception of aspiration, expectation and design process of middle class homeowners. Thus architects were shortlisted based on their background and their interaction with middle class homeowners. For instance, two architects interviewed during the first set of fieldwork, whose focus is on urban design and planning were eliminated from the list. Furthermore, architects with a minimum couple of years of practice were chosen so that they would have the experience of interacting with different homeowners. In total, twelve architects were interviewed (Table 6-1). During the process, one architect's feedback was considered as that of a builder's as the nature of the project and process followed was closer to that of builders.

Builders were chosen following a close scrutiny of their work to ascertain their experience in residential projects on plotted development. A list of builders was shortlisted from the registered builders in Mysore. With the assistance of the president of the builders' association (Respondent no.102), a list of builders who handle middle class residences were identified. Apart from this, to represent the cross-section of contractors, three contractors, who were not registered builders but who construct houses as per the requirement of the homeowners were also interviewed. The interview was conducted in all locations including people's offices, residences, on construction sites, in nearby restaurants and even in their cars. In all twelve builders were interviewed.

| | Homeowners | Architects | Builders |
|------------|------------|------------|----------|
| Interviews | 25 | 10 | 12 |

Table 6-1. Number of respondents, second set of fieldwork, Mysore 2011

While selecting the home occupiers, as explained during the first set of fieldwork, care was taken to ensure that different settlement patterns were represented. This included the old quarter of Mysore around the Fort and Palace that featured Agrahara layouts, those living in post independence planning schemes and those in recent private sector developments. A wide spectrum of respondent occupations were collected including government employees, state agencies, in addition to more recent additions such as the software and IT sectors (Table 6-1).

Furthermore, to understand the change in patterns and attitudes, the interviews were conducted with people from different age groups. The cross-section includes teenagers and potential young homeowners, who have less specialist knowledge of the building, design and construction process. Another category included middle aged people who had recently built their homes in order to get a good representation of the prevailing situation and finally, elderly people, over sixty years old, were interviewed. Their feedback helped to track the change in values, attitude and aspiration and to see which direction we have come from and where we are heading (Schwartz, 2001).

A pilot survey of the multi-sorting task was conducted before starting the full survey. In the beginning, one representative from each section – an owner, an architect and a builder – were chosen and tested. Apart from the outcome of the MST process, the participants were asked to provide feedback on the MST process; its legibility, the amount of information provided and any information required including any other

issues to be addressed. Most of the feedback was constructive and was included while conducting the fieldwork.

The same cards were used among architects, builders and homeowners to maintain consistency, which helped to differentiate attitudes between the professional practice, understanding of the designers and homeowners' perception, their social profile. The cards were consciously designed to show only two pictures and no further explanation was given. Further information is provided for the respondents based on their requirement. Again, the information provided was neutral; it just explained what there was and what was happening rather than clarifying the implications. As noticed in the fieldwork, most of the respondents could read the cards without much help and some, who had difficulty reading, could understand the process extremely quickly.

The process of sorting was made very simple to be user-friendly for all the stakeholders and was carried out at two levels. A chart with a scale of five levels 'with most likely to use' and 'least likely to use' was plotted on an A3 sheet, where one card could comfortably sit in each of the five columns identified. Because of the size, it was very easy to conduct the interview at any given place. With a very brief introduction, each element was introduced to the respondent and each card was explained briefly as to how they could address that particular boundary condition. For instance, while asking respondents to chart their preference for security, all the four options worked out were given to them as four cards in random order of sustainability. Only if required, a brief explanation was given as to how each card addresses the security concerns at the boundary. Once respondents understood what was happening visually, they were asked to place these cards on the A3 sheet in terms of likelihood of usage.

Once they confirmed their choice, their preferences were noted in a log sheet and the next set of cards explaining another element of boundary condition were given out. Once they were familiar with the process, it usually took one or maximum two

rounds of sorting for them to note their preferences and a follow-up semi-structured interview was then carried out.

This process worked more as a discussion, or narration of their choice or rationale for placing the card in a particular place (priority). The questions asked were very simple and straightforward, such as why they chose that particular place for that model. Once a minimum level of understanding was established, they were asked more about their most likely and least likely choices, where again the questions were mostly leading in terms of “why do they think this model will not work or what can they accept” and in some cases “what has to be altered to make these models work?”. The outcome was extremely useful and highly informative while analysing people’s aspirations and expectations later.

Apart from the introduction of broad research area, throughout this process, the respondents were asked to place the card based on their preference, and at no given time the implication of their choice was discussed. It was even made clear that all the options were worked as potential possibilities for middle class houses at Mysore, based on the feedback from the set of first fieldwork.

The process worked effectively and efficiently as most of the respondents got involved in the selection process. When all the elements had been sorted, respondents were given a brief introduction to the sustainable built environment, energy consumption and carbon emissions, drawing specific reference to practices at Mysore. The charts and graphs analysed from the IES simulation and simple charts prepared overlapping performance of four models were explained, and the significance of homeowners decision-making and its implication on sustainable housing was pointed out.

After the brief explanation of about 3 – 5 minutes, respondents were asked to redo the whole process of sorting their preferences of each card, but this time they were told about the impact of their choice on sustainable housing.

In most cases, the cards were given to them in the ascending or descending order of sustainable features among the choices and they were asked to place the cards as most likely to least likely use. By now, they were very familiar with the cards and scale. The semi-structured interview was used to ask them specifically as to why they think a place is right, if they changed their choice, why, and if they did not, why not and so on.

Although for the respondents it looked like one A3 sheet with 28 postcards, it was an intensive task as this allowed one to engage with them and to learn which elements they thought they could alter their preferences in view of the larger cause and those they could not.

6.7 Observation, analysis:

The outcome of the multi-sorting task, including the feedback from the semi-structured feedback and earlier research analysis has been overlapped to understand people's perception, expectations and aspirations. First it was analysed and the results reflected on. In the next chapter, these results are interpreted on broad themes specific to the study area and in general to see which has an implication on the study area.

6.7.1 Building Volume

In the case of building volume, when asked about middle class homeowners' preferences, almost all the architects felt that middle class clients would prefer a typical plot with a four-foot high compound model (**Figure 6-14**). Builders and contractors (Referred to as builders henceforth) expressed similar views; every builder interviewed was of the opinion that the middle class homeowners of Mysore would prefer the plot typology (**Figure 6-15**). The reasoning for their choice goes beyond the basic difference between each model. The concept of owning a plot and

identifying themselves by identifying, demarcating and later glorifying has become normal and key players find many issues which are forcing homeowners to move away from the earlier Jagali typology. According to one builder interviewed, “Privacy, dust and vibrations due to vehicle movement, forces people to build their house away from the road” (Respondent no.111). Another builder felt that privacy is a major concern and people would prefer not to build “their house on the street without privacy” (Respondent no.109).

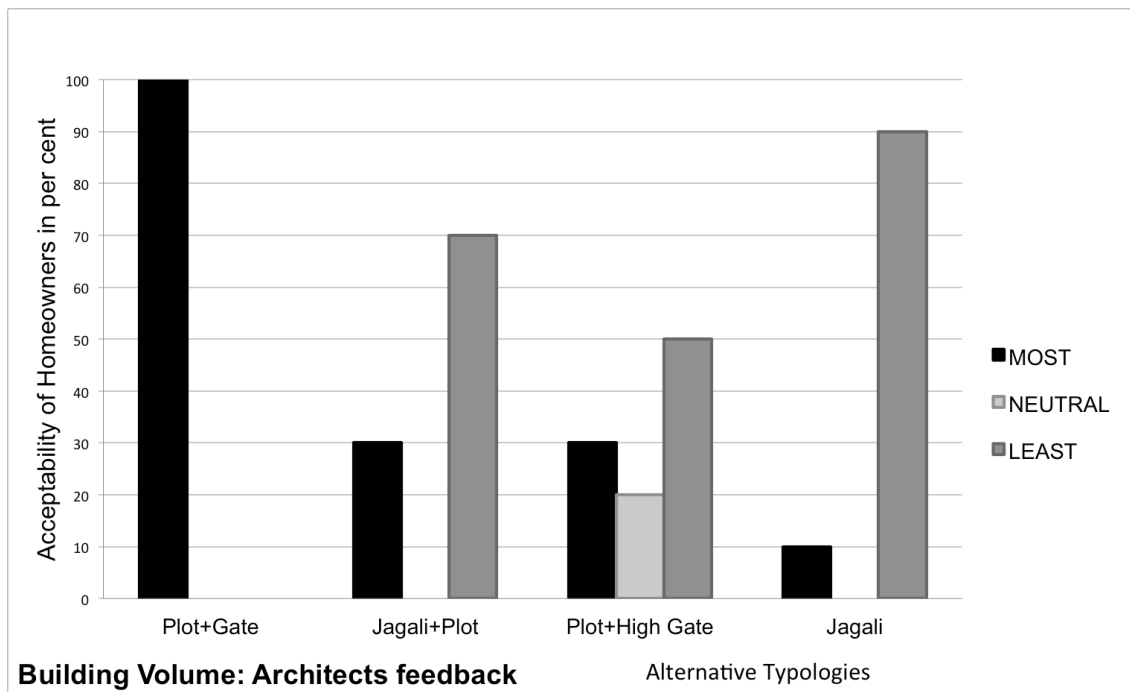


Figure 6-14. Building Volume: Architects feedback

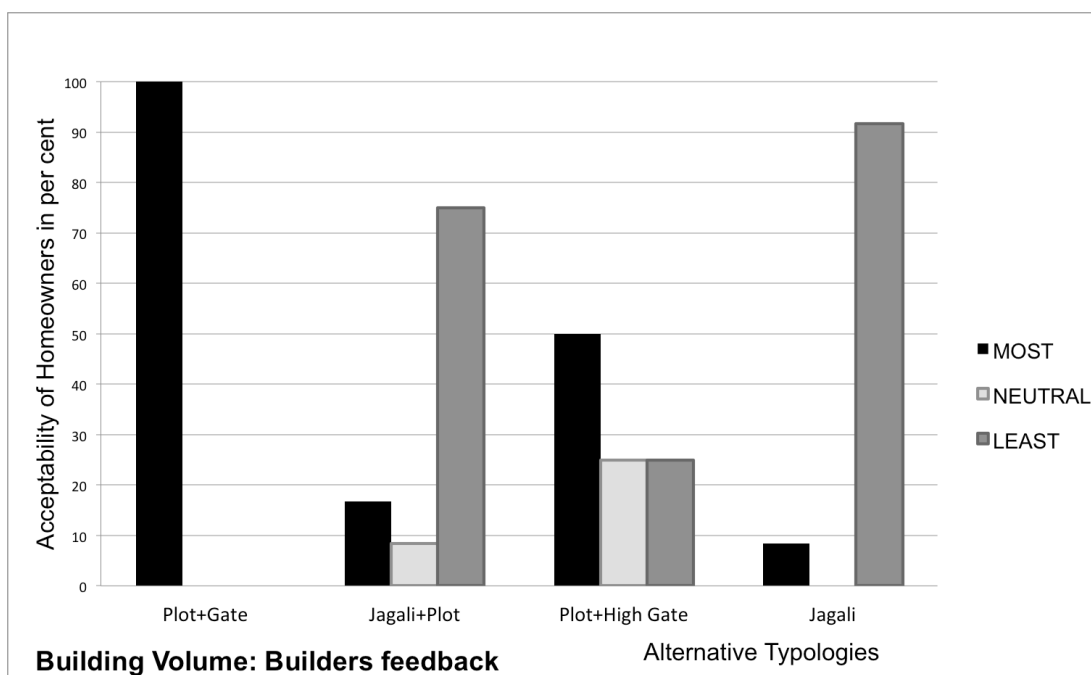


Figure 6-15. Building Volume: Builders feedback

When the same question was asked directly, the homeowners echoed similar views. Over 95% of the house owners strongly preferred the typical plot typology (**Figure 6-15**). When their attention was drawn to the well-established Jagali typology, they felt there is clear deficit of trust among neighbours which is crucial for community living (Respondent no.98). In the prevailing complex social structure, compatibility of neighbours was one of the critical concerns while defining boundary conditions. When specifically asked about the significance of a wall between the neighbours' plot and their height, one respondent summed it as: "If the neighbours' attitude matches ours then we do not mind, otherwise it is difficult; we had a low wall earlier, now because of new tenants, we have raised the wall" (Respondent no.97).

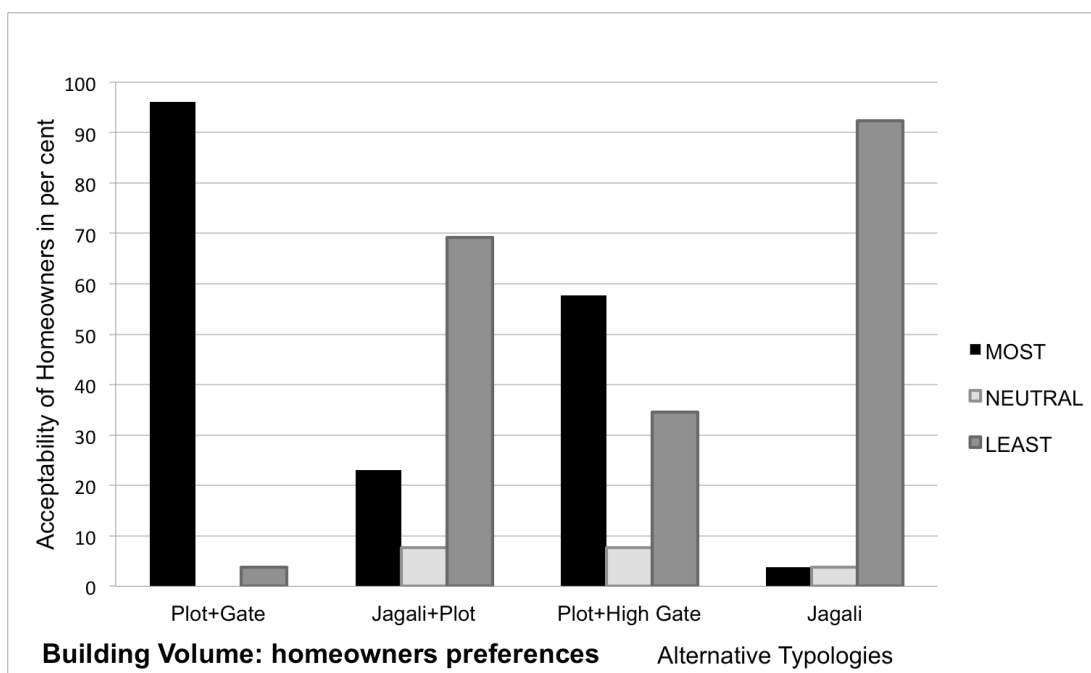


Figure 6-16. Building Volume: Homeowners’ preferences for alternative typologies

On further examination of the Jagali typology and a closer examination of spatial configuration reflects homeowners’ impressions of the Jagali typology. Save for one architect, all the others felt that their clients would not prefer the Jagali typology (**Figure 6-14**). According to the architects, with economic centred housing, people staying together are from different regions and most of the time they do not know each other. In the present working culture, they come back home late in the evening and prefer to spend time with family and in front of TV (Respondent no.73, interviewed on 8 March 11). Another architect feels that the Jagali typology is possible only in rural areas (Respondent no.74), and even if one wished to have it in urban areas, it would only be possible within gated communities (Respondent no.80) or they would “need a boundary to protect the whole area” (Respondent no.74).

When the same question was asked directly, more than 95% of the homeowners said the Jagali typology is outdated and this is their least preferred typology (**Figure 6-16**). Similarly, 90% of the builders feel owners would not prefer the Jagali typology at all (**Figure 6-15**). Furthermore, architects have shown no liking towards

the new typology (model 2: Jagali + Plot Typology) (**Figure 6-14**), and their preferences are evident as more than 70% dislike the new typology, the combining Jagali concept and plotted development (**Figure 6-16**).

There are many reasons for their disconnect: the most critical ones could be summed up as privacy and identity. As one architect mentioned, the Jagali typology is “too transparent” (Respondent no.80, interviewed on 11 March 11), which is echoed by an owner, who does not like the Jagali typology because, “everyone can see, there is no sense of ‘our house’ ” (Respondent no.95). Other reasons include it being very noisy (Respondent no.100) and outdated (Respondent no.96). The concerns expressed were more fundamental, for instance one respondent argued that without a compound, a house loses its aesthetic value and with no defined boundary, one won’t know who is entering whose house (Respondent no.92). This sense of identifying one’s boundary is critical and respondents strongly felt they should know which their place is (Respondent no.99, interviewed on 21 March 11). One resident went a step further to clarify his future concerns as “we don’t know what will happen with the next generation. Once we’ve spent so much, we don’t mind spending little more and erecting compound” (Respondent no.90).

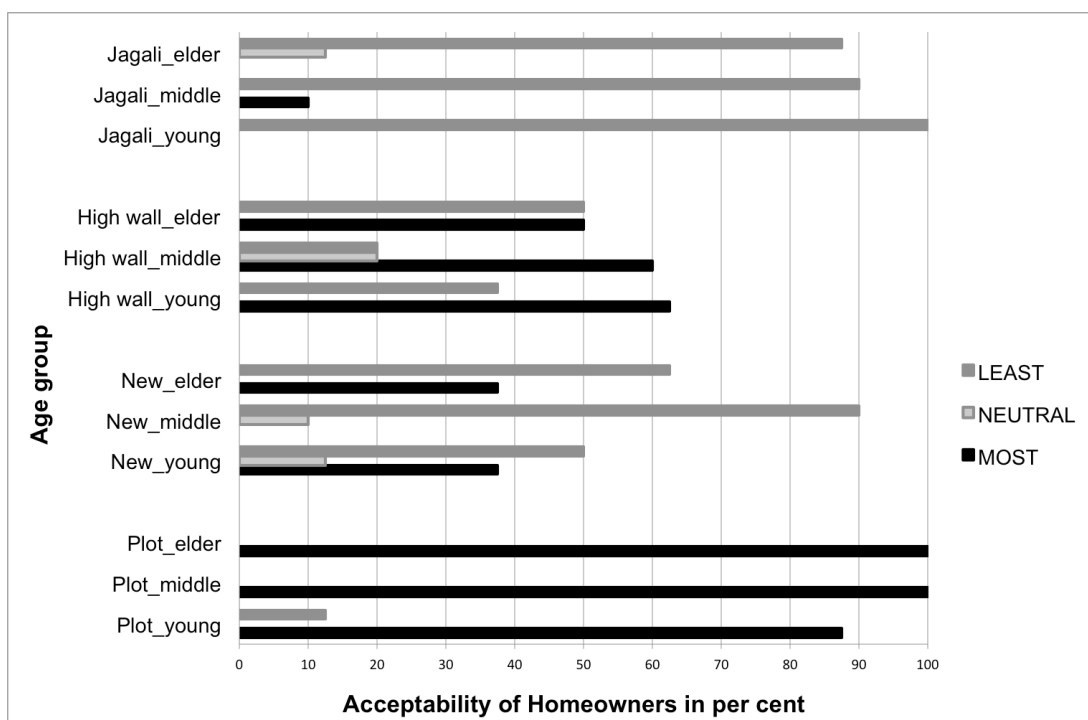


Figure 6-17. Building Volume_Homeowner Age group analysis

The change in attitude is clearly evident among most younger respondents who do not like the Jagali typology, compared to a smaller number of middle aged people who don't like it and an even smaller number of elderly people who dislike the Jagali typology (**Figure 6-17**). The concept of private space in this transition area has taken over the Jagali type community spaces, where owners prefer private gardens (even a small patch of green) and can protect their plants (Respondent no.93).

When it comes to the most aspiring high wall model, their opinion is evenly divided with more architects believing that a high wall will be least liked by homeowners (**Figure 6-14**). According to one architect, it is more clients-led, where people demand a high wall, which are encouraged and accommodated by architects (Respondent no.74).

More builders compared to architects think their clients prefer high compound and gate typology. Again, more builders – up to 75% - think their clients would not

prefer the new typology (**Figure 6-15**). According to a builder, the high wall is the concept of rich people, which is copied by middle class homeowners (Respondent no.114).

Compared to architects and builders' perceptions, homeowners' feedback suggests that they are more likely to use and prefer high walls (**Figure 6-16**). Though high walls are usually for big bungalows, it is not uncommon among middle class houses (Respondent no.86). Similarly, fewer older respondents prefer a high wall, compared to more middle-aged people, and again more younger respondents prefer a high wall (**Figure 6-17**). Younger respondents prefer a high wall because they are not interested to know their neighbours and they consider it as a lack of privacy and feel more comfortable with a high wall around them (Respondent no.107). On the other hand, elders look at the practical issues and disadvantages of high walls. According to one respondent, "there are complications because of higher compounds: e.g. the neighbour's house meter was stolen in the middle of the day. Had there been a low wall, it could have been avoided" (Respondent no.87).

One of the main changes in the way roads are used and the resultant concerns of safety, pollution and disturbance are identified as the reason for moving away from the traditional typology. In the complex class and cast system, concern of privacy and to differentiate themselves from neighbours along with concern of intruders, have been the influencing factors for homeowners to define their territory and insulate it by raising the compound and gate. While these high compounds are used to express their wealth and status, the traditional typology without a compound is considered suitable for lower class people and homeowners consider this as a downside compared to the upward mobility and expectations of owning a individual house with defined boundary.

6.7.2 Entrance Sequence

In the case of the entrance, when architects were asked about middle class homeowners' preferences, almost all felt that homeowners would prefer the plot typology and all felt that the Jagali typology would be least preferred by the middle class homeowners (**Figure 6-18**). Builders also expressed similar views with more than 80% of them endorsing the plot typology as most likely to use and more than 90% think homeowners would not prefer the Jagali typology (**Figure 6-19**). The concept of owning a bit of open space in front of the main door plays a crucial role. This space is the mostly utilised external area apart from utility space at the back. As one architect observed, "The Indian tendency is to hang around, they don't leave abruptly. The elderly are more comfortable in these spaces. These spaces are used most. These transition spaces are most useful if plot size allows them to have sufficient open space. Entry may not be very direct but close to the gate" (Respondent no.79).

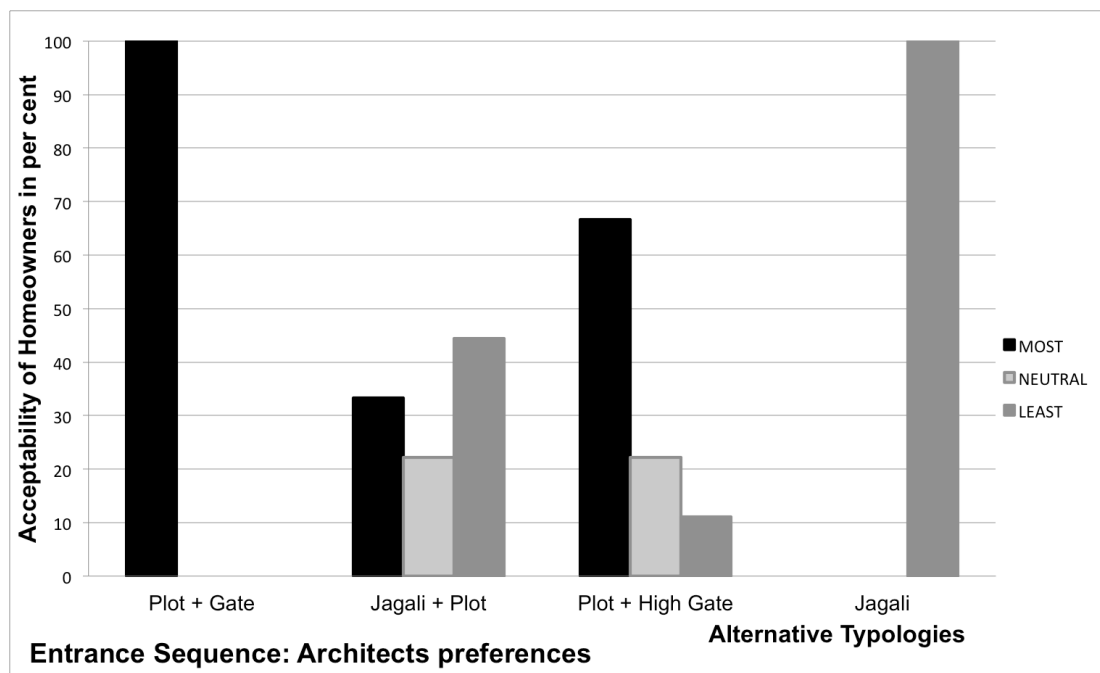


Figure 6-18. Entrance Sequence_Architects feedback

When the same question was asked directly, the homeowners echoed similar views. About 90% of them were most likely to use the plot typology and the same number

of respondents expressed that they were least likely to use the Jagali typology (Figure 6-16). During the interview, homeowners were quick to identify that their concerns necessitate defining and glorifying their territories. The issues ranged from social to cultural and logistical concerns. According to one homeowner, a “compound is a must as you don’t know how relationships, security and privacy will change (Respondent no.87). When asked to specifically to mention their concerns, one homeowner felt “neighbours had dogs, pigeons, etc and were never bothered about others... Neighbours take other people’s fruit, so raising the compound was the only option” (Respondent no.85).

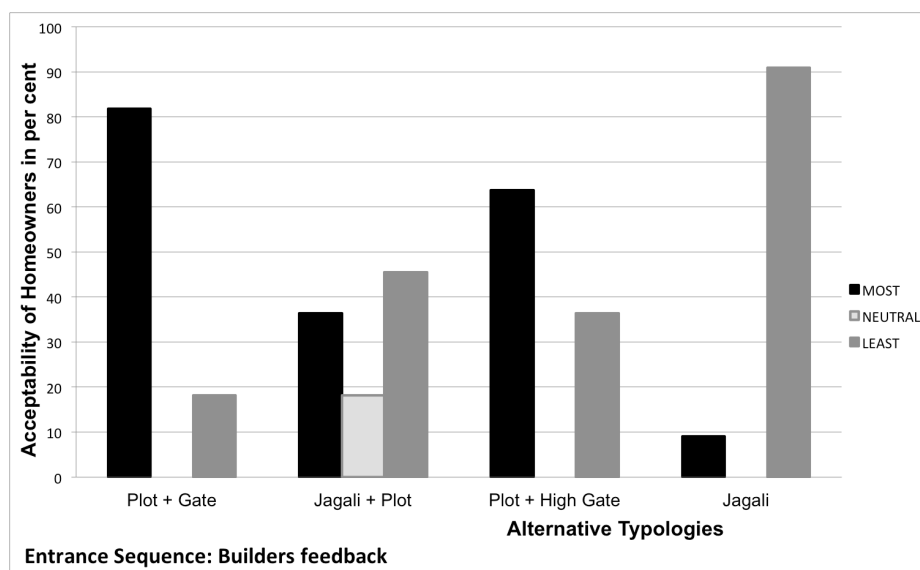


Figure 6-19. Entrance Sequence_ Builders feedback

When specifically asked about the reasons for their least preference being given to the Jagali typology, builders felt it is out-dated; it is only suitable in villages (Respondent no.115). Most the respondents felt it is not suitable in cities as the inside of the house is directly visible to passersby and the public, which is not preferable (Respondent no.86). The same reason was given for the new typology as it reflects the similar configuration. According to an architect, these new typologies will be liked in but not in a moderately populated area (Respondent no.77.). The shift in homeowners’ priorities and concerns are consistent and homeowners who were residing in these Jagali typologies till recently also expressed similar views. Asked

about their personal experience, one respondent said: “we were living in a Jagali sort of house before moving here. One day a lady just walked in, we were shocked and taken aback... we do not prefer Jagali houses and direct entry to house from the street” (Respondent no.88). Dislike is more evident among middle-aged homeowners and younger respondents when asked about their preference for the new typology, combining Jagali typology and plot demarcation, more elders, about 60% are inclined to adapt to the new typology compared to less than 10% middle aged people and about 25% youngsters (Figure 6-21).

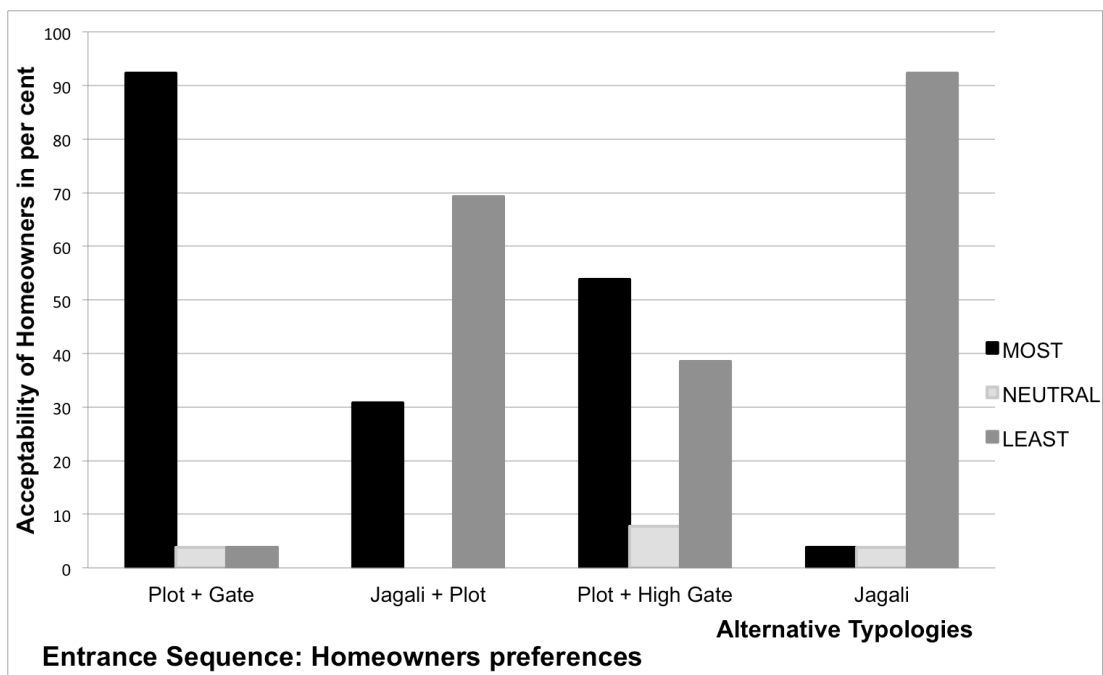


Figure 6-20. Entrance Sequence_ Homeowners’ preferences

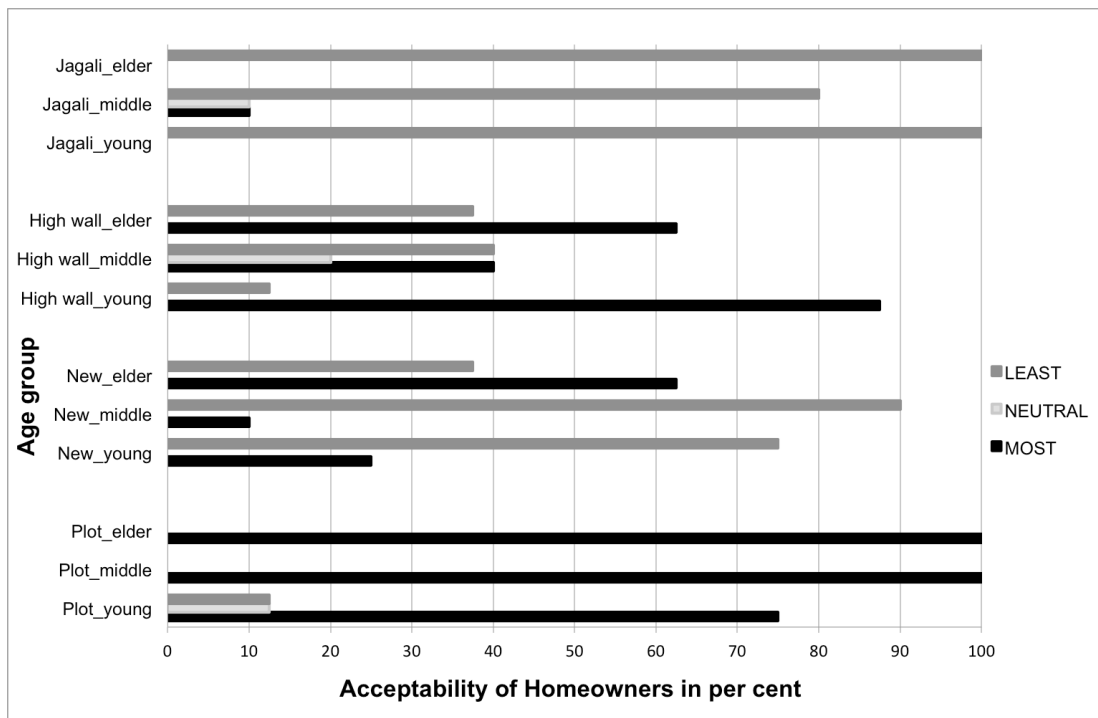


Figure 6-21. Entrance Sequence_ Age group analysis

On the other extreme, the model which is most popular among middle class demographics, the high wall and gated typology, was preferred by some middle classes for its obvious advantages. Deep, recessed entrance provide a closed and private space (Respondent no.95, interviewed on 19 March 11) and according to another respondent, a little higher wall is very useful as it avoids dust (Respondent no.99, interviewed on 21 March 11).

According to the survey, more than 70% of the architects feel the high wall and high gate typology are preferred by homeowners and only about 10% think it may not be homeowners' choice (Figure 6-18). Furthermore, architects' feedback suggests that higher middle class homeowners prefer deeper entrances with high wall and high gate typology.

Opinion is divided about the high wall where 60% of the builders think homeowners would prefer the model whereas about 40% think the other way and builders strongly feel that a high wall is the concept of affluent demographics (Respondent no.114,

interviewed on 12 March 11). Again, more than 50% of homeowners prefer the high wall and gate typology when it comes to entrances (**Figure 6-18**). Further analysis reflects differences in the opinion of homeowners of different age groups. For instance, while nearly 100 % of the middle age homeowners prefer the plot typology, only 75% of youngsters prefer the plot typology, who have strong preference for the high wall. Whereas only 40% of middle age homeowners prefer the high wall (**Figure 6-21**).

Respondents' feedback clearly suggests a move away from Jagali typologies and strong preferences for plot typology. Furthermore, the inclination of youngsters towards the high gate compared to elders also reflects the trend, which is further confirmed by not many preferring the new typology which incorporates the Jagali typology.

Altered social requirements have played a crucial role while defining the space and activities at the entrance. Homeowners' preference to interact with known or selected people has resulted in the prevailing plotted development as the most favoured typology. This clearly suggests that homeowners still use the open and semi-open spaces in the transition space, whereas it is now not totally public and they prefer them for their personal activities.

6.7.3 Opening Configuration

In case of openings, when asked about middle class homeowners' preferences, nearly 90% of architects felt that homeowners would prefer wide openings (**Figure 6-22**). Similarly, more than 90% of the builders felt that homeowners would prefer a wide opening (**Figure 6-23**).

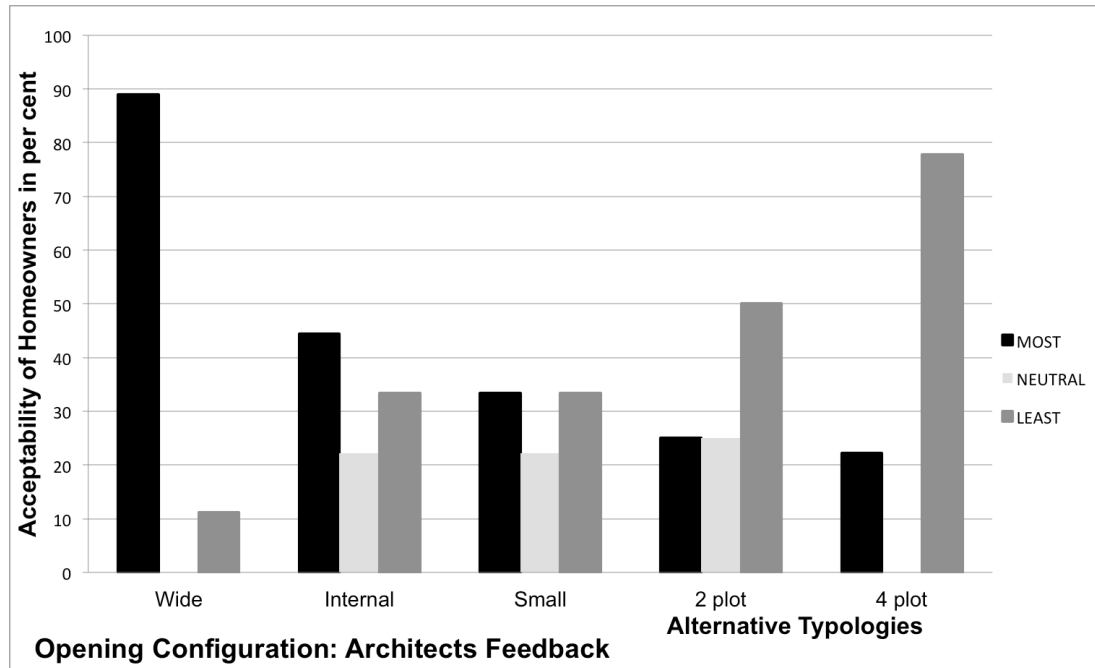


Figure 6-22. Opening Configuration_Architects feedback

Preference for wide openings is evident and in most of the cases it is not followed by any rationale even among professionals. When asked this, drawing attention to conduction gain due to over-glazing, one architect emphasised the importance of ambience inside. According to him, “I give more light and ventilation as it will affect their attitude. If you make it highly climate responsive, the interiors may be ill lit, dingy and the attitude of the people would be very narrow” (Respondent no.75). When specifically asked about orientation and size of the opening, one architect felt that irrespective of the orientation all clients would prefer one wide opening towards the front (road) side (Respondent no.77). Another architect clarified that with the bigger windows, visually homeowners feel elated. And to reduce overheating, they cover windows with curtains (Respondent no.7). Furthermore, these windows play a major role in informing people's choices and interests. As an architect pointed out,

“They prefer big windows facing the street with teak wood to make a statement. Chajjas²⁶ are decorated; it is a statement to show how much they can spend on elevation and the opening becomes part of it...” (Respondent no.80). A similar opinion can be traced from the builders, where one builder interviewed felt homeowners use curtains to reduce over heating (Respondent no.109).

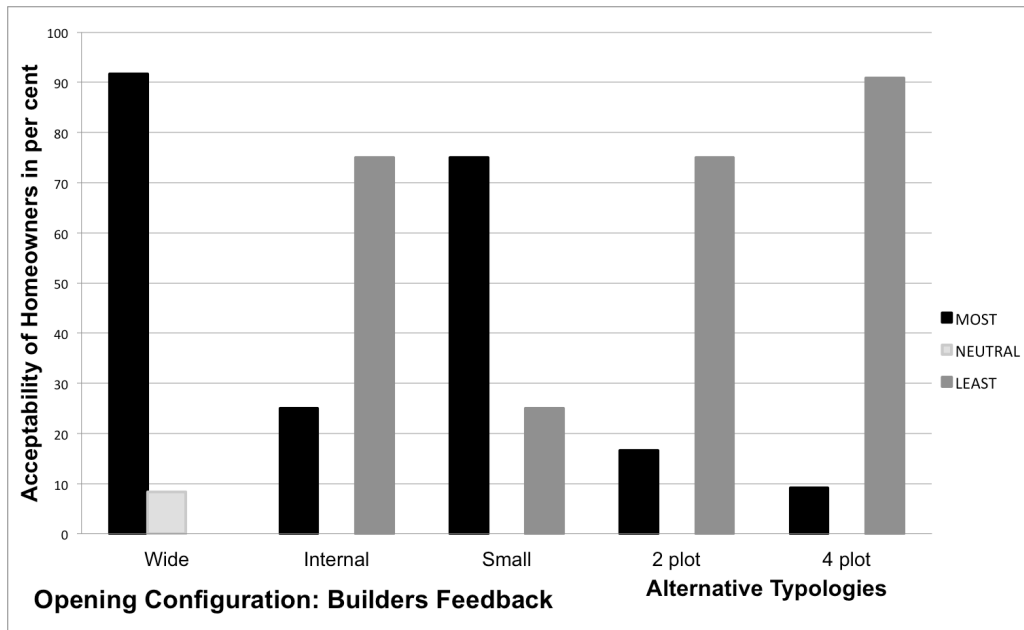


Figure 6-23. Opening Configuration_Builders feedback

Contrary to architects’ and builders’ perceptions, less than 70% of the homeowners prefer wide openings (**Figure 6-24**). This is important against the backdrop of 90% of architects and builders preferring wide openings. Again the rationale for a wider opening is related more to aesthetics than quality of light required inside and homeowners had the same solution of using a curtain to control the amount of light (Respondent no.106).

²⁶Chajja is the term used in the Indian subcontinent for the projecting or overhanging eaves or cover of a roof. Nowadays, Chaaja is the terminology commonly used for the structure above the windows to protect them from rain and glare.

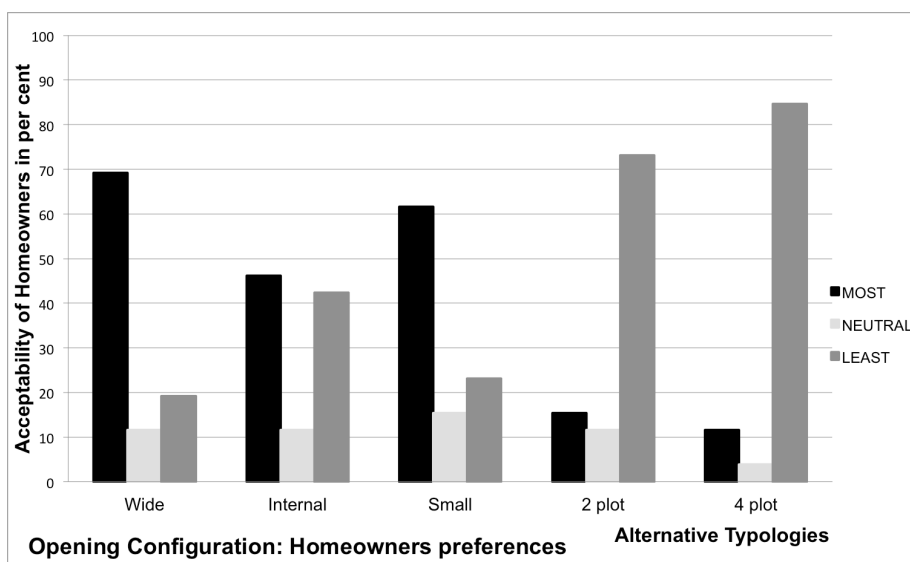


Figure 6-24. Opening Configuration_ Homeowners preferences

The size and location of windows have less relevance in terms of light and ventilation. According to the feedback received, in most of the houses, no one opens a single window shutter (Respondent no). The reason to keep it permanently closed is due to insects, fear and security. They will not let a breeze in but put on a fan (Respondent no.81). Furthermore, more than 85% of elders would prefer wider openings compared to less than 80% of middle aged people and only about 38% of youngsters prefer wide openings (**Figure 6-25**). Further analysis reflects differences in the opinion of homeowners of different age group. Elders would prefer to look outside and be connected to the street visually compared to middle aged owners. More youngsters, about 75%, would prefer inward looking openings (**Figure 6-25**).

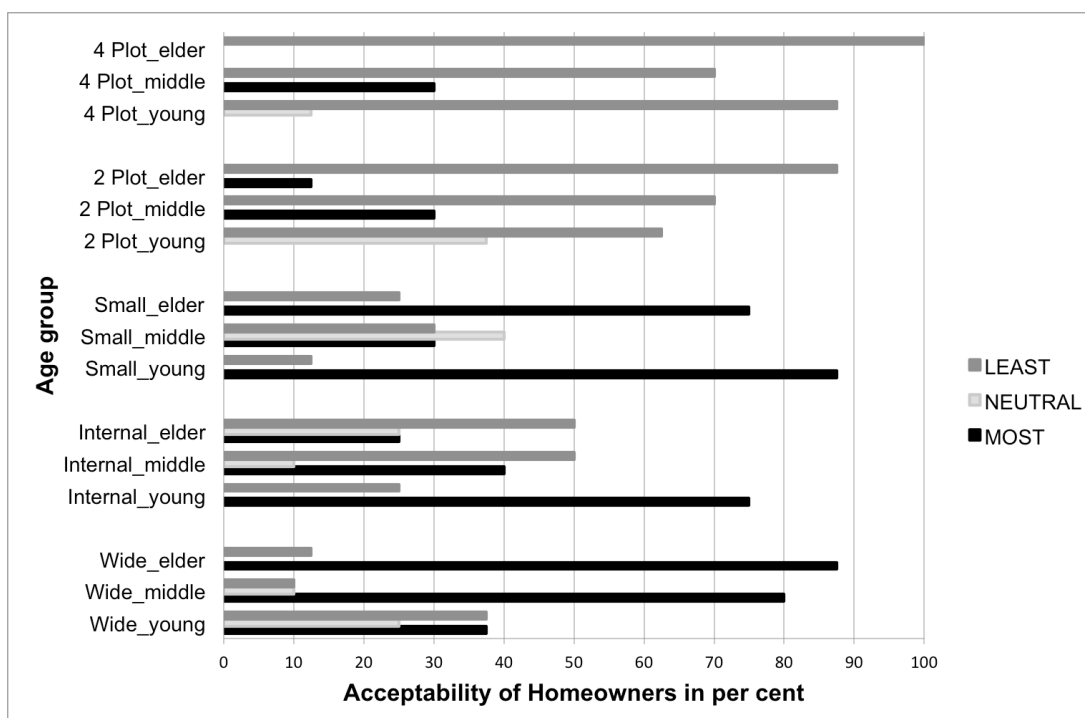


Figure 6-25. Opening Configuration_ Age group analysis

When asked about climate responsive narrow openings, surprisingly very less architects, about 30%, like narrow openings (**Figure 6-22**) compare to above 70% builders prefer small openings (**Figure 6-23**) and above 60% of homeowners prefer narrow openings (**Figure 6-24**). The reason for the low acceptance rate could be attributed to lack of awareness and peer pressure and looking at a wide opening as a status symbol.

The concept of using a window for good lighting and ventilation and to interact with neighbours has not been successful. Up to 25% of architects think that middle class homeowners would prefer openings towards shared spaces with neighbours (**Figure 6-22**). According to them, less people might dislike this concept, about 70%, which is less than 90% of builders. Similarly, more than 90% of the builders felt that openings overlooking the shared spaces of the neighbours would be least preferred by the homeowners (**Figure 6-23**). Most of the homeowners would prefer not to have their windows opening to shared open spaces with their neighbours.

Again, the low acceptance rate could be attributed to issues related to regulation, social criteria and concern of privacy. According to one architect, changed social network and priorities makes this the least feasible typology (Respondent no.76). According to another architect, “two plot and four plot sharing community spaces are not acceptable in the urban scenario; in rural areas it is fine. Even regulations do not permit them to do this” (Respondent no.79). One builder posed a more practical concern that flexible design and spatial organisation mean these two or four owners will have their own plans which may not match, unless built together and all buy into it. Thus the builder feels that this typology is suitable for group housing and not for individual plots (Respondent no.115).

Homeowners also expressed similar concerns and stressed more on the practical concerns which bothers them on a day to day basis. One respondent looks at this more as a challenge as a lot of cooperation is required by all the owners involved and according to him this typology can only work when the owners are relatives or kith and kin (Respondent no.86). It is important to note that the very reason for people to move away from the Jagali typology of social living was to move away from being too close to their kith and kin (**Figure 4-4**). Other owners reflected on the issues or concerns in terms of its implication on privacy and concern of noise (Respondent no.100) and many others responded similarly as privacy is critical and sharing open spaces and openings overlooking them will not work. Again, reluctance to open the windows towards shared spaces is more common among elders, close to 100%, also they think this is not feasible as they are more concerned with who their neighbours would be (Respondent no.106) and what will happen tomorrow (in future) (Respondent no.88) and thus strongly prefer to take an individual approach.

Having a large opening is one of the most aspiring requirements of the homeowners. They tend to attach it to status and wealth of the owner. In the process, not many owners are concerned about the orientation of the openings and lack of awareness among designers and builders have also increased the emphasis on large openings. Furthermore, planning regulations that do not reflect the orientation has been

instrumental in homeowners’ preference for climatically insensitive, European model of wide openings.

6.7.4 Building Security

In the case of security, when asked about middle class homeowners’ preferences, almost all the architects except one feel social interaction would be the least preferred option for homeowners (**Figure 6-26**). When specifically asked about the rationale behind their opinion, architects touched on different issues including social order, security, privacy and so forth. According to one architect interviewed, the main concern in today’s context is the empty houses in the morning when parents go to work and the kids are away at school, he strongly feels, “lack of social order and government’s responsibility (lack of) forces people to think of their own security” (Respondent no.74). According to practising architects, security and privacy plays a crucial role in housing, due to a lot of theft and burglary, homeowners would take every precaution possible to prevent easy access to unknown people (Respondent no.75).

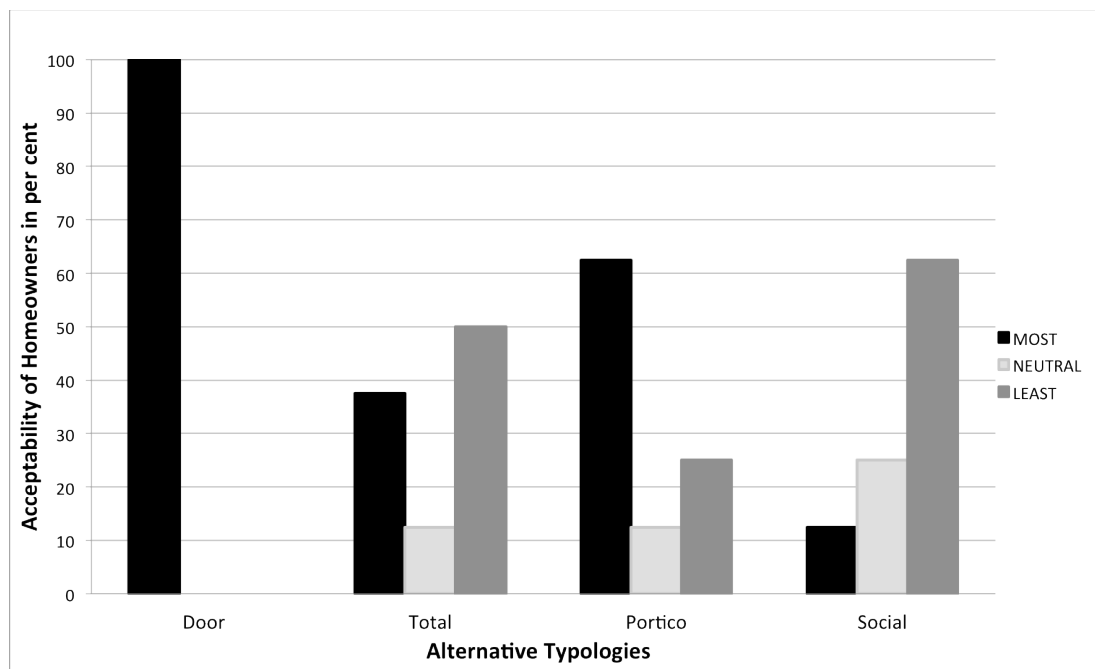


Figure 6-26. Building Security_ Architects feedback

According to another architect, among other issues, social insecurity, burglaries and uncontrolled animals play a crucial role in discouraging people from social interaction. Furthermore, this necessity has become a requirement. In his words, “It has become a requirement to have protection of the boundary. The boundary is a visual barrier to announce one’s territory and vice versa” (Respondent no.76). Finally, with society moving away from an inclusive culture of empathy for the poor, the social spaces have become obsolete. Disparity between haves and have nots is one of the main reasons for the failure of social interaction and semi open spaces (Respondent no.79), which were the hallmark of the Jagali typology.

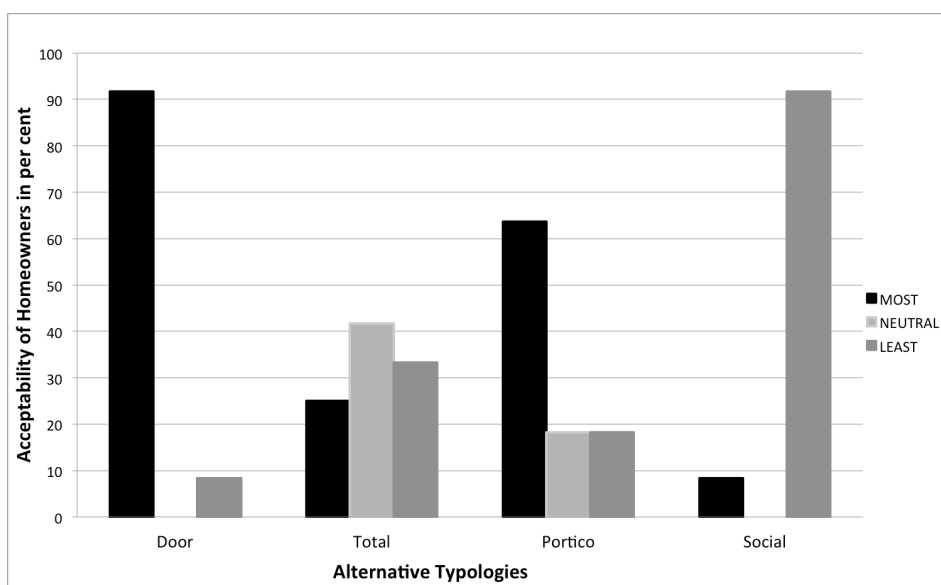


Figure 6-27. Building Security_ Builders feedback

More than 90% of builders feel that security achieved by a socially inclusive system will be least preferred by owners (**Figure 6-27**). Builders share similar views expressed by the architects when it comes to the rationale for middleclass homeowners’ least preference for social interaction. According to one builder, “they want some security, as social interaction never gives comfort and people prefer security (Respondent no.115).

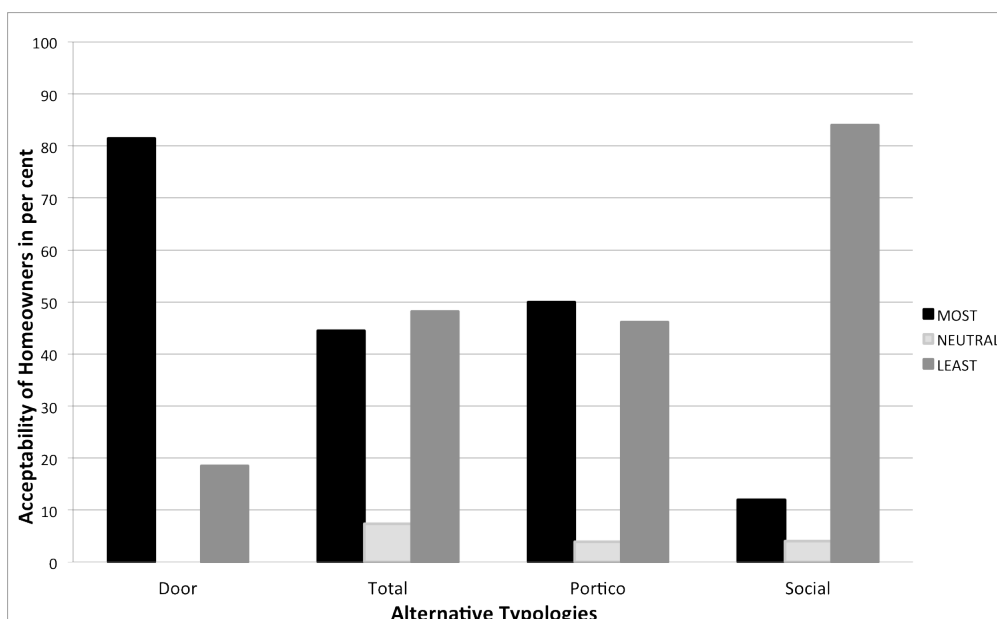


Figure 6-28. Building Security_ Homeowners preferences

When the same question was asked directly, the homeowners echoed similar views. According to the survey conducted, more than 90% of the homeowners are least likely to adopt the social interaction typology (**Figure 6-28**). Since the dislike for the typology, which was prevailing up till the last 40 years, is very strong, owners were further asked about the rationale for their preference through a semi-structured interview. The question of security was broken down to simpler building blocks and a simpler question of their understanding of Jagali typology and its relevance in today's context.

While explaining the difficulties with the Jagali typology, one respondent summed it up as “when everything is open, it is not secured. It is too open. It is not workable in cities because, even if there is any problem, anyone screaming, no one comes to help. Even we do not check our neighbours, we think, why bother. So social interaction will not be feasible” (Respondent no.106).

When it was specifically clarified that social interaction works as it is open and every community member knows what is happening in their community, one respondent strongly disagreed saying “everyone has to keep vigilant, you come home to relax

and rest and do not want the tension of having to be on the lookout” (Respondent no.100). Other respondent felt “Social interaction is not feasible because, major security is required to ensure that no one enters our area. If someone comes in, by the time anyone comes to help (from neighbours) it will be over. So it is better to take precautions. A compound is a must, if you do not have compound, anyone can just walk in. There is no security...” (Respondent no.101).

The same view was reinforced by another respondent who said “in the current situation people can break in, everyone is busy in their own world and TV, even if someone breaks a neighbour’s head, no one is bothered. So it is not feasible” (Respondent no.99). When interviewed, a sociology PhD student narrated a recent incident that happened at the campus staff quarters: “In one house when only the wife and daughter were around, someone came up to the window and peeped in and scared them ... if there were to be a compound, then they would have had some security and privacy” (Respondent no.101).

Reflecting on the values, homeowners feel lack of morals as the main reason for them to protect themselves (Respondent no.91). As there is a clear disparity of different social and cultural sections, one respondent feels personality also matters while accepting this typology. According to him, “it is individualistic, people are more selfish, they are not interested in anyone coming or disturbing them, they are self-centred. In the lower middle class area, even if one stranger enters, everyone comes together to help” (Respondent no.87).

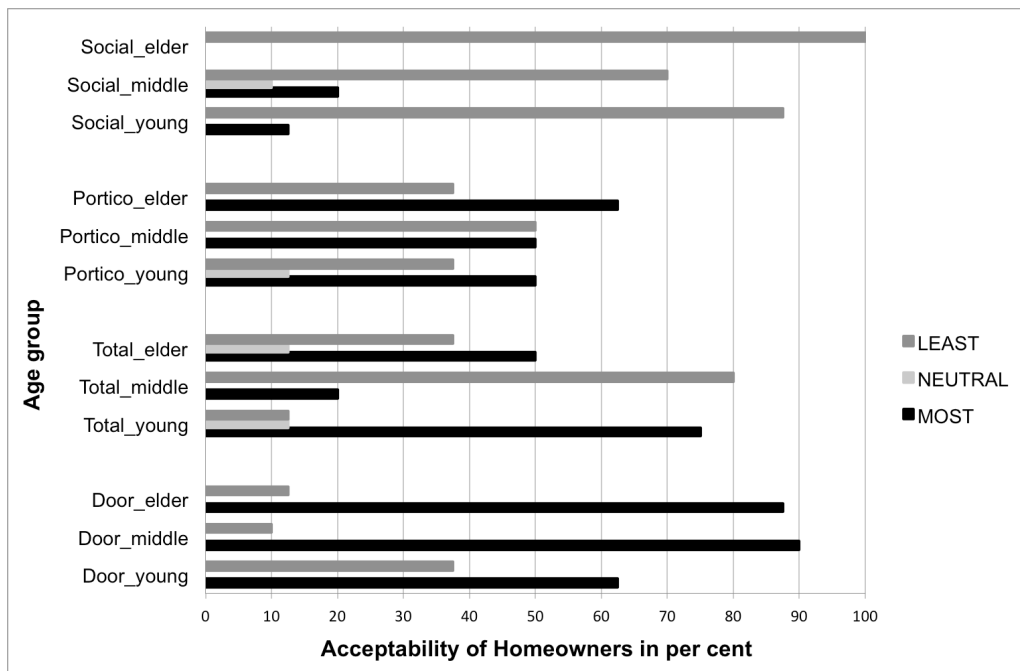


Figure 6-29. Building Security_ Age group analysis

When the same question was asked to a different age group, almost all the elders and about 90% of the youngsters interviewed strongly believe that social interaction will not be effective, while up to 20% of middle-aged people think it could be considered (Figure 6-29). The whole premise is to have control and owners strongly feel that “neighbours’ access should be there but not too much, there should be a provision to control” (Respondent no.86).

When specifically pushed about the concept of energy consumption and emission, owners were mostly clear of their priorities and one respondent clearly argued: “Safety is very critical, energy is only one side of the argument. Safety is more important, even if it costs more than Rs 200, I’m not bothered. Theft is a concern. There are elderly people, vehicles may be damaged and trees may be destroyed” (Respondent no.97).

The other extreme of the social typology is the highly secured, high gate, total security typology. When asked about middle class homeowners’ preferences, less than 40% of architects interviewed think total security covering the whole plot is

essential (**Figure 6-26**). Contrary to architects' and builders' perception of homeowners' choices, less than 50% of the homeowners would like to completely secure their plots (**Figure 6-28**).

Generally, homeowners are not too fond of total security as they feel their home will look like a prison. However they acknowledge the need for security. One respondent narrated a recent experience: "In one house they stole the battery from the car, so they have put a grill for the whole house. It looks like a prison now." (Respondent no.98). Most of the respondents felt that total security is not required and a fully closes environment looks like a prison (Respondent no.102).

Further analysis clearly reflects a difference in the aspirations of youngsters to those of elderly people. The total security typology is preferred most by youngsters, whereas relatively fewer elders and much fewer middle aged people prefer the total security typology (**Figure 6-29**). When it comes to protecting only the portico, more than 60% of the architects think that homeowners would prefer a security grill to be used to enclose the whole portico (**Figure 6-26**). This new concept has been necessitated due to middle class homeowners' affluence, where everyone owns a two-wheeler and most aim to own a four-wheeler (Respondent no.115). As one architect sums it up: "Vehicles are an important factor in defining our lifestyle, they dictate our typology" (Respondent no.76).

About 50% of homeowners would prefer the portico to be covered by security grills (**Figure 6-28**). One variation they would look forward to would be to also protect the rear utility areal (Respondent no.109). One advantage of the grilled portico is that the main door of the house can be kept open and elderly people can move around freely (Respondent no.115). Most of the elders prefer portico security compared to youngsters and middle aged people. Older people find this more comfortable as they can keep the portico grill closed and keep main door open, which visually connects them to the outside world (**Figure 6-29**).

The most prevailing typology is securing the main and rear door with an additional steel door. All the architects interviewed felt that homeowners would prefer an additional steel door to the main and rear door. A similar trend could be observed while interacting with the builders. More than 90% of them believe that homeowners would prefer additional security for their main and rear door (**Figure 6-27**). The main advantage of this typology is that in most cases the steel doors are grilled above the lock rail and both the front and rear wooden doors are kept open, which provides good cross ventilation within the house.

Homeowners have shown varied preference for sustainable features among different elements identified. Security has been the most significant factor which influences their choice. Homeowners have expressed a strong preference for security and therefore have totally rejected the community security which was very effective in the traditional housing typologies. Though there is a tendency to align towards sustainable typologies to some extent in all other elements, they are very particular of protecting their territory and individuals themselves. Their concern for security and the perception of fear and safety is complex and thus is further looked into in the next chapter.

6.7.5 Social Interaction

In the case of interaction, when asked about middle class homeowners' preferences, about 90% of the architects prefer the plot typology and architects strongly believe that none of the homeowners would be interested in or would prefer the Jagali typology (**Figure 6-30**). Another architect drew attention to the daily routine, where, according to him, "most of the homeowners do not want to be seen. Each person has their own schedule and has no time to interact with others. The setback of the neighbours is unimportant for them, and thus they are not interested in the open spaces, so there is no interaction possible" (Respondent no.80).

Another critical factor affecting these transition spaces are land value and poor implementation of bylaws by the corporation. Because of high land value, every inch

of setback is used, which is deliberately encouraged by many architects (Respondent no.73).

According to one architect interviewed, interaction depends purely on the neighbour. “Generally homeowners build the compound towards the end of the construction process. By then they would know their neighbor and what they are like. If they like them and are happy with them, they will go for a low 4’ compound wall. Otherwise they will opt for a high compound wall. Mysore can be to some extent compared to Bangalore. No compound wall works only for a gated community and not for plotted development. The jagali typology is outdated and no one prefers it to other typologies” (Respondent no.77).

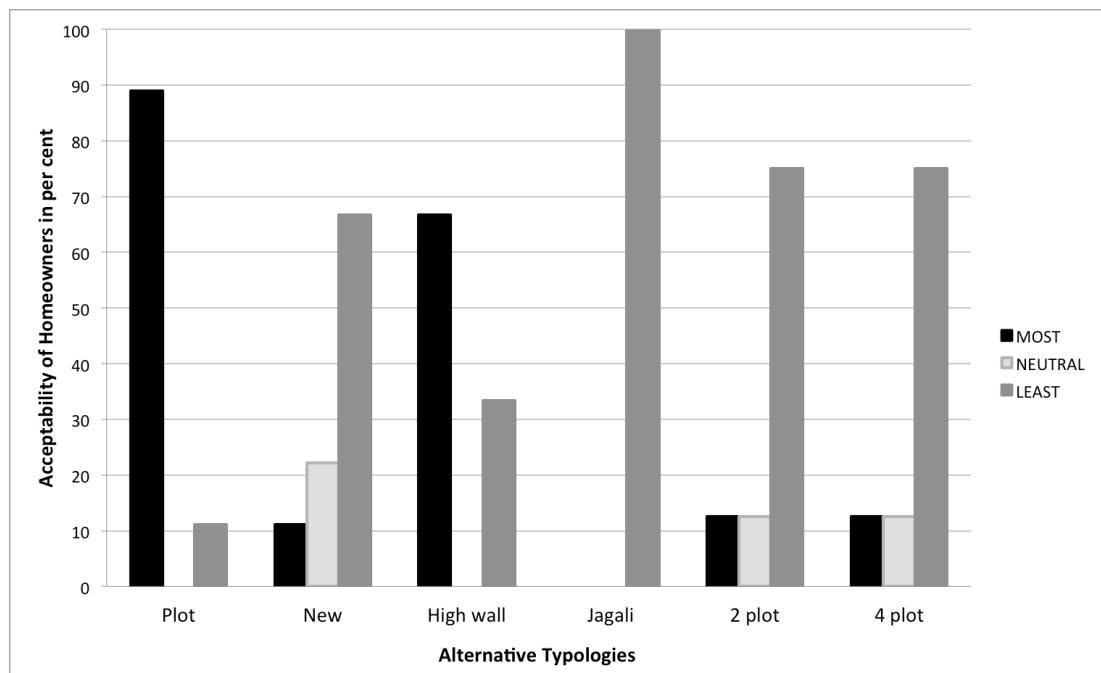


Figure 6-30. Social Interaction_ Architects feedback

Another critical factor affecting these transition spaces are land value and poor implementation of bylaws by the corporation. Because of high land value, every inch of setback is used, which is deliberately encouraged by many architects (Respondent no.73).

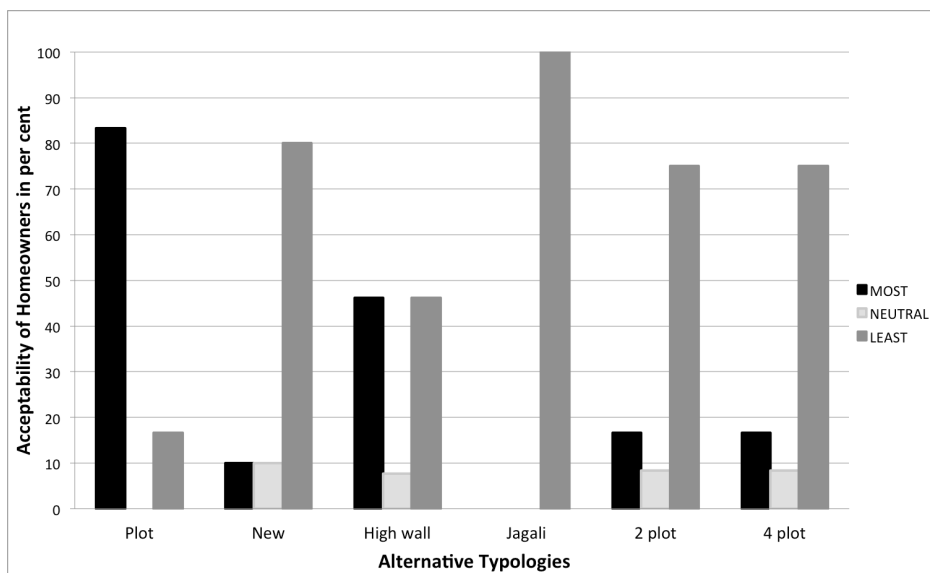


Figure 6-31. Social Interaction_ Builders' feedback

In the case of interaction, more than 80% of the builders believe that middle class homeowners would prefer the plot typology for interaction (**Figure 6-31**). According to the builders interviewed, middle class homeowners wish to have semi-privacy where they can define their territory and also socially interact with neighbours (Respondent no.117).

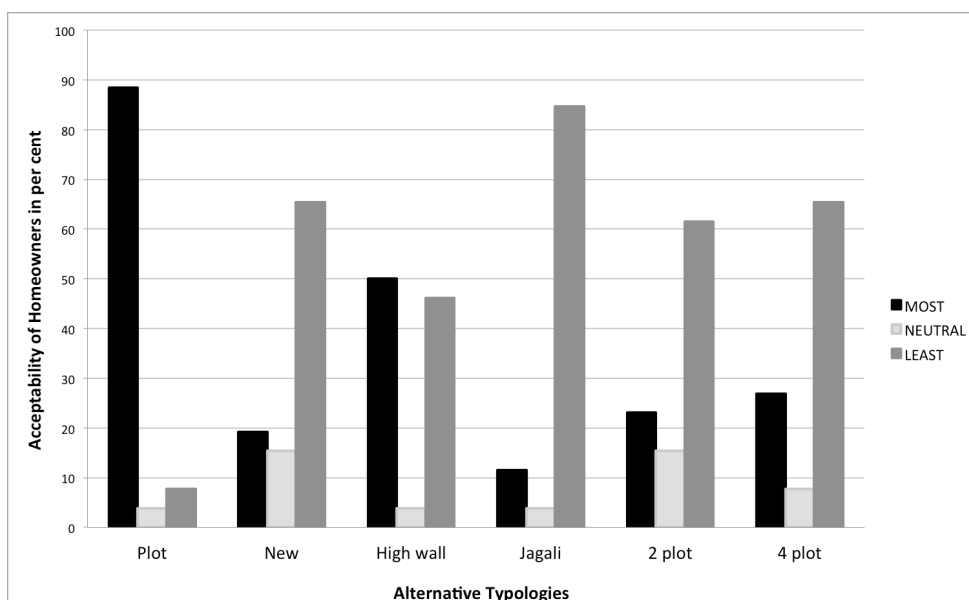


Figure 6-32. Social Interaction_ Homeowners preferences

When the same question was asked directly, nearly 90% of the homeowners expressed their preference for the plot typology (**Figure 6-32**). Most of the owners interviewed expressed the need for privacy and control to choose what they wish to do as important factors while working out options for interaction (Respondent no.100). According to one respondent, “There should be scope for talking, but only if required, we can always go and talk if we wish. If there is work, we can always go, otherwise each can mind their own work (business)” (Respondent no.106).

When it comes to the Jagali typology, community living, hardly 10% prefer the Jagali typology (**Figure 6-32**). Builders also strongly feel that the Jagali typology is the least preferred option (**Figure 6-31**). According to the builders interviewed, community living is possible in a gated community and will not be feasible in a residential layout with plotted development (Respondent no.111).

According to the architects, community living will not work for middle class demographics and works only for rich, high-end people, and in a gated community (Respondent no.74). According to another architect, community living has faded. It is only by compulsion that people live together now (Respondent no.76).

When it comes to the other extreme of high gate typology – the high wall typology – more than 70% of architects think homeowners would prefer a high wall and private spaces (**Figure 6-30**). About 50% of the homeowners prefer the high wall typology to seclude them from the outside world (**Figure 6-32**). Again most of the youngsters prefer the high wall typology so that they can have their space without any onlookers (Respondent no.95). Whereas many residents feel that the high compound typology is not feasible. Completely open is also not feasible (Respondent no.86).

In the case of shared spaces, 80% of homeowners feel that the new typology of opening to the street is the least preferred option (**Figure 6-32**). Furthermore, up to 80% of the builders feel interacting with neighbours in the shared spaces will not be

liked by the owners (**Figure 6-31**). According to one architect, the concept of sharing open space for interaction would not be feasible as regulations will not permit this as they demand open space all-round the plot (Respondent no.79).

Privacy is the crucial concern for homeowners. According to one respondent, “when everyone gets on well, these spaces work well. But for any disputes, if they are not on good terms, then it will be very bad” (Respondent no.101).

Some residents are more categorical in their opinion as one respondent expressed “sharing space is like sharing life and at this time in India, I would not prefer that” (Respondent no.93). Again, many consider this typology to be not feasible for the Indian condition (Respondent no.87) and that it is obsolete as we have moved away from a joint family to a nuclear system.

The feedback is very clear as homeowners prefer interaction and would like to engage with their neighbours, however they do not believe that they can share open spaces and live in community living (Respondent no.91). A sense of demarcation and identity is core to housing and interaction is no exception for this. Another main concern is of the way plots are bought and built. Unless they are working together it is not feasible and thus the concept cannot be generalised (Respondent no.95).

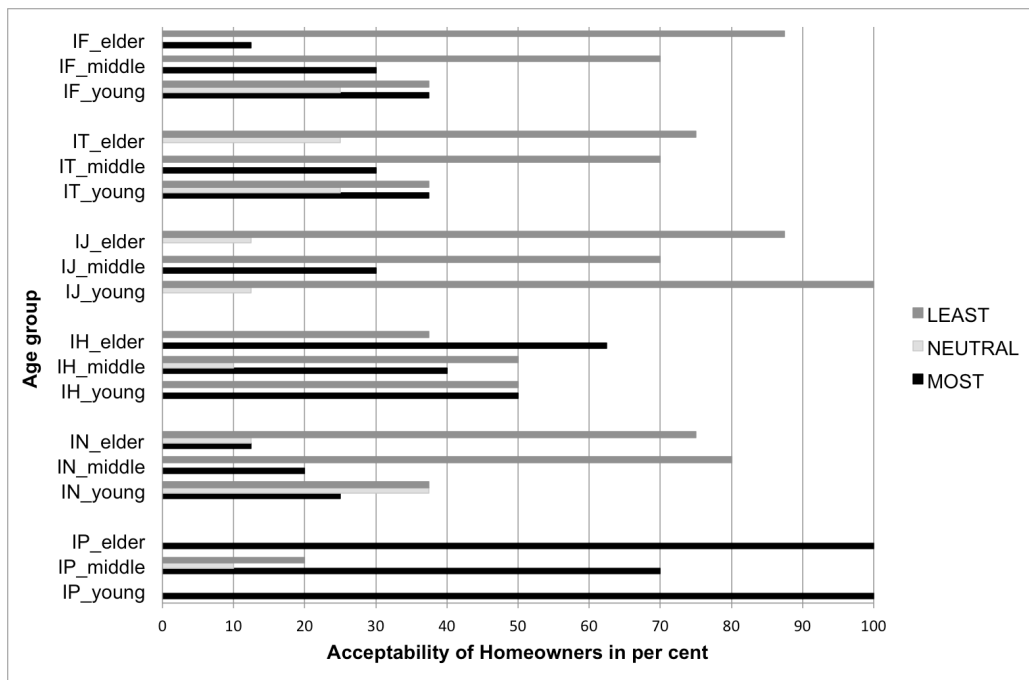


Figure 6-33. Social Interaction_ Age group analysis

Further analysis clearly reflects the difference in the aspirations of younger respondents to that of elderly people. The new typology is most liked by youngsters compared to middle age and elderly people. Interaction among neighbours of both two and four plots are least preferred by elders compared to middle aged people, and youngsters prefer them the most. Again, the high wall typology is most preferred by youngsters and elders compared to middle aged people (Figure 6-33).

Altered social requirements have drastically changed the way people interact with their neighbours. Though they have still retained interaction with their neighbours, now it is limited and they prefer it only if both feel comfortable doing so. Therefore the prevailing plot typology with a four-foot compound has been ideal as it provides a physical boundary and in the meantime there is a visual connection for them to interact if and when required. It is the same reason along with a concern of privacy that has resulted in a negative attitude towards the traditional open Jagali typology. Again, interaction can be overlapped on homeowners' preferences for volume, entrance and security, where interaction has been instrumental in defining their preferences.

6.7.6 Building Skin

Unlike the consistent pattern and similarity among the opinion of owners, builders and architects in other elements discussed earlier, they differ in their opinion in the case of material choices. According to architects, only 30% of the homeowners would prefer tile cladding for the road-side and important areas of the building (**Figure 6-34**). According to practicing architects, clients usually heed architects' advice and most architects recommend the use of plastering and stone or terra-cotta block cladding (Respondent no.78). Since relatively less homeowners approach architects for their home design (**4.3.3**), it is the opinion of builders, who are directly involved with the owners in most of the cases and homeowners' opinion is crucial. According to builders, up to 50% of homeowners prefer and are likely to use cement tiles or decorative tiles for the elevation (**Figure 6-35**). This figures increases when the owners are asked directly. According to homeowners, more than 60% of them would prefer tile cladding for the elevation (**Figure 6-36**).

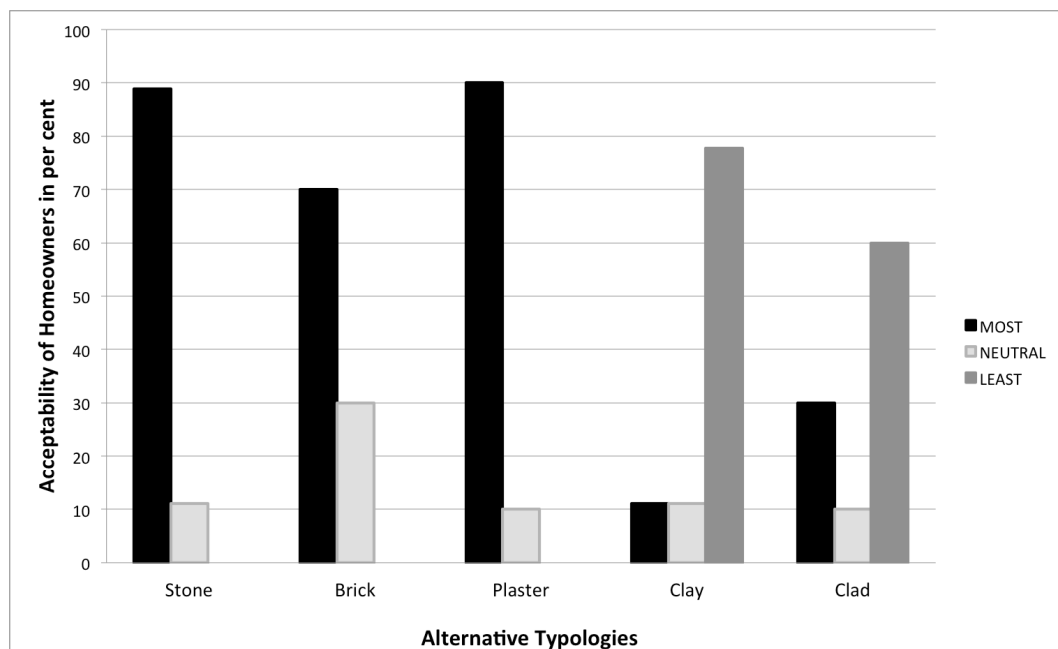


Figure 6-34. Building Skin_ Architects feedback

The follow-up semi-structured interview clearly suggests that most of the time the owners' choice of material is based purely on the trend, price and aesthetics, in that order (Figure 4-9). When asked about the rationale behind their choice of elevation material one homeowner summed it up as "something different is all that matters". When its implication on carbon emissions is explained, his reaction was, "We have to live like others, so we will be doing what others do" (Respondent no.91).

When it comes to use of natural materials like stone and brick, nearly 90% of the architects believe that middle class homeowners would prefer stone as construction material (Figure 6-34). Contrary to architects, only about 55% of builders believe that owners would prefer stone and brick as cladding and structural material (Figure 6-35). According to the feedback of architects and builders, there is no set policy for the use of materials. It mostly works as a 'demand and supply'. According to one architect, "People are ready to switch over to stone work. But the constraint now is availability of material and labour. Wire cut brick has been too expensive" (Respondent no.73).

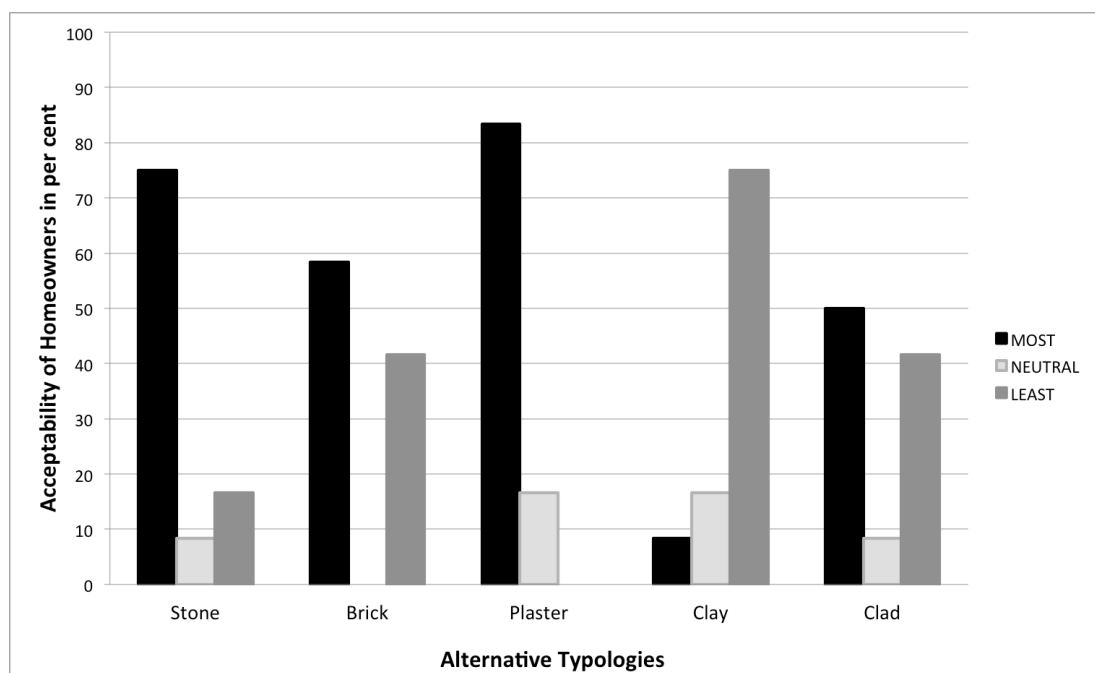


Figure 6-35. Building Skin_ Builders feedback

When it comes to most sustainable and thermally insulative material, clay blocks, architects strongly feel that only about 11% owners would prefer clay blocks and most homeowners prefer them least (**Figure 6-34**). When specifically asked the reason behind their least preference for this material, architects feel lack of expertise (Respondent no.74) and even awareness and education (Respondent no.80) are the main reasons for its low usage. Other architects who use this material in their projects had different opinions; according to architects, clay is generally a failure in Mysore because of the quality and contents of the available soil (Respondent no.75 and 76). Another architect felt the major concern they are now facing are maintenance issues due to some technical problem and builders are not happy to use them (Respondent no.79).

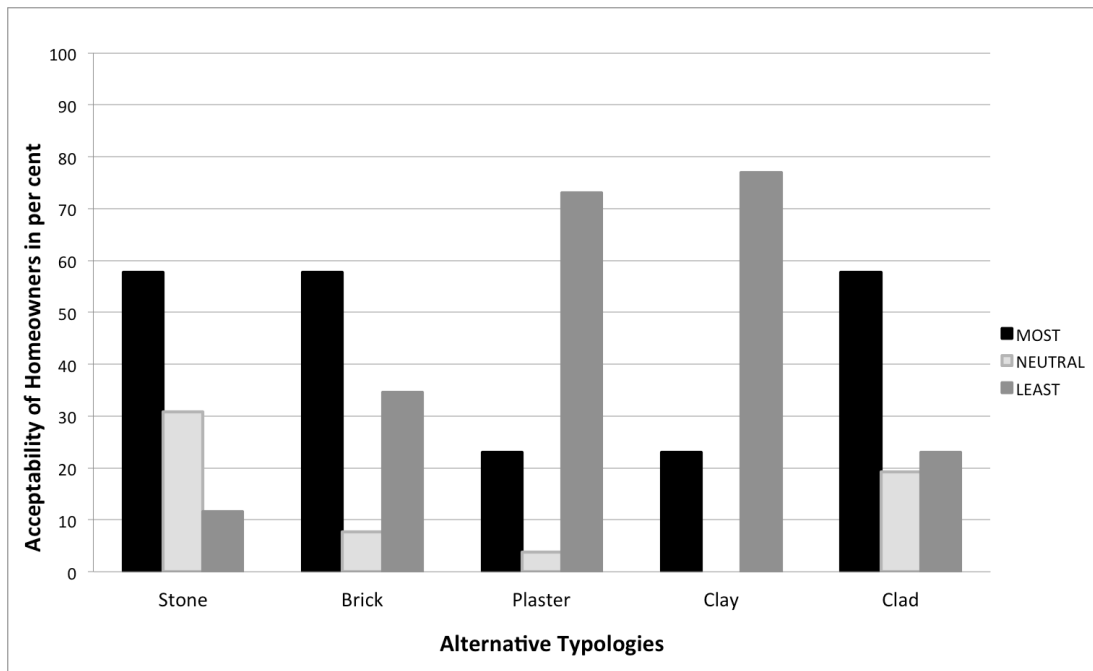


Figure 6-36. Building Skin_ Homeowners preferences

Similar views were expressed by a homeowner who did not want to use soil cement blocks because of practical concerns (Respondent no.98). When it comes to clay blocks, almost all elders interviewed dislike the material, whereas about 90% of middle aged people would not prefer it and only 35% of youngsters do not like clay blocks; more than 62% are most likely to use them (**Figure 6-37**). The major hurdle

they are facing is lack of awareness, availability of materials and its implications on energy consumption. According to one owner interviewed, “they do not have much information about all the materials, which is a sort of hindrance” (Respondent no.88).

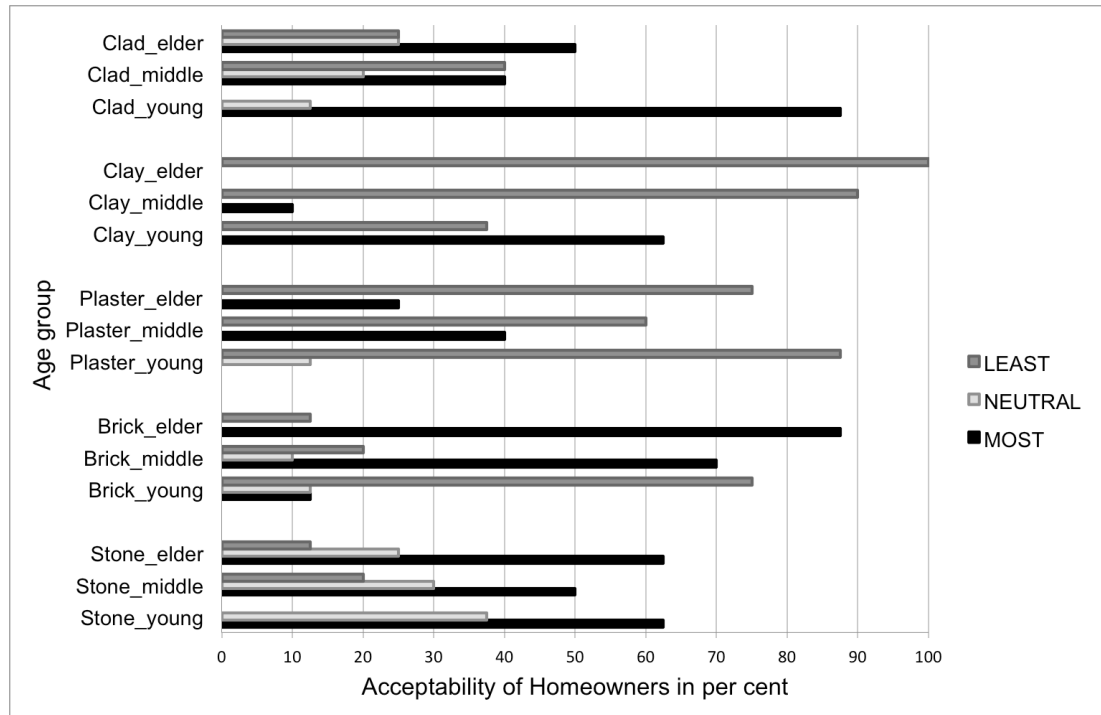


Figure 6-37. Building Skin_ Age group analysis

There are clear differences in the opinion of stakeholders. Trend and in-demand material influences homeowners’ choices while architects tend to prefer plastering finish with stone cladding or masonry for the front façade. Though stone is preferred by homeowners and wire cut bricks are a favourite of architects, their cost and availability of clay respectively has limited their usage as elevation material. The most sustainable option – clay blocks – is not preferred by owners as it is not aesthetically pleasing for them and designers are concerned about the quality of the clay. Generally with awareness and exposure, homeowners are likely to lean towards sustainable alternatives so long as it has been the trend and is aesthetically pleasing.

6.8 Reflective analysis

An analysis of these representative elements reflects the concerns and aspirations of the middle class homeowners and also demonstrates the variations in their preferences for different elements.

Section 6.7 reflects the people's preferences and its implication on sustainable housing for each building element examined. The variation in homeowners' preferences shows both the opportunities and challenges of implementing sustainable housing strategies. The feedback of each building element for different typologies has been brought together to analyse homeowners' preferences and acceptance of sustainable solutions.

6.8.1 Model 1: Jagali typology

Homeowners' preferences clearly reflect that the Jagali typology is obsolete as the majority of respondents rejected most building elements. Less than 5 per cent of the respondents preferred the Jagali typology when it comes to building volume, entrance sequence, building security and social interaction (**Figure 6-16, Figure 6-20, Figure 6-28, Figure 6-32**). Nearly 25 per cent of the respondents are ready to use natural materials like brick and stone, whereas barely 6 per cent of homeowners would prefer mud, which was extensively used in the Jagali typology (**Figure 6-36**). The number of homeowners prepared to reconsider the Jagali typology has not increased substantially unlike other models, which clearly reflects that homeowners are not ready to revisit and adopt the Jagali typology as a sustainable housing typology (**Figure 6-38**).

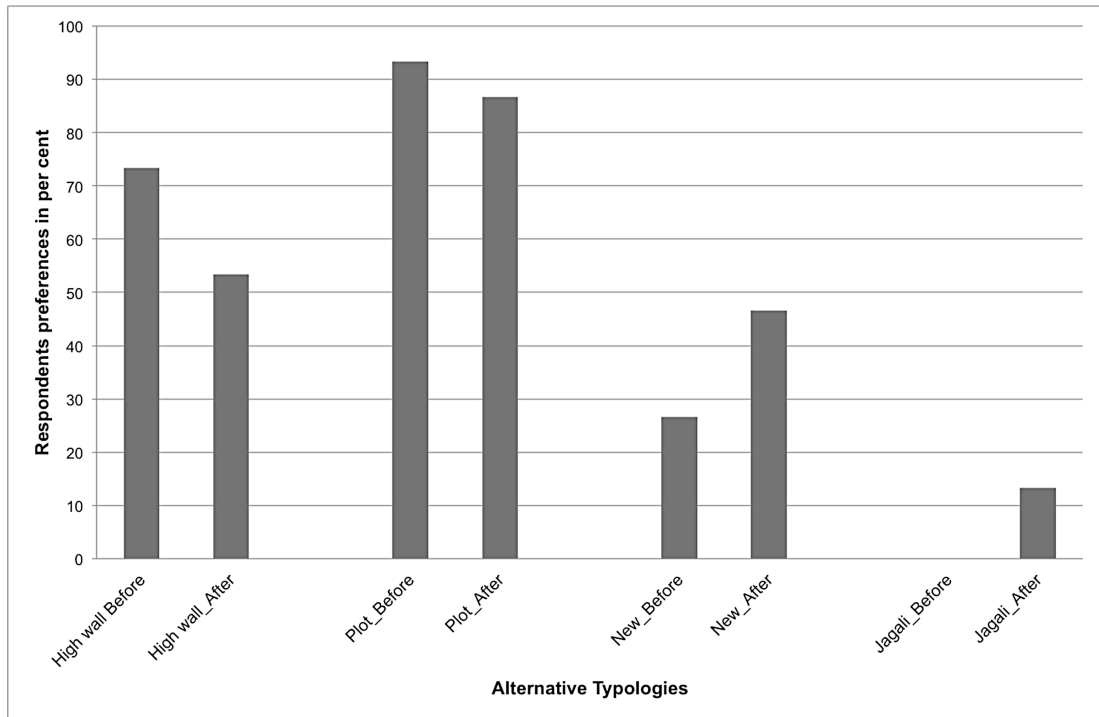


Figure 6-38. Building Volume: Respondents feedback before and after the explanation of research scope

6.8.2 Model 2: Jagali + Plot Typology

Homeowners are presented with the hypothetical scenario incorporating sustainable features of the Jagali typology and the prevailing plot typology. Less than 15 per cent of respondents have shown interest in the new typology in the case of building volume, entrance sequence, building security and social interaction (**Figure 6-16, Figure 6-20, Figure 6-28, Figure 6-32**). The fact that very few homeowners are prepared to reconsider and opt for these typologies clearly suggests that security and privacy have been their paramount concerns and they are not willing to compromise them in the name of sustainable housing.

6.8.3 Model 3: Typical Plot Typology.

This typology was developed as the most prevailing typology and the middle class homeowners' preferences validates the hypothesis. Nearly 50 per cent of the homeowners prefer the plot typology in the case of building volume, entrance sequence and social interaction (**Figure 6-16, Figure 6-20, Figure 6-28, Figure 6-32**).

When it comes to opening configuration, building security and building skin, homeowners' preferences are distributed across all the potential options without any relation to a sustainable agenda.

6.8.4 Model 4: Plot and high gate typology

Homeowners have shown consistently high preferences for the building elements associated with the plot and high gate typology. More than 30 per cent of the respondents expressed preferences for building elements like building volume, entrance sequence and social interaction (**Figure 6-16, Figure 6-20, Figure 6-28, Figure 6-32**).

As elaborated in the respective building elements in section 6.7, in most of these cases, homeowners are not willing to make greater changes towards sustainable options. Though more than 40 per cent of them prefer wide openings in the case of opening configuration after realising the impact of the conduction heat gain, more than 50 per cent of them are willing to change their preferences to smaller openings. Homeowners' strong preferences for unsustainable typologies show the challenges involved while examining alternate sustainable building strategies.

6.8.5 Summary

The outcome of the fieldwork can be summarised based on the level of acceptance of sustainable models and the probability of leaning towards sustainable housing (**Table 6-2**).

| Fieldwork Reflections | | |
|-----------------------|---|--|
| | Level of acceptance of sustainable models | Probability of leaning towards sustainable housing |
| Volume | Least | Negative |
| Entrance | Least | Negative |
| Openings | Most | Positive |
| Interaction | Moderate | Perhaps |
| Security | Least | Negative |
| Skin | Most | Positive |

Table 6-2. Summary _ Outcome of fieldwork

People's choices and preferences clearly reflect the area in which we can expect them to support and adapt to sustainable features. The feedback can be classified into three types. First, the elements for which people are ready to change their preferences for the cause of sustainability; in this we can easily find the materials and openings as two aspects for which people are ready to make sustainable choices.

There are certain factors, like interaction, for which they do not have very strong preferences. In this case people would consider making some adjustments but are not ready to outright support a sustainable agenda. However, when it comes to issues like security, people are not ready to compromise and would not be interested in sustainability issues and would not compromise on their perception of what is safe and secure for them.

This study has been very useful in disentangling one area: the boundary condition. This allowed the separate analysis of each element so as to identify people's choices and preferences and, in turn, the housing typology they would prefer. And from this the resultant sustainable concerns could be identified rather than broadly summing up the boundary conditions as unsustainable in the present context.

This study was also helpful in identifying the areas and elements where it is easier to achieve higher sustainable goals compared to areas where there will be higher resistance to change. Revising the model to suit both peoples' choices and a sustainable agenda further tests this.

6.8.6 Revised simulation:

The outcome of the research clearly reflects the potential to incorporate peoples' aspirations for sustainable housing strategies. To quantify the opportunities, one of the building elements has been examined further. The fieldwork analysis in 6.7.3 shows homeowners' willingness to revise their preferences for opening configurations. The research in 5.13 has shown that for the weather conditions of Mysore, opening sizes plays a crucial role and increase the conduction heat gain by 300 % in the most desired high gate typology.

This hypothesis was tested by revising the study model prepared in section 5.13 by only altering the window configuration to provide adequate lighting and ventilation (**Figure 6-39**). An IES daylight analysis simulation was carried out to analyse the daylight factor and to decide on the size and location of the openings. An IES daylight analysis of the revised model shows that adequate daylight can be achieved even after reducing 60% of the opening size compare to the plot and high gate model (Figure 6-5).

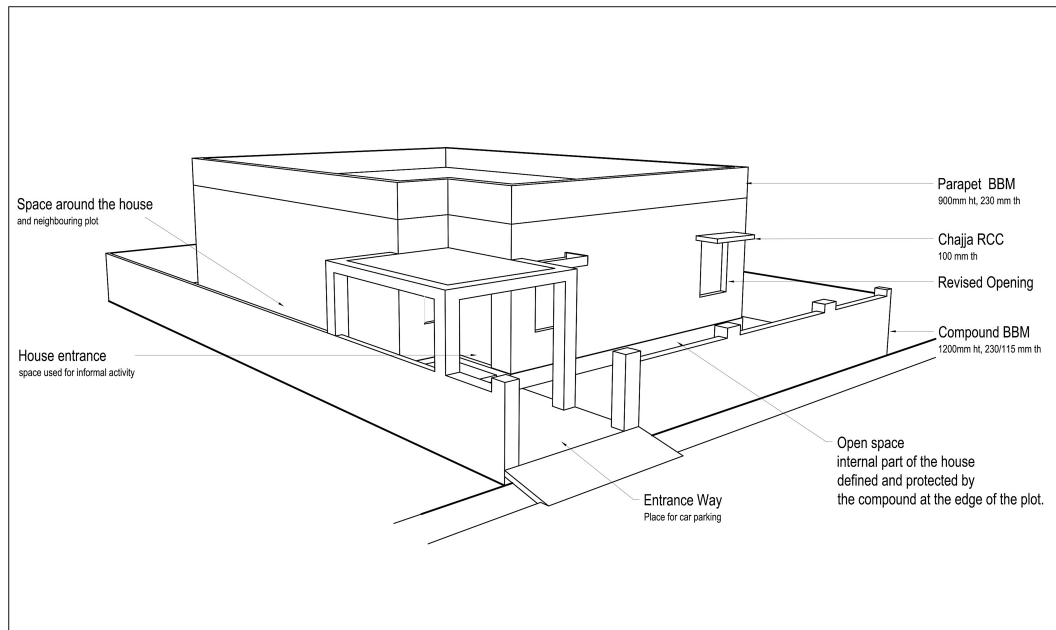


Figure 6-39. Revised Model

The revised model is similar to the original study model in all the aspects except the opening configurations. Peoples' choices and preferences, collected by social methods, were inputted into the IES simulation model to analyse the difference in the process of sustainable housing. To test this, one model was altered to have optimum sized windows which people would be ready to conform to in order to achieve more sustainable housing.

The results of the simulation for both models are shown in **Figure 6-40** and **Figure 6-41** with respect to conductive heat gain and carbon emissions for a representative day – May 21 – one of the hottest days chosen to analyse heat gain and carbon emissions. For the simulation purpose, only opening configurations of both typologies are altered while providing an input in the IES.

The conduction heat gain is the same in both typologies till around 7 am, which then changes drastically by noon. There is a higher level of heat gain once in the morning by around 10 am and once in the afternoon by around 3 pm. Due to the time lag, there is a smaller peak before noon and highest conduction gain by 4 pm. Implications of the wider openings and resultant higher conduction gain are evident

from this simulation, where the heat gain and carbon emissions are steady in the revised model where as it shows two sharp peaks which clearly reflect the excessive conduction heat gain during peak times in the morning and afternoon.

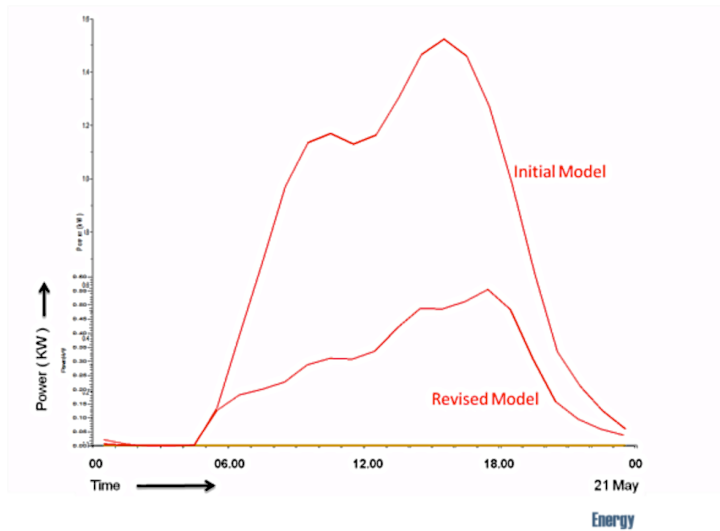


Figure 6-40. Post-fieldwork simulation: Energy consumption

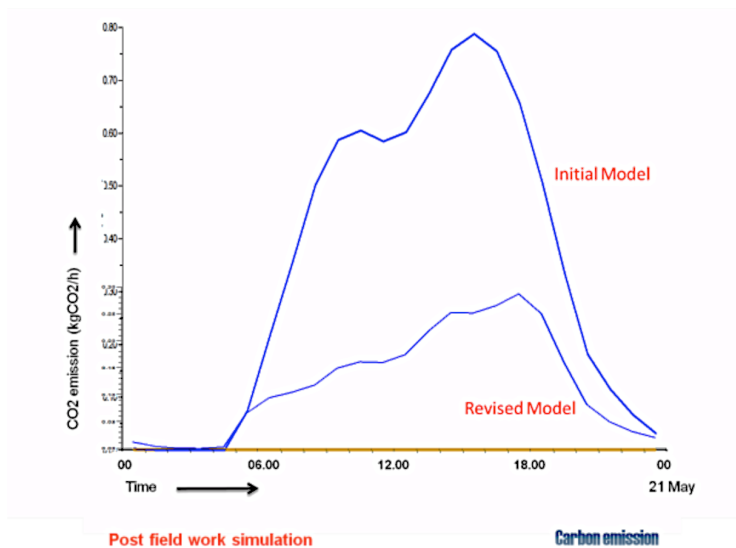


Figure 6-41. Post-fieldwork simulation: Carbon emission

The new IES simulation chart clearly shows a drop of 40 % in the energy consumption and thus a reduction in carbon emissions. The changed window parameter has also reduced the conductive heat gain by 20 %. The results clearly show that by changing the elements which people are ready to alter, we can reduce carbon emissions by a fifth. This is significant because it is useful to identify areas we can really target and thus reduce emissions.

6.9 Conclusion:

Through the use of survey fieldwork and model simulations, this study has highlighted the relatively recent shift in attitudes and cultural values relating to housing; from an inherently sustainable approach which valued shared spaces, local materials and communal activities, to one which reflects a move towards a twentieth century western approach; of individualism, nuclear families and consumer driven values. The study also clearly demonstrates that there are elements like materials and openings, which people are willing to opt for and that there are elements like security, on which they would not compromise. Their immediate concerns would be of greater importance than the greater issues of carbon emissions and sustainable housing.

The outcome clearly reflects middle class homeowners' preferences and their varied preferences for different elements. The reasons for these choices are not simple and straightforward. Furthermore, the factors which have influence on the building elements examined are beyond the study area, including at the local and national level. In this context, the findings of this chapter are further discussed and interpreted thematically in the next chapter.

Chapter 7: Reflection and Discussion

7.1 Introduction

The outcome of the two sets of fieldwork and the research that followed each batch of fieldwork demonstrates the trajectory of housing in India in general and in Mysore in particular. Unsustainable practices and strategies are evident from the material selection process for finishes through to the concept development and construction stage. Homeowners' insensitivity towards sustainable practices is evident in the social domain and use of space.

The research highlights how social perception and economic aspiration limits the acceptability of sustainable design and construction strategies without any counterbalance of regulation. A key instance of this is the provision of climatically defensible space that has been demonstrated as having significant social and environmental benefits. Here, a dominant concern about protecting family, property and possessions, overrides more permeable and sociable forms of living. The concern for security has been consistently identified as a critical factor in all the building elements that have been researched and tested. This chapter will discuss security as the overreaching theme for discussion and reflection of the thesis research.

A key part of the study is how Mysore can be seen as the progenitor for sustainable design. This research demonstrates that some older middle class values like communality in terms of activities and interaction at the dwelling entrance have become obsolete. This chapter will explore some fundamental shifts in the values of the middle class during a period of economic growth.

The concern and aspirations of middle class homeowners' along with policy guidelines and support from government clearly suggest that unlike the developed world, carbon reduction and wider issues in the provision of sustainable housing are pursued in an unregulated environment. This chapter explores the effectiveness of legislation, enforcement and regulation in developing sustainable housing

(Karnataka, 1994). In the case of Mysore, the fieldwork and research reflects that such an environment is very much undeveloped.

Sustainability is often contradictory and counterintuitive. Practices that work well in terms of environmental and economic sustainability may be not successful in terms of social sustainability. There are many paradoxes in the complex situation of India, with disparities between regions, class structure, economic disparity and fragile legislation. This complex situation also throws open some challenges and opens certain opportunities. The next section of this chapter will look at these broad themes of paradox, challenge and opportunity.

There is a fundamental paradox of reconciling global demands for carbon reduction with economic growth that is only in part addressed through high level convergences and contraction strategies (Mayer, 2004). At a very local level, a closer inspection of the urban grain of Mysore reflects that the traditional 'Jagali' typology was efficient and sustainable in the past. The paradox lies in that the most sustainable solution in environmental terms is perceived as being threatening to social sustainability criteria through not dealing effectively with legitimate perceptions of safety from crime.

Finally, the chapter reflects on the very central theme of middle class values of the disconnect between traditional cultural values and the consumption patterns of the new middle class.

7.2 Reflective Themes

7.2.1 Perceptions of Security

The concern for safety and fear of crime is a complex phenomenon and for middle class homeowners the concern is not just for physical safety, it is also for psychological safety which makes residents feel secure and the place liveable (Nemeth and Schmidt, 2007).

Though respondents consistently reiterated security as the crucial factor when choosing highly unsustainable typologies in the fieldwork questionnaires and structured interview, research and statistics do not support their claim. Researchers have established that there is a difference between the actual level of crime, the fear of crime and the perception of crime (Peel, 2005, Chang, 2009, Balkin, 1979, Brennan and Zelinka, 1997).

In the case of Mysore, most respondents expressed their deep concern for safety and covered their whole plot with additional steel grilles. However, the record of the crime rate of Mysore is 50 criminal incidents per 10000 households (Mysore, 2012, Home_Affairs, 2012), and it is declining (Hindu, 2008).

There are many aspects which influence homeowners' perception of safety. Nasar and Jones (1997) have identified "incivilities" such as deteriorating buildings, trash and the presence of unsupervised youth as indicators for the perception of safety and have argued that they will affect fear, interpretations of the seriousness of crime, and the level of perceived risk. They have also established that dark spots, un-built plots and unkempt spots would increase the perception of threat among residents (Austin et al., 2002).

Researchers have established a relationship between the concept of social and physical incivilities, or symbols of disorder, crime and fear of crime (Perkin et al.,

1992). Scholars who have researched the source of fear have concluded that concerns with disorder are more critical to residents than the crime itself (Greenberg and Crossney, 2007).

Kohm has argued that, an increase in public fear will affect the quality of life as it restricts the movement of the individual. It will have a negative impact on the general sociability and reduces mutual trust (Kohm, 2009). Though media can play a constructive role in engaging the community members, according to Carli, media enhances the fear of crime (Carli, 2008).

Scholars like Chang have argued that there is a correlation between the social, economic background of the homeowners to fear of safety. According to Chang, crime rate is low in the area of higher income groups and residents sharing a high level of social identity (Chang, 2011). Peel and others have argued that economic factors would directly affect the burglary rate (Peel, 2005). Contrarily Taylor and Gottfredson (1986) have expressed difficulty in establishing a correlation between homeowners' income level, social factors and crime rates.

In the case of Mysore, lower middle class homeowners still favour community living with shared spaces and invisible boundaries. According to one builder, who resides in one such layout, many of them still continue to live there in spite of increased economic status and they have a very low crime rate as they know each other (Respondent no.112). Contrary to the argument of Chang, and Peel, the highest crime rate is recorded in Indiranagar, one of the most affluent neighbourhoods in Bangalore (Rao, 2010b).

In the case of India, factors like urbanisation, breakdown of the joint family system and attraction of consumerism are considered to be the main reasons for an increase in the perception of criminality and insecurity (Verma and Kumar, 2008). Verma and Kumar's findings reflect the significant factors influencing the perception of security in the Indian context.

Community participation plays a crucial role in quality of life and crime prevention. The International Centre for the Prevention of Crime (ICPC) has acknowledged that public policy to reduce crime has to include the quality of community life. According to their report, emphasis should be placed on maintaining and reinforcing social cohesion of communities to collectively act and to improve their quality of life, rather than simply reducing crime (Idriss et al., 2010). One of the four types of crime prevention approaches outlined in the 2002 UN guidelines, adopted by the ICPC, places emphasis on improving the quality of life of communities (Idriss et al., 2010). The underpinning focus of sustainable housing is social cohesion, community participation and the health and wellbeing of the inhabitants. As demonstrated through this research, traditional Mysore housing typology was sustainable as it had used semi-open and open spaces effectively for the interaction among neighbours and has established a cohesive public character which had a sense of community security.

This strong link between community, social cohesion and house design appears to be missing in the recent housing developments. After the Second World War, Le Corbusier's concept and design for public housing was considered as a breakthrough in a new concept of housing typology. Though they had all the facilities, the project was not successful as homeowners never felt safe and secured in the communal spaces, corridors and lifts (Midtveit, 2005).

Failure of these projects were attributed to lack of communal safety and security of the homeowners, which were addressed by a new movement in the 1970s known as "Crime Prevention through Environmental Design (CPTED)" (Brennan and Zelinka, 1997). Scholars have argued that the design of land use should be sensitive to social contexts and crimes can be controlled by proper land planning. Oscar Newman (1973) was the first to develop a systematic set of environmental design principles aimed at reducing urban crime (Midtveit, 2005). According to Newman, the physical environment has to define territoriality, defined as a combination of physical, psychological, psychobiological and cultural dimensions. He strongly argued that the

environment is both a contributing cause and a potential solution to crime in public housing (Newman, 1973).

Newman proposed the concept of “defensible space” and according to him, crime prevention can be achieved through appropriate residential space design, and the construction of safer adjoining areas (Cozens et al., 2002). His study proposed an attempt to reduce crime rates through improvements of the residential environment. However, critics pointed out that Newman’s defensible space design technique not only encouraged more closed space configurations, but lacked a methodology based on more objectively ascertained facts (Hillier & Shu, 2000) see (Chang, 2011).

In the case of Mysore, active use of Jagali had increased the presence of familiar people on the street that had the potential to act as a deterrent. This had resulted in in-built security and safety features for the homeowners in these community oriented traditional housing typologies. The plotted development followed post independence is a clear departure from the traditional typology and right from the earliest layout proposed by the Mysore Development Authority, the emphasis was purely on the provision of basic services like water, sanitation and electricity with metalled road. Their aim was to provide sites for the residents of Mysore and placing emphasis on achieving light, ventilation and privacy have limited them to consider layouts as a series of plots of different sizes with facilities like civic amenities and parks at strategic places.

With such a structure, homeowners were left to protect themselves and their conscious effort was to invest in their piece of plot and to protect their boundary and its residents. The concept of community participation and safety for the residents could be thought of only when the land development had an inbuilt opportunity to incorporate these factors. One such scenario is gated communities, where few homeowners can define the boundary collectively along with many other facilities and activities.

This research shows the complexity of the boundary condition, wherein the concern of safety and ambition to display wealth along with aspirations and requirements have been intertwined and it is not possible to propose sustainable strategies unless we untangle the issues to be addressed at the boundary condition. In this regard, addressing the concern of safety is paramount and only later other aspects including sustainable housing can be addressed.

Gated communities are considered as the perfect solution for the concerns of security. The middle and upper classes easily shelter behind these gates as the easiest and quickest solution. These gated communities came with their own caveat, and though they provide safety and security for some, their purpose in the wider context is highly debated.

7.2.2 Gated communities

The concept of gated communities - their requirements, origin, contextual variation, features, context and the Indian perspective – has been elaborated upon in chapter five in addition to examining different settlement typologies. Following from the previous theme of perceptions of security, in this section, relevance of gated communities for Mysore middle class homeowners is examined.

Many scholars agree that perceived concern for security is the primary motivation for the residents to live in these gated communities (Alex and Godwin, 2009). This fear is shared by bureaucrats and residents in the marketing of an exclusive lifestyle appealing to different social and economic groups. A significant emphasis on security, along with a search for community living and identity has become the emblem of these gated communities, which are made further attractive by additional amenities which help to increase the property value.

Contrary to the understanding of safety and security in gated communities, residents staying within these gated communities feel they provide only a false sense of safety (Low, 2003, Low, 2006) and furthermore, they promote rather than reduce a fear of

crime (Atkinson and Blandy, 2006). Another concern of increased crime rate and security concerns and a need for gating has been contested and negated by many scholars (Minton, 2009). Studies clearly suggest that there is no difference between the gated communities and non-gated neighbourhoods in terms of perceived safety and actual crime rate (Atkinson and Blandy, 2006) and a sense of community is higher in the non-gated neighbourhoods.

With the number of gated communities being relatively small, the concept of gating goes beyond physical aspects of gated communities to gated lives and gated minds. It is these gated lives and minds which lead to the seclusion of houses and people insulating themselves within their compound, creating mini gates within their compound.

These gated communities with security for family and amenities have in a way become the dream of any middle-class person to aspire to and look for. This research clearly suggests homeowner's willingness to stay in such spaces. It is purely the affordability which is holding back the middle class from owning a home in gated communities. The outcome is that homeowners own what they can afford in terms of a plot and they try to copy the provisions and facilities of gated communities and makes provision for themselves in their plot. The resultant typology is securing and isolating their plot and providing facilities like UPS (uninterrupted power supply) as power backups, owning bore wells and marking clear boundaries with well-maintained green spaces so they can turn a blind eye to the outside world.

The concern of security and crime is unfounded, and as discussed in the earlier theme of security, the statistics do not support the claim of these homeowners. When specifically probed during the interview, homeowners tend to mix fear and perception with real incidences. Middle class homeowners also tend to include other factors like protecting their plants, strangers coming too close to the window and peeping in and trespassing as safety concerns and often mix with privacy. The attitude of crime is measured with indicators such as fear of crime and perception of

safety. The quality of housing has direct relation with the perception of the safety (Austin et al., 2002).

This research acknowledges homeowners' concern for their safety and even though their concern is irrational, their perception of fear has to be addressed while deriving sustainable housing strategies. Affordability and carbon footprint along with social concerns, clearly suggest that gated communities are not the solutions for sustainable housing and in the process of addressing this issue, other types of gates – the gated lives and gated minds – have to be addressed while addressing the concerns of middle-class homeowners.

7.2.3 Mysore: A return to traditional values?

Homeowners' values were examined by a 'multi-sorting task' process, which was carried out in two stages during the second set of fieldwork. The first stage of sifting provides evidence to user preference and aspirations. After the initial sorting of the cards, respondents were given a brief introduction about the concerns of climate change and the implication of their design decisions on carbon emissions and energy consumption. An initial model analysis and the IES, VE-ware, output produced as simple graphs with the implication of each element on energy consumption and carbon emissions were explained to the respondents. During the second round of placing their preferences, respondents were prompted to respond to the issues identified in their briefing and then rank again each model to explore whether they had changed their perception of the key elements identified in the building model.

An analysis of each building element reflects homeowners' choices and variations in their preferences for each element. Observation and analysis of each building element have been elaborated in chapter six. Two elements, building volume and building skin, are compared and elaborated on below to understand the respondents' choices and their acceptance of sustainable choices.

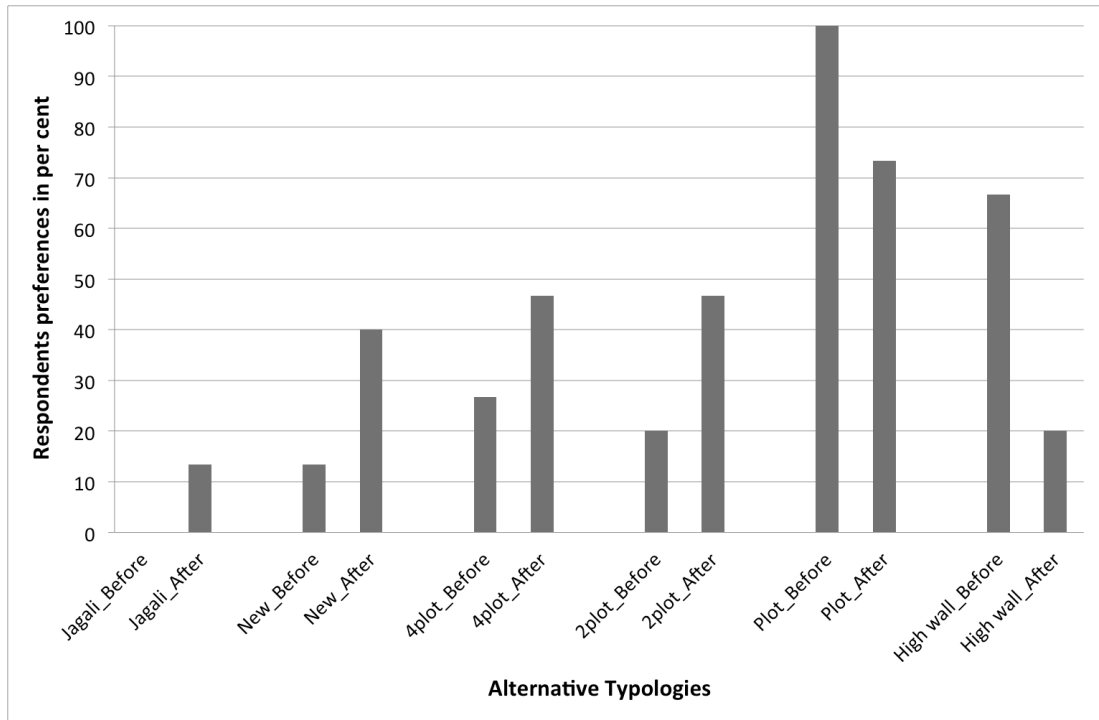


Figure 7-1. Social Interaction: Respondents feedback before and after the explanation of research scope

One important observation is that all the elements in each building typology have shown a clear move towards more sustainable elements. There is a reduction in the number of respondents preferring the unsustainable typologies and a general increase in the number of respondents who prefer the sustainable typologies. For instance, in the second round of the multi-sorting process and the semi-structured interviews that followed, more than 15 per cent of the homeowners were prepared to change their preferences for most unsustainable typologies in all the building elements (**Figure 7-1**). By comparing the two elements, the trends and the percentage of change in perception is analysed further.

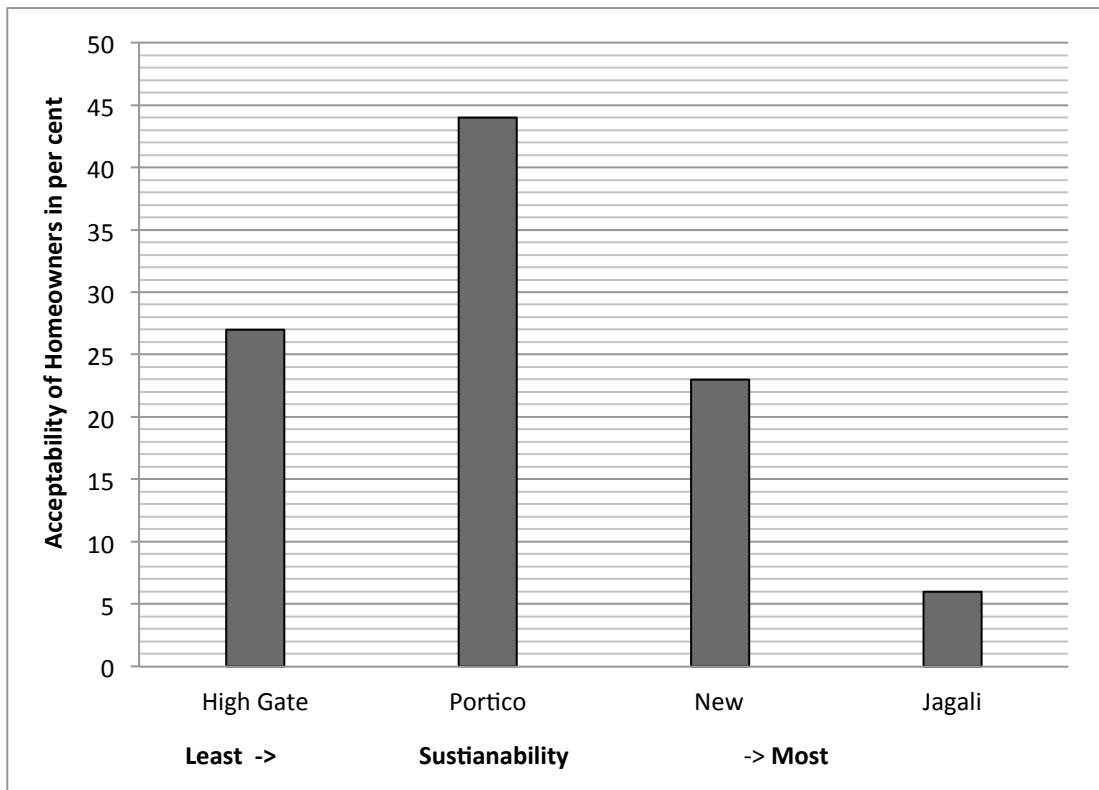


Figure 7-2. Building Volume: Homeowners preferences

The most sustainable Jagali typology was the least favourite among the respondents. In the case of the ‘building volume’ element, only 6% of the homeowners prefer the Jagali typology whereas nearly half of the respondents prefer the typical plot typology, which is predominant. More than a third of the homeowners prefer the most unsustainable, the high gate, typology (**Figure 7-2**).

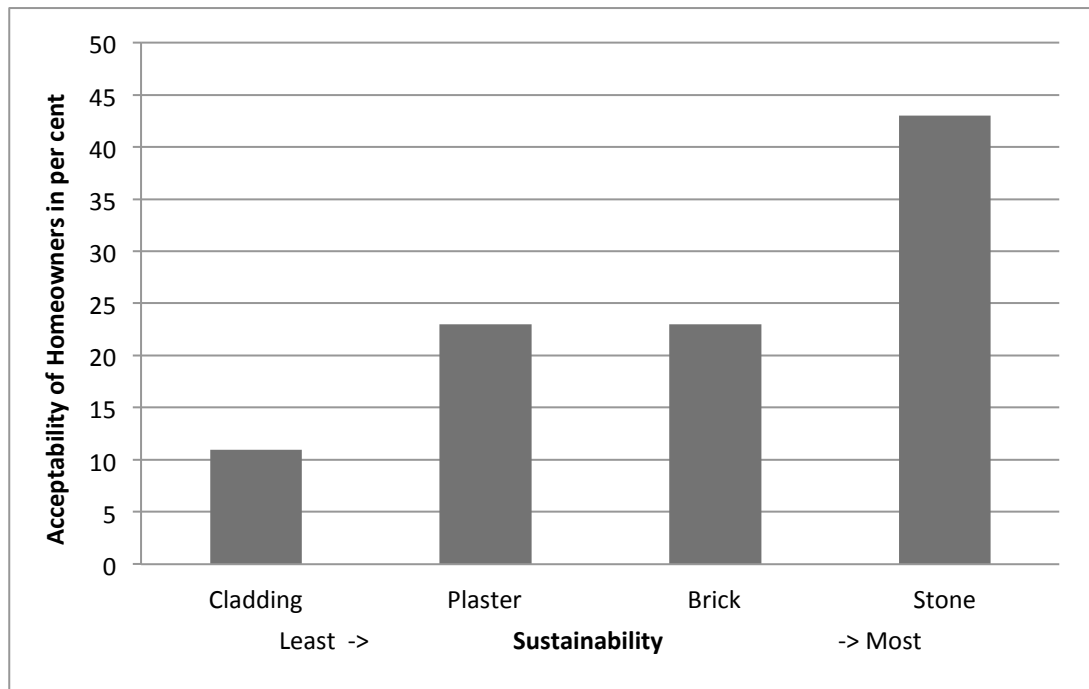


Figure 7-3. Building Materials: Homeowners' preferences

Contrarily, in case of 'building skin', nearly 28% of the homeowners prefer stone, the most sustainable material among the options given to the respondents. However, only 12% prefer plastering their exterior surface and nearly 35% of homeowners interviewed prefer concrete tile cladding to enhance the elevation, which has been the least sustainable material among the options given to the respondents (**Figure 7-3**).

This observation clearly suggests homeowners' preferences that lean towards the options which are unsustainable in nature. The values and concern of middle classes are tested by giving them the awareness and asking them to reorganise the cards based on their preference and concern for sustainability. This provides an understanding of a shift in the way they look at each option of each typology and hence the trend.

In the case of ‘volume’, when compared to their previous sorting, more than 27% of homeowners changed their preferences from the high gate, the most unsustainable typology. Furthermore, nearly 40% more homeowners expressed their preference for a new typology developed as a combination of the Jagali and a plot typology considered to have sustainable features. Nearly double the number of the initial survey showed an interest in the Jagali typology, the most sustainable option (**Figure 7-2**).

In the case of ‘material choice’, when compared to their previous sorting, more than 75% of homeowners changed their preferences from the most unsustainable, concrete tile cladding. Furthermore, double the number of the homeowners of the initial survey who showed interest in plastering, moved away from concrete tiles. Furthermore, nearly 30 % more homeowners expressed their preference for the use of stone, the most sustainable options in the revised sorting of their preferences (**Figure 7-3**).

In both cases there is a clear move away from unsustainable options and a steering towards sustainable practices. In spite of the willingness of homeowners to lean towards sustainable practices during the revised sorting, when these trends are put together in a bigger picture, there is a clear difference in terms of the implication of their choices. The final preferences show that more than 25 % of the homeowners still prefer high gate compound, the most unsustainable typology and more than 43 % of them prefer the prevailing plot typology, which has few unsustainable features and only 6% of the homeowners prefer the Jagali typology, the most sustainable one (**Figure 7-2**). In comparison, more than 40% of the homeowners have shown preferences for stone, the most sustainable option among the ‘materials’.

Furthermore, in the case of ‘material’ options, the number of homeowners’ preferring concrete tiles, the most unsustainable option, gets reduced to about 10% and about 23% of the homeowners would prefer both plastering and exposed brickwork as a finishing material for the elevation (**Figure 7-3**).

This comparative analysis clearly indicates the prospects for the opportunities to explore sustainable strategies, which are rooted in the response to the aspirations and expectations of the middle class demographics of Mysore. Thus it can be concluded that a return to traditional typologies is not likely in a climate of concern about security and a lack of planning regulation which is discussed in the next section.

7.2.4 A climate of regulation

Distributions of legislative powers in India have been discussed in chapter two. Up until 1980, when India was ruled by the major political parties, there was a clear distribution of resources among all the states from the centre. Recently, the political climate has altered drastically (Khemani, 2003). To appease regional political demands, there is always a compromise in the way decisions are made and resources are allotted (Kochanek, 1987). The major challenge at the state level is the lack of clarity and conflict between the state list and the centre list of legislative powers. For instance, tax and levies are collected at central level (India, 2007). The urban policy decisions are made at the central level of the planning commission whereas the regulations related to land and development lies with the state government. This has always resulted in a conflict and a bottleneck in the development process (Rosser, 1972).

One of the crucial factors of sustainable development is public participation, which is the essence of democracy. There is a clear move in this direction and the 73rd and 74th amendments to the Constitution have recommended decentralisation of authority and devolution of powers and the removal of the present ambivalence of the State Governments in empowering the urban local bodies and the Panchayati Raj Institutions (Narayana, 2005). The outcome of this is that Panchayati Raj Institutions and the Urban Local Bodies would have been vested with adequate powers and responsibilities to discharge their functions effectively in the areas entrusted to them like civic amenities, health, education and local area development (Singh, 2008a).

The empowerment of local bodies to prepare their own development plans also comes with the responsibility to govern and enforce the regulations. The greater challenge is the human resource, technical knowhow and the required tools to propose guidelines.

The planning commission, responsible for the development activities, established 'The National Building Code' (NBC) to protect the public's health, safety and welfare of the citizens in 1967. NBC has been revised three times in the last 45 years, once in 1970 and a second time in 1983. The objectives of the revised NBC 2005 are to serve as a model for adaptation by public works and other governmental works departments, local bodies and other construction agencies (BIS, 2005). The whole document has been more of a recommendation rather than an enforcement tool and all the municipal bylaws are expected to refer to the NBC while formulating their bylaws and it is not binding.

The Code contains regulations and lays down a set of minimum provisions designed to protect the safety of the public with regard to structural sufficiency, fire hazards and health aspects of buildings. The Code also covers aspects of administrative regulations, development control rules and general building requirements.

The third revision published in 2005 covers 'industrialised systems of building' and 'architectural control'. There is a clear emphasis on empowering architects and designers and providing for them to approve and build small-scale projects. Though it elaborates on basic, general building requirements and development control rules, it is broad-brush and provides macro level guidelines. For instance, the core concerns of the process of plot subdivision, the rationale of leaving space all-round are not discussed. Furthermore, the major challenge of the implication and monitoring of these regulations are not discussed.

Most importantly, sustainable development has not been the priority while decision-making, and none of the policy guidelines reflect sustainable strategies. As identified in the earlier sections of this thesis, the regulations related to environment were realised very recently. Only now sustainable development has been identified as a

critical aspect at the planning commission level. It would take sufficient time to translate into policy and find its way into urban development authorities and local planning bodies.

Another dimension of the development agenda is the process of enforcement and implementation. Like regulations, governance and enforcement also play a crucial role in the process of sustainable built environment. To examine the practices and prevailing scenario related to regulations and enforcement, one of the critical policies in the plotted development; 'the building bylaws and regulation' is investigated. The building by-laws and regulations, which are prepared based on the broad principles of the Comprehensive Development Plan of Mysore (MUDA, 1996). The building by-laws provide guide line for the construction activity, including the plot coverage, space to be left between the buildings. The comprehensive development plan is developed based on the guidelines of the Karnataka state town and country planning act 1961 (Karnataka, 1961) and the policy put forth by the National Planning Commission.

The concern of sustainable agendas and their inclusion in these development plans are paramount. Their significance was emphasised earlier in this dissertation. The process of implementation and enforcement of an existing set of rules and regulations has been a greater challenge. Most respondents have identified graft and corruption as a common means to overcome the regulations. Violation of regulations and its impact on housing is visible at every level of building activity. The violation varies from, at the lowest level, not leaving the required amount of space on all sides of the plots and building more than the permitted ground coverage on their property on one hand, to building unauthorised constructions in government and public spaces on the other. According to one of the town planning members interviewed, the development authorities are taking action and enforcing the regulations. Unfortunately, their focus is more on commercial establishments, illegal constructions on public and government sites and illegal construction of non-permitted higher floors.

The fieldwork's visual documentation clearly demonstrates the violation of norms and standards in most of the buildings. During the interview, the executive engineer in charge of these regulations commented that the regulations are worked out to provide good quality light and ventilation and thus healthy living conditions for the residents but he felt that lack of awareness and knowledge are the main reasons for homeowners' violating them (Respondent no.6). Whereas when the same question was asked to the designers, they feel that these by-laws and regulations have become too rigid and the concern of light and ventilation could be addressed in many different ways and by-laws are not really serving their intended purpose. One example quoted is the uniform setback regulation for the whole city irrespective of geographical condition, access to the property and orientation of the site.

Architects strongly feel that they are likely to violate the regulations. Another architect interviewed emphasised the fact that there is a provision in the regulation to normalise the violations of up to 25% by paying a fine, so in most cases the homeowners are advised to design for 125% of the allowance and pay the fine for a tax and plan approval fee to normalise the 25%. For homeowners, it is purely the concern of land value and almost all the owners interviewed felt that the open spaces left outside are a waste of space and due to the cost of land they are particular to build every square centimetre possible. Violations of houses built in plotted areas are not regulated rigorously, instead it has become a political agenda for every new government to normalise all the illegal construction (Karnataka, 1994).

This representative example of regulations, clearly reflect the drawbacks and serious concerns at the grass roots level. The weak implementation mechanism clearly demonstrates that it would be an uphill task to formulate a strategy for a sustainable built environment and implement it at Mysore and bring the middleclass homeowners on board. This is in stark contrast to the development plans proposed nearly 100 years ago, where Mysore was known to have had sustainable features due to the robust planning guidelines and implementation.

In conclusion, there is a clear disconnect from the robust local planning supportive of sustainable development during the early 1900s and legislation and policy decision of India after independence has been neither reflective of the social and cultural values nor does it have sustainable development as its priority. It is in this context that sustainable strategies could be most effective when they are approached at building level rather than at master plan level. It is the flexibility and adoptability at this level which supports the resilient communities towards sustainable housing and that change cannot be imposed to achieve more sustainable outcomes and therefore has to operate within consent boundaries of middle class demographics.

7.3 Reflections: Some Paradoxes

Global challenges in relation to India have been discussed in the first chapter. The need for enhancing or at least maintaining a growth rate is crucial in the development vision of India to provide basic services, eradicate poverty and improve the standard of living of billions (Mukherjee, 2012). These national preoccupations will increase resource consumption and by implication, increase carbon emissions.

Affluence of middle class homeowners and their aspirations has further increased the resource consumption. As identified in chapters two and four, middle class homeowners' consumption is bound to increase in the immediate future. It is only after the middle classes fulfil their aspirations, that the energy reduction strategies can be implemented. There is a need for convergence before contraction can take place (Mayer, 2004) and middle classes have a key role in achieving sustainable development and most specifically in India.

Economists and social anthropologists have established that the middle classes are most likely to benefit from the economic liberalisation policy and the resultant development in India in the last two decades (Fernandes, 2006). A key reason for this disconnect could be attributed to the nature of growth of Indian middle class. Where

many believe that economic benefits have been despite rather than because of government (Varma, 2007).

Homeowners' disconnect from the government is evident from the first set of fieldwork. Their lack of interest and disconnect in understanding and participating in public activities and government initiatives are analysed in chapter 4.

A lack of awareness has been a crucial factor that reinforces the middle class' aspirations and the paradox of their increased demand for consumption taking the national imperatives off the hook. Increase in consumption demanded by the middle class homeowners is at a time when government is trying to reduce consumption to reduce carbon emission. These critical issues lead to emerging paradoxes in the Indian context. Major paradoxes are:

Environmental sustainability versus sustainable social mobility

Class segregation: from implied to defined boundary

Climate mediated Jagalis: Environmental versus social sustainability

Reconciling traditional and contemporary middle class values and aspirations

7.3.1 Environmental sustainability versus sustainable social mobility

In chapters two and five this research demonstrated that traditional housing typologies have to be not only socially inclusive but also environmentally sustainable.

In the case of Mysore traditional houses, environmental sustainability means the use of locally sourced materials and climate responsive design. More so in terms of lower land footprint per person, this had been achieved by sharing the party wall.

Shared facilities and community spaces like the 'Jagali' area of the exterior and courtyard spaces of the interiors have reduced the construction work drastically and thus the embodied energy of the houses.

With a socially acceptable housing typology, traditional houses were not only environmentally sustainable but they had responded to the social and cultural needs of the homeowners before the advent of plotted development and change of housing typology.

The emphasis on new European models of plotted development has consciously shifted focus from socially cohesive housing to plot size and location based on homeowners' financial situations and affluence. As discussed in the second chapter, the Indian class and caste system always had its downside. Recent research in this area demonstrates the ill effects of the caste system and the growing disparity and poverty in a section of society (Singh, 2012, Deshpande, 2000, Rao, 2010a). Against this background, empowerment of lower classes has been the most important vision of the Government. Independent India is a socialist and secular country and there is a clear separation of religion and state (India, 2007). After independence, according to the constitution, discriminating against a person based on his caste is legally forbidden.

In some ways, plotted development moving away from clustered houses has been used as an opportunity to integrate different classes socially as a community. The Town and Country Planning Act reinforces this view by insisting on the provision of different sizes of plots for the inclusion of all classes (MUDA, 2007). In this reconfigured situation, homeowners tend to establish their territory and isolate themselves within their gate (Respondent no.2) (CITB, 1987).

During the interviews, most respondents expressed their commitment to family as paramount. The first part of the research, understanding the middle class people of Mysore, shows that homeowners' involvement in community activities has reduced from neighbourhood to city level. Interestingly, when they were specifically asked

about their relationship with friends and family, they noted that they had a strong bond and that there was frequent interaction between them. According to one respondent, they like to be and are very often in touch with their family members. With facilities like phones, mobiles and having a car, mobility is not an issue. When specifically asked about the concept of being together, the respondents had strong views about establishing their independence and having privacy. As one respondent summed it up: “We want to be in touch with our family members, all my brothers and sisters and their family live very close by... but, we do not want to stay together. We want to have privacy, and we are there for each other whenever we are needed” (Respondent no.83).

Another factor highlighted during the interview was the proximity and relationship with neighbours and their friends or community members. Most of the respondents overwhelmingly suggested that their relationship with their neighbour depends on the person and thus most of them would spend most time among their community members either as associations or during get-togethers.

This revised social configuration has altered the requirements of the housing and thus mobility is a critical factor (Graham and Marvin, 2001). In a way, these new housing typologies suit the present social requirements of maintaining one’s own personal requirements of an independent insulated house and greater mobility to access their friends or family members when they choose.

In this context there exists a paradox between environmental sustainability and sustainable social mobility in space and access to communication tools. Unlike traditional typologies, when both do not go together hand in hand, a sensible balance has to be achieved.

The research underpins the need for catering for the aspirations and values of the middle classes and in the process acknowledges the need for social mobility in space and access to communication tools for a sustainable built environment while embarking on environmental sustainability. We have to acknowledge the need for

mobility and must integrate the defined boundary parameters to derive sustainable housing strategies.

7.3.2 Class segregation: from implied to defined boundary

In the traditional housing typology, the Jagali acted as an invisible boundary and a transition between the internal and external space. This semi-open space was efficient due to the active participation of neighbours, who belonged to the same community and, in most cases, were relatives.

The smooth transition from interior to exterior and cultural clarity to entertain neighbours unconditionally in these spaces has been instrumental in proving these spaces to be fluid and highly sustainable, both socially and environmentally. Now, owning a plot and their own home has been the dream of every middle class Mysorean. House owners tend to establish their territory and demonstrate their affordability. In the process, these rigid plots have been physical and psychological barrier between the homeowners and outsiders. It has been established in chapter 5 that these rigid boundaries have also been the cause of unsustainable practices.

Following on from the previous theme of Environmental sustainability versus sustainable social mobility, the paradox here is homeowners requirements and expectations against the backdrop of the prevailing social and economic conditions and how these two typologies respond to them. The Jagali typology had been successful as interaction was always among homeowners who knew each other. But as the fieldwork survey clearly demonstrates, today's middle class homeowners give least preference to their family and friends while they are deciding the location of their home and with economy, status and other factors being instrumental in the selection of the site and house, they are not aware of their neighbours and

neighbourhood. This is evident from their feedback in the first set of fieldwork. Neighbours were given least priority while property seekers were finalising the location of their house (Figure 4-4).

In the present context, homeowners tend to spend more time with their family members than the neighbours and thus would prefer more internal spaces than the semi-open external space. The two sets of fieldwork have also demonstrated that homeowners tend to interact with their friends and relatives more than with the neighbours and social interaction is facilitated by greater and smoother mobility. In this sense, though the plots have a rigid boundary and are segregated, they have provided opportunity for social mix and cohesion of society.

Research to reinvent the use of the Jagali typology shown during the fieldwork was rejected by the middle class homeowners. Separation of employment from habitation, the increasing distance between the two, in both spatial and temporal terms has an impact on the effective use of these typologies. Density and mode of transport have a bearing on these Jagalis. Changes in density and transport modes mean that there is greater movement of vehicles and people on the streets, and hence an increase in noise and pollution along with the movement of unknown people makes the semi-covered Jagali difficult to use for a major part of the day.

This theme clearly demonstrates that there is a paradox between the invisible boundaries, Jagali typologies, and the plot system. Though these plot typologies are rigid, they provide greater fluidity for mobility and accommodate the homeowners modified social and cultural aspirations. Plot typologies accommodate the co-existence of different social system. The major finding of this research is that homeowners need to define plot boundary has to be acknowledged. Because class segregation is officially obsolete, sustainable housing strategies have to be derived within these boundaries.

7.3.3 Climate mediated Jagalis: Environmental versus social sustainability

Stemming from the earlier theme of concern for security, the open Jagali typology leads to another paradox between climate mediated Jagalis versus concern about security. Continuing from the earlier themes, another question constantly surfaces about security and how the traditional 'Jagali' typology was successful earlier and why there is a need for inspection in the present social context.

The approach to housing, the reason for buying a property and the amount of money spent has changed over time. In the process of demonstrating their wealth and as observed by the architects and builders during the interview, a pseudo display of wealth has altered homeowners' concerns. Due to the importance attributed to displaying one's wealth, concerns about safety and security have increased. There is a clear improvement in the standard of living of the middle classes, and this has helped them to own more than the basic requirements and make choices. For instance, most of the respondents' concerns for their special plant or flowers in the garden have forced them to use a raised wall and gate as a first layer of security. Furthermore, the disparity between the haves and have nots has increased the perception of threat and according to the feedback, homeowners give high priority to security and to protect themselves.

The feedback from the questionnaire confirms their concern for security as they have given it top priority while selecting the site and finalising the house design. This has clearly increased the embodied energy of the houses and the new typology is no longer climate responsive. Daylong observations during the fieldwork reflect the way these reconfigured spaces are used. The homeowners are provided with security measures like a steel grill at the plot edge. In most houses they keep the main and rear wooden doors open in the morning as they feel secure with the grill outside. This in a way has helped the elders who feel they are still able to come out till the portico

without fear of invasion. In this sense, though the plot typology has increased the embodied energy, it has also provided natural ventilation and mobility.

There is a paradox between climate mediated Jagalis and the concern about safety and protection. Furthermore, the external rigid boundary and isolation it creates from the neighbours has to be balanced with the improved use of internal spaces.

7.3.4 Reconciling traditional and contemporary middle class values and aspirations

The crucial part of the research is to examine middle class homeowners' values and relate them to their spending patterns. The research has demonstrated that like developed countries, the concept of middle class cannot be identified as a homogenous group. The initial literature study and the following feedback collected from respondents during the fieldwork demonstrate that middle class homeowners can be broadly classified into two categories based on their attitudes. Firstly, those who are traditionally middle class, as described in chapters two and four, and secondly, those who have recently experienced upward mobility. Their differences in a way explain to us some paradoxes of traditional values and spending patterns. Historically, the middle class tend to be more inclined towards sustainable housing elements compared to newer entrants who have a desire to demonstrate their newfound wealth and status. The survey feedback also reflects that most of the respondents feel the traditional values are obsolete and no longer relevant in the present day context. Conscious efforts after independence to imitate and develop as the West have put value on development, success and wealth.

There is a paradox between traditional values and current spending patterns. More importantly, both rhetorics run parallel in India. Furthermore, as scholars have identified (Fernandes, 2006, Fernandes, 2000b, Fernandes, 2000a, Varma, 2007), this complex paradox can be seen side by side in different demographics at the same time. In the case of India, it is all more intricate as both these values are exhibited by

the same person based on their preferences and choices. There is no easy solution for these phenomena. Based on respondents' feedback during the second study, elaborated in chapter six it can be concluded that homeowners are not ready to compromise their priorities for sustainable housing. In the meantime, if there are ways for them to engage in sustainable strategies without affecting themselves, they are ready to play an active role.

7.4 Challenges

7.4.1 Harmonising expectations

The greater challenge is whether traditional values still play a role in helping form sustainable solutions for housing. In chapters four and six this research demonstrated the challenges involved in addressing this theme. Overall, the research clearly suggests that middle class homeowners are unwilling to accept the changes required for more sustainable housing.

Deeper investigation suggests that their approach depends on the specific issue and individual perceptions. As concluded in chapter 6, the middle class homeowners of Mysore are not homogenous and more importantly, their values are not uniform across all the issues. Furthermore, their preferences will not only depend on the individual, but are also influenced by the building elements. For instance, middle class homeowners strongly prefer the high gate plot typology and would not like the 'Jagali' typology.

Furthermore, the same homeowners have shown different values during the interviews. For instance, when it comes to construction materials, they prefer concrete blocks, or for interiors ply boards imported from China, as the cheapest options available. Then again, the same homeowners would prefer a particular floor finish, electrical fixtures or surface treatment, or in the case of a tile of a particular specification because they are the most expensive available in the market (Respondent no.22) (Figure 4-9). The logic is in a way understandable as they would

like to use the most economical measures to save money on things that are not visible on the outside and spend most on the elements which enhances the building's aesthetics. Similarly, they are not ready to compromise in the least bit when it comes to security. This clearly reflects the challenges involved while relating traditional values to sustainable strategies.

Another issue is the use of mechanical devices for comfort. The research and IES simulation has demonstrated that weather conditions are most suitable for natural lighting and ventilation for most parts of the year. A climate responsive design of a traditional typology had ensured that the internal spaces were comfortable during most parts of the year.

Researchers have proved that the homeowners of naturally ventilated buildings will accept and feel comfortable in a wide range of weather conditions (Brager et al., 2004). The weather condition of Mysore facilitates passive ventilation and cooling strategies for most of the year except during the extreme summer of April and May. This research points to the limits of adaptive comfort as homeowners' affluence and aspirations have made them more sensitive to temperature variations and energy intensive mechanical devices accessible to manage their micro-climate. Products' affordability and availability have ensured that even the poor would consider having a mechanical fan for ventilation. Improvements in the standard of living, a sensitivity and desire to achieve desired comfort conditions in the internal spaces have encouraged middle class owners to invest in these mechanical devices. Furthermore, the interview feedback suggests that most of these mechanical devices are installed to display homeowners' wealth. When specifically asked about the need for air conditioning during an interview, one middle class homeowner consciously expressed affordability as the main reason rather than comfort (Respondent no. 119).

When the impact of air conditioning on the environment was pointed out, the retired officer clarified that he had bought the air conditioner using his hard-earned money from his 25 years of service and he was not ready to compromise on comfort for the sake of climate change. In the meantime his wife pointed out that they were being

practical in their energy consumption (Respondent no.120). They use the air conditioner only during the two to three extreme summer months and even then only for about one hour in the late evening before they sleep, so that the air circulation through the fan would make the latter part of the night more comfortable (Respondent no. 124). A similar trend is also observed in most other factors like having hot water in the kitchen, electric chimneys or owning more than one car, where it was more for show than real use and homeowners strongly feel they are not really contributing to carbon emissions.

This clearly demonstrates the underpinning factor of affordability, utility and display of wealth. In most cases, as the research has demonstrated, the usage is much less compared to other factors which have influenced them in owning these devices (Majumdar, 2001). It can be concluded that in the process of following traditional values and harmonising their aspirations, there has to be a clear emphasis on comfort and a natural way of achieving it through climate responsive design and adopting passive design solutions (Athavankar, 2002, Majumdar, 2001). However, as the research has demonstrated, homeowners may choose not to stop using mechanical devices, although they can be encouraged to reduce their consumption through alternate practices and efficient systems.

7.4.2 Affordability and Energy consumption

The government of India is subsidising many industries and products, from gasoline to food amounting to up to 14% of its GDP (TERI, 2012). As an effect of this, the household will not be paying the full amount of the electricity it consumes. Because of the subsidy middle class homeowners spend only about 1/200th of their monthly income on electricity (Filippini and Pachauri, 2002), compared to 1/20th spent in developed countries (Gregg et al., 2006). The rationale for subsidies and the items the government subsidises are a different matter and this research is not about whether subsidies are good for India or not.

If we look at this issue from a homeowners' perspective, we see that they find the mechanical devices affordable, and because of the subsidised rates, find it easier to pay the running costs. There are indications that subsidies will be withdrawn in the move to a market economy with increased capacity, supply resilience but at the price of higher delivered energy cost (TERI and IISD, 2012).

Although not a focus of this thesis, future increases in fuel costs may well drive a push towards more passive methods to achieve thermal comfort, but the current environment of low energy pricing forms no incentive for carbon reduction strategies to be enacted by householders without some form of state or government regulation.

7.5 Wider Sustainable Contexts

7.5.1 Low tech versus high tech

The history of sustainable development in India was discussed in chapter 2. This section examines the implications of early political divergences between the beliefs of Gandhi and Nehru that still have relevance today.

Independent India's development has been defined by the legacy of its first two leaders. Gandhi believed in the empowerment of village communities and a network of villages. He believed in a democratic administrative structure and most importantly the need to be self-reliant (Prakash, 2002). On the other hand, Nehru strongly advocated India as a modern state and believed in science and technology as a means of development. It is this dialectic political discourse that has led to the co-existence of radically differing attitudes towards technology.

As described in the second chapter, a high technology approach is strongly advocated for sustainable architecture to solve environmental problems (Mathur, 2007).

Sustainable development is always measured quantitatively by measuring energy consumption, material embodied energy, resource consumption and waste (Guy and Farmer, 2001). Very few institutions and research centres promote low technology

alternatives that include revisiting alternative technologies and non-conventional and renewable energy resources. The research data from architects shows that very few promote alternative technology. Most architects seem to not consciously encourage renewable resources. Unfortunately despite the benefits of this ‘bottom-up’ approach, as described in chapter four, it is not a popular choice for the homeowners, for whom the research indicates that such simple solutions are related to low income groups and do not reflect economic progress or social mobility.

Technology-driven approaches to ‘green’ architecture have taken precedence and have become internationalised. An illustrative example of this process is the CII Green Business Centre (CII GBC) in Hyderabad, India (CII, 2009). CII Green Business Centre is awarded the LEED (Leadership in Energy and Environmental Design) ‘platinum’ rating by the US Green Building Council. This is considered as the first building to have a platinum rating outside US. The outcome of this, Green Building Council has developed a rating system targeted to green buildings in India, called LEED-India. Furthermore, the leading research centre of India, The Energy Research Institute (TERI), also took the same path of quantifying the sustainable architecture by developing its own rating system called GRIHA (GRIHA, 2012).

The whole process clearly reflects the direction sustainable architecture is going in India. These ratings are usually directed at major public or commercial projects with little emphasis on housing (IGBC, 2008). Secondly, as the research has demonstrated, to implement this technology driven green architecture, would involve additional cost. A greater challenge is a willingness of the middle class homeowners to invest their money in the initial stages of their house construction.

Presently, India is still developing its strategies for a sustainable built environment. Major research centres like, The Energy Research Institute (TERI, 2012) and Indian Green Building Council (IGBC, 2008) are moving towards assessing them more quantitatively in a localised rating system to incorporate social and cultural factors. These underlying issues, whilst not directly relevant to the research work undertaken,

inform how householder perceptions of sustainable design may change as greater emphasis is given by the government to specific forms of low carbon development.

This study demonstrates that frequently using high tech solutions from the developed world may not be appropriate to India. In the meantime, the only alternative is not a low technology solution, and a return to traditional low skilled forms. Scholars like Eladio Dieste have argued that a sophisticated understanding of the indigenous materials using scientific methods may prove an effective direction providing the solution responds to context (Pedreschi, 2000).

7.5.2 Generating awareness

The issue of awareness and exposure has a critical role to play in the process of sustainable architecture. The significance of economic empowerment and its impact are discussed in the introduction of this dissertation. Its implications relating to the focused study area are briefly discussed.

The previous theme reflects two strands of sustainable practice in India.

The impact of this is visible from strategic policy level to its delivery to middle class households via the media. The core issue of sustainable architecture, its principles and objectives are a crucial factor to the built environment and have already been part of the mainstream curriculum in developed countries that are supported by the established regulations and codes of practice to achieve pre-defined targets.

A lack of understanding of sustainable architecture is evident from the fieldwork, wherein more than sixty per cent of architects responded of not being able to identify the materials, design and construction process as the reason for the increase in the internal temperature of the houses. Interaction with the faculty of a school of design in Mysore clarifies that architecture students take a course dealing with climatology, and this is studied more as a standalone course rather than as the core part of the design course (Respondent no.20). The design studio emphasis is also more on modern western architecture. An examination of the syllabus of the Visweswaraiiah

Technological University during the fieldwork in 2009 reflects a clear emphasis on the history and architecture of the world rather than on the local architecture.

Understanding the local context and environment is critical while developing sustainable strategies. As Eladio Dieste says in reference to the situation in South America: 'I believe that we must contemplate each problem independently, keeping in mind the conditions of our circumstances and environment' (Pedreschi, 2000).

The recent interaction with the faculty at Bangalore indicates that architecture schools have introduced one course on energy efficient buildings again taught by the architects with postgraduate experience from the US and the UK with emphasis placed on a rating system (Respondent no.14). Interaction with the senior practising architects clearly suggests a lack of awareness as the core reason for designers not to advocate and promote sustainable architecture. The professional body –The Council of Architecture has not made any emphasis on sustainable architecture in its regulations, guidelines and other publications(COA, 2012) and pedagogical research, conferences and seminars speak even less about a sustainable built environment. An example to illustrate this can be cited from the publications in the architectural and builders journals.

A review of all the leading journals used by professionals and related to architecture was conducted during the first set of fieldwork. Important journals and periodicals like 'Architecture plus design', 'Indian Architect and Builder' (IAB, 2009), 'Inside Outside' (Inside_Outside, 2009) and professional organisations like the 'Journal of the Institute of Town Planners' (ITPI, 2011), the Council of Architecture magazine (COA, 2009) were scanned for the subject 'sustainable architecture' for the period of 2008-2009. Among these, very few journals have published articles and papers related to sustainability and a total of about 15 papers talk about the subject 'sustainable' (COA, 2009, IAB, 2009, AD, 2009, ITPI, 2011). Hardly any bottom-up research paper contextualising the location and sustainable solutions evolving from these could be traced. Among the published articles related to sustainable architecture, they are more related to achieving zero carbon emissions by technology

and more emphasis is on quantitative measures developed based on the western model.

Another factor of exposure among the public is examined through a study of the emphasis on the environment in the curriculum for primary and secondary school children.

The primary education system is not uniform and the exposure is purely dependent on the type of education at particular schools. Basically there are three types of schools, state-run government schools, private schools and third, CBSE (Central Board of Secondary Education) syllabus schools (CBSE, 2012). There is a clear progress in the curriculum development and children are taught about the environment in all three types of schools. The contents, methods adopted and emphasis varies from one to another. The CBSE has the most comprehensive syllabus with the teachers trained to handle this subject very effectively. This is a good starting point, and exposes students to today's issues like pollution, resources, and renewable energy. Lack of practical input, a disconnection from the local and immediate realities and application of these in their real life and in higher education has been identified as the basic shortfalls. This study also reflects the lower level of rigour and expertise of the teachers in private and state-run government schools.

7.6 Conclusion

If we ask a simple question as to whether homeowners prefer a sustainable housing typology or building elements, the obvious answer we get is that they are not interested. If we segregate their preferences into different elements, and then ask the same question, we can find clearly positive and negative results with some in-between answers. This complex process is very helpful to simplify homeowners' preferences and their reflection on building elements.

This fieldwork and the research that followed have also demonstrated that expression and display of wealth has become a mantra of the middle class. This research also demonstrates that perceptions of sustainability specifically in an Indian context are complex and in some cases there will be conflicts of interest, where one dimension of sustainability is counter intuitive with another.

Finally, this chapter has also briefly examined that challenges and opportunities in the process of the sustainable built environment. The research has produced some useful outcomes, that would be helpful in preparing sustainable housing typologies in a Mysore context and such a methodology could be applicable in different parts of India. The way this research might be used, and its significance is discussed in the next chapter.

Chapter 8: Conclusion

8.1 Introduction

Economic globalisation is enabling India to reinvent itself as a development crucible, and this is providing previously unrealised opportunities for economic transformation by catering to a rapidly growing middle class. The relationship between affluence and consumption means that the Indian middle classes have a crucial role to play in achieving a sustainable development process.

This thesis has argued that sustainable housing has to be contextual and draw understanding from social, cultural and economic fields to understand the values and aspirations of the middle class and their implications on sustainable housing. The bottom-up approach to the research validates this thesis by examining middle class homeowners' preferences in Mysore, a south Indian city. Mysore used to be recognised as having socially cohesive and inclusive housing typologies that were climate responsive and calibrated to local, social and economic needs.

Changes in social conditions, cultural practices and lifestyle can be seen in the way homeowners use their homes to demonstrate affluence and status. Their changed preferences can be traced to the way they identify, demarcate and celebrate their housing boundaries. This research points to the importance of the external boundary of the site and the edge of buildings in terms of aligning meaningful, sustainable design strategies with the concerns and aspirations of the emergent middle-class.

This final chapter sums up the research findings with a discussion on the role of stakeholders and reflections on the scope for further research.

8.2 Research Process and Outcomes

As identified in the first chapter, India has lower per capita carbon emissions compared to developed nations. However, the real concern is the total energy consumption and India is the fifth largest carbon producer in the world. As the economy of India continues to develop, the country becomes a major global power. With economic power comes the ability to harm the environment as has happened with the carbon footprint of the US (**Figure 1-1**). The growing manufacturing base, the increase in service industries and the increases in urbanisation lead directly to the rapidly increasing middle class. This burgeoning middle class and its desire for improvement and affluence has a very considerable impact on energy and material consumption. For instance, the household income of the middle class has been projected to increase from 5 per cent in 2005 to 41 per cent in 2015. This has increased the aggregate consumption of the middle class by 14 times in 20 years (Ablett et al., 2007).

This research has examined the growth of India after independence and has established that the sustainable agendas are not given enough importance in urban development. Development was mostly influenced by the Nehruvian model that was driven by the need to modernise the economy and increase the countries technological base and material resources.

India's economic success has empowered the middle classes. More than 600 million people or more than 40 per cent of the Indian population will be middle class by 2025. Affluence, consumption patterns and the increasing size of middle class, as well as their increasing ability to afford consumer goods together with their desire for western style affluence make it a key factor in the Indian social and economic domain and middle class behaviour that has impact on the sustainable housing is the focus of this study.

The preliminary research and the literature review elaborated upon in the second chapter demonstrated that urban middle classes are particularly important to this

research as their aspirations and developing patterns of consumption have directly negative effects on the environment. This research has also examined the change in homeowners' attitudes and impacts on towards sustainable housing.

Traditionally, housing had been more climate responsive, socially and culturally inclusive and with the use of locally sourced materials, they were most sustainable. A South Indian city, Mysore was chosen to examine the implication of the aspirations of the middle class demographics on sustainable housing. Mysore was known as a precursor to green architecture and had adopted inherently sustainable features. One of the sustainable strategies they had adopted was 'Jagali' housing typology which has been replaced by the plotted development now common in most of the cities in India.

This thesis has argued that, in the domain of sustainable housing, a qualitative approach is essential to the understanding of social and cultural dynamics as well as quantitative strategies to measure and benchmark performance. Because of the nature of this multi-threaded approach, mixed method research practices have been followed using triangulation methodologies and grounded theory. This has resulted in the revisiting and refining of the research focus and objectives throughout the research. During the research process, spatial scenarios for housing were developed to harmonise preferences and different sustainability agendas. The triangulation study directed the research towards a focus on identifying and testing the critical building characteristics of the boundary location.

This study indicated that the current legislation on sustainable building is currently underdeveloped and behind current practice elsewhere; the need to consider a 'bottom - up' approach as a more effective strategy was developed. The research then concentrated on homeowners' preferences. Their preferences were qualified by a multi-sorting task analysis and study model performance tested by sophisticated environmental simulation. This was triangulated with fieldwork studies to help propose sustainable housing strategies.

The methodology adopted has been critical to supporting the architectural response to the cultural and economic condition on one hand (social methods) and the climate responsive, traditional design and simulation models (environmental design methods) on the other.

The first part of the research attempted to understand the aspirations of middle class homeowners, and the present housing typology was examined during the first set of fieldwork study. The fourth chapter elaborates upon the research methodology conducted during this study and also features observations, an analysis of the research work as well as the outcomes.

This chapter validates the observations and resultant study areas defined during the literature study and, more specifically, examines aspirations and values of the Mysore middle classes and the implication this has on the sustainability of the built environment. This chapter also examines the factors that shape the values of the middle class generally and more specifically in Mysore.

To understand the middle class demographics of Mysore, social and cultural behavioural patterns and values, housing design process, socio-economic influences, and the current awareness of the sustainable built environment were examined during the fieldwork. In order to analyse the impact of development on neighbourhoods and housing in Mysore, data were examined for key indicators of sustainability from the macro to the micro scale that comprise community living, site layout, building entrance, house planning, finishes and facade.

The study highlighted the relatively recent shift in attitudes and cultural values related to housing, from an inherently sustainable approach that valued shared spaces, local materials and communal activities to one pointing more towards a twentieth century Western approach of the individual, aspirational nuclear family, away from the traditional extended family and the adoption of consumer-driven values, that have resulted in increased embodied and operational energy.

From the analysis of current housing typologies in Mysore security and fear over domestic safety are the predominant factors that define the way boundaries and transition spaces are treated and defined. Safety and privacy were the critical reasons for homeowners to move away from the traditional typologies. Mysore homeowners use high gates as a layer of solution for their security and privacy concerns.

This thesis started with a broad research of the sustainable built environment and, as elaborated in the research methodology, the research questions and study areas are narrowed down using grounded theory to one specific section of the house. The process of identifying boundary conditions or transition areas as a study area which was used extensively during the second set of fieldwork, are elaborated upon in chapter five.

An element analysis of traditional and contemporary models clearly demonstrates people's varied preferences over a period of time, which are triangulated with quantitative information. Based on the element analysis of both typologies, modification of these factors in the new typology and their implication on sustainable features, six major elements, volume, entrances, openings, security, interaction and materials, are identified to cover the issues related to boundary conditions.

The six identified building elements of the transition space are used as parameters to construct four working models so as to reflect the sustainable, most prevailing and most aspiring alternatives. These different models are tested to examine people's preferences during the second set of fieldwork.

The second fieldwork study was approached with more specific and focused research questions. Research methodology comprising a multi sorting task and semi-structured interviews was developed based on the experience of the first study and further used to elicit the information required for the focused study area. The specific methodology employed integrates two different techniques: the environmental analysis to obtain quantitative data, by simulating and predicting energy consumption and carbon emissions; and the a sociological study to obtain qualitative data and

determine people's preferences and their willingness to align towards sustainable practices. Triangulation methodology was also deployed and complemented the research methodology as the two build on each other.

Chapter six elaborates upon the research methodology and the fieldwork process presents the results of the fieldwork. The outcome reflects the middle class homeowners' preferences and their varied preferences for different elements of building that determine the boundary and threshold. Understanding preferences and their underlying motivations of building owners will indicate their responsiveness to or rejection of sustainable design strategies.

8.3 The Findings

8.3.1 Overall conclusion

The outcome of the research was elaborated upon in chapter seven in the form of reflective themes. Paradoxes such as environmental sustainability versus sustainable social mobility and class segregation, from implied to defined boundaries, are also elaborated upon. Furthermore, challenges to achieve the identified strategies and wider sustainable contexts, which are not examined in this research but have an impact on the study area, are also examined.

8.3.1.1 The major findings

- Sustainable strategies could be most effective when they are approached at building level rather than at master plan level. It is the flexibility and adoptability at this level that supports the resilient communities towards sustainable housing.
- There is a clear gap between the policy and implementation of the policy. The policy decision developed at national level has to reflect the issues at the regional and local level. This study points out that these policies can be effectively implemented at building level.

- This study acknowledges the need for social mobility for a sustainable built environment while embarking on environmental sustainability. We have to acknowledge the need for mobility and must integrate the defined boundary parameters to derive sustainable housing strategies.

8.3.1.2 Homeowners values

- The middle class homeowners have moved away from traditional socially and environmentally sustainable traditional communities.
- Homeowners' values can be selectively integrated with the sustainability agenda.

8.3.1.3 Concern for safety

- Homeowners' concern for their safety and perception of fear has to be addressed while deriving sustainable housing strategies.
- Concern of security and resultant space in the transition and boundaries of buildings is a major factor in developing unsustainable designs. The concerns of safety and ambition to display wealth along with aspirations and requirements have been intertwined. These issues at the boundary condition have to be untangled while proposing sustainable strategies.

8.3.1.4 Housing typologies

- A return to traditional typologies is not likely in a climate of concern about security and a lack of planning regulation.
- There is evident change in the middle class demographics that has an impact on housing. The excessive use of resources and space within the house and defining the individual boundary has resulted in an unsustainable prevailing housing typology.
- Affordability, location and carbon footprint along with social concerns, suggest that gated communities are not the solutions for sustainable housing for middle class homeowners.
- The prevailing plot typology lacks concern for sustainability.

- Homeowners' need to define plot boundary has to be acknowledged. As class segregation is officially obsolete, sustainable housing strategies have to be derived within these boundaries.
- One of the key findings of this study is that homeowners are not ready to compromise their priorities for sustainable housing. In the meantime, if there are ways for them to engage in sustainable strategies without affecting themselves, they are ready to play an active role.
- Performance of the four study models shows the impact of change in boundary condition. This study points to the nearly three times more total energy consumption and 65 per cent more carbon emission in the high gate typology compare to the traditional Jagali typology.
- Homeowner's preferences for building materials are complex. This study has demonstrated that homeowners would prefer the most economical material for the internal part of the construction like masonry construction. They would then prefer the most expensive material where they can demonstrate their wealth such as in flooring or cladding material for elevation.
- As this study has demonstrated, it is not possible to stop using mechanical devices, although homeowners can be encouraged to reduce their consumption through alternate practices and efficient systems.
- Though this study argues for low tech solutions compared to a high tech approach, at a broader level, sustainable solutions can be derived by a contextual understanding of the indigenous materials using scientific methods.

8.3.1.5 Stakeholders

- This study emphasises the significance of awareness of homeowners and teachers, while developing sustainable design strategies.
- Builders believe in catering for the needs of the aspiring middle class homeowners and are concerned about reducing their profit margin in case of changing to sustainable practices.
- Architects play a key role in developing and implementing sustainable housing strategies. This study points to the challenge involved in the process as most of the time architects lack significant knowledge. This study has identified the need to develop knowledge through pedagogic professional development and the educational system.

The key finding of this research is that middle class homeowners are not willing to revisit the traditional ‘Jagali’ typology and traditional lifestyle. The resultant additional carbon emissions by the middle class homeowners are examined in chapter six and interpreted in chapter seven. This research has demonstrated many reasons for moving away from ‘Jagali’ typology including the change in family demographics from larger extended families to nuclear families that has resulted in the relatively bigger house being unoccupied for most of the day. This social change, along with distanced community relationships, and the attitude of middle class homeowners to exhibit their wealth has resulted in an increased emphasis on security.

This research has demonstrated that security and related building elements are one of the difficult areas of middle class housing where sustainability can be increased. The ‘house entrance’ is another area where homeowners are not willing to compromise their preferences and opt for sustainable alternatives. There is a strong relationship between social perceptions, profession and homeowners' preferences and their willingness to opt for sustainable solutions.

The highlight of the element analysis and examining homeowners' preferences of building elements was that their willingness to opt for sustainable features in some

building elements could be identified. Homeowners have shown a clear willingness to adjust their choices in the case of building materials and openings.

The measurable benefit of this thesis is evident from the revised model simulation elaborated upon in chapter 6. This research underlines the significance of understanding people's aspirations and acknowledges that the contemporary typology has to be revisited to reduce energy consumption and carbon emissions. Revising one of the six identified elements - i.e. openings to reduce the conduction heat gain - has reduced energy consumption and carbon emissions by 40% of the total energy consumption. Considering that nearly 350 million of the population are middle class, 40 per cent energy saving from one building element in transition space has a huge impact on the quantity of carbon reduction.

These alignments are much easier to incorporate as two of the buildings' elements identified are mostly related to peoples' preferences and choices. It is very practical to target homeowners and develop sustainable strategies in terms of building materials and openings.

This study demonstrates the ways to engage with the stakeholders to reduce the carbon footprint. A brief explanation of the impact of climate change was well-received by respondents during the fieldwork. Most of the architects and builders revealed that more tangible information would help them to influence their clients. In this context, the outcome of this research could be shared with the stakeholders of Mysore and this will have a major impact on their understanding of sustainability. For instance, the simulation models developed for two elements of boundary conditions could be carried out for other elements and the results could be tabulated in simple graphs showing the increasing rate of carbon emission due to homeowners' preferences. Similarly, the study conducted at the boundary condition can be carried out for other parts of the house and the overall impact of homeowners' preferences on their carbon footprint could be mapped.

This study also demonstrates the lack of basic understanding of the building fabric and its operation by the respondents. Designers and builders could use this research to show their clients how their choice of opening, materials and spatial organisation is significantly contributing to their carbon footprint by increasing the conduction gain, embodied energy and excessive use of energy.

The impact of these measures and their effective implementation could be further enhanced with the coordinated effort from the builders and designers. This research shows that there is a lack of understanding and awareness in the profession, which could be one of the limiting factors while adopting sustainable housing typologies. It is in this context that a clear national policy, reflected in regulations, will play a crucial role in developing sustainable housing for middle class homeowners.

The impact of a subsidy on resource consumption was reflected in chapter 7 (7.4). As the economy increases, the rate of energy consumption increases. The pressure of gross energy demand on production and resource increase costs is making the buildings less affordable. As the economy in developed countries increases globalisation and the current recession may result in a shift back to production in the developed world. Some signs of this are already happening in the US. This could create problems in countries like India with large populations which are inherently now less resilient than they once were.

The majority of the Indian demographic, the poorer section of the society, more than sixty per cent, has to be the focus of any governmental policy. Every opportunity has to be used to lift more of the population out of poverty. This research emphasis on lifestyle, and cultural underpinning would play a pivotal role in inclusive community participatory design and reduce the gap between the rich and the poor.

8.4 The Role of Stakeholders

The significant finding of this research is the variation in peoples' willingness to opt for sustainable strategies among different building elements. For instance, homeowners are ready to make adjustments for elements like openings and materials. This not only demonstrates that the Indian middle class is willing to opt for sustainable housing, it also sets the direction for further research as to where sustainable strategies could be achieved with maximum acceptability and thus have a higher impact.

The outcome of this research demonstrates homeowners' choices. It also validates the initial question of 'Can any of homeowners' values be harmonised for sustainable strategies?' The issues identified which have an impact on sustainable housing typologies are complex. Homeowner's concerns identified, while examining their response for the building elements, can also be charted based on the level at which the issues could be addressed. They range from policy level decisions, to regulations, to architects' and builder's professional services and finally to homeowners' aspirations.

In this section, the six building elements analysed in the previous chapter are examined, and recommendations proposed at different levels are discussed briefly.

8.4.1 Homeowners

Among the building elements analysed, even though all the elements have direct relevance to people's preferences, it is the entrance, volume and interaction which have a direct bearing on peoples' choices and preferences. It is the homeowner's social and cultural values which play a crucial role while finalising the building typology.

Two significant outcomes of the research at this level are: first, homeowners are particular about their cultural preferences, and it is critical to understand their

requirements to direct them towards sustainable housing; second, the research also demonstrates that other key players – architects, Government and Legislation – have totally missed this point. This research points out that architects and builders give least preference to understanding the social and cultural requirements of the homeowners while finalising the house design. Policy decisions which are reflected in the regulations and building bylaws have no mention of homeowners' social and cultural expectations.

Homeowners' aspirations, for instance, to demonstrate their wealth, and cultural preferences to move from multi-purpose shared spaces and community spaces to individual buildings have resulted in higher energy required for embodied energy and operational energy. From this research, it is evident that homeowner's preferences play a crucial role while envisaging sustainable housing and this has to be acknowledged by policy makers and accommodated by the architects and builders.

8.4.2 Designers: Architects and Builders

It appears from the analysis that architects and builders play a crucial role in the deciding of the size of the windows and opening and the finalising of materials used. Though homeowners have strong preferences for the choice of material and the size of the opening, this research suggests that it is the architects and builders who influence the homeowners and are decision makers in most cases.

In the case of building elements like openings and building materials, architects' and builders' preferences play a crucial role while harmonising homeowners' preferences to sustainable housing strategies. The research points to the challenge involved in the process as most of the time designers lack significant knowledge of these elements related to sustainable housing. Furthermore, builders are of the opinion that altering the preferences would reduce their profit margin.

There is a need for professional bodies like the Council of Architecture, the Indian Institute of Architects and the Builders' association of India to generate pedagogic

awareness among architects and builders. Architectural education has incorporated sustainable architecture as part of its curriculum. Again, emphasis on the local and contextual understanding and social and cultural values has to be considered.

Architects have a greater role to play. The responsibility of the architect is to develop an understanding of homeowners' socio-cultural values. It is equally important for the architects to have a contextual understanding of the sustainable agenda.

Architects can convince their clients only when they can address homeowners' aspirations by providing alternative solutions which are also sustainable.

Architects and builders have a greater role to play in the process of sustainable housing, and they should not limit themselves to catering to homeowners' aspirations.

8.4.3 Policy Guidelines and regulations

From this research, it is evident that security is the paramount issue for homeowners, and they will not compromise their safety in the process of sustainable housing. The research points to that fact that lack of security and fear of crime has been the main reason for people to erect high gates, which are leading to unsustainable housing typologies. This research also shows that it is for the same reasons that homeowners prefer gated communities, and they would be happy not to have defined boundaries in the secured gated communities.

The outcome of the research demonstrates that fear and security cannot be addressed by an individual and at one house level. This requires clear policy, planning and regulations. This research demonstrates that the social dimension of sustainability – creating a safe environment – has to be addressed along with homeowners' preferences; a robust policy is critical to achieving a safe environment for homeowners. Further research can be carried out on effective policy and regulations to create a safe environment in the process of creating sustainable housing.

Legislation has to be addressed at different levels: the government of India is responsible for the international community and should have a clear strategy which should account for the ground realities at grass root levels. Legislation at the local level would be the most useful tool in implementing the national level strategies as they could be effectively formulated to the local context and cultural requirements.

8.5 Research process: Reflection

This research focuses on the social and cultural practices of middle class demographics of Mysore. In a socially and geographically complex place like India, regional and contextual understanding of the study area is critical. The extreme weather conditions and totally different social systems of different regions of India will have a bearing on the outcome of the research and the results might not be consistent. However, the research structure and methodology developed for this research can be adopted with minor variations for further studies.

The key part of the research is to identify homeowners' social and cultural values as well as their contextual cultural preferences. The questionnaire and research questions developed have very effectively elicited this information from the homeowners of Mysore. Though the overall research structure could be retained, these specific questions may have to be tweaked to conduct further research elsewhere.

For the questionnaires used in the first set of fieldwork, different measurement scales - nominal, ordinal and interval – were used. This was very useful to identify people's perceptions and aspirations. However, in a couple of cases, while identifying their preferences, it was challenging to code and assess their preferences where they had placed a similar grade for most of the variables. This did not help to narrow their preferences very effectively. On reflection, the issues of these natures could be assessed as priorities among the available options. It was most effective

when a similar process was adopted in the multi sorting task during the second set of fieldwork.

Similarly, the environmental psychology methodology, Multi Sort Tasking, has been very effective to communicate alternative typologies to respondents and has provided useful results that were analysed and interpreted in chapter 7 and chapter 8. On reflection, this methodology was most informative as respondents were asked to elaborate their thought process while making their choices. This semi-structured interview was useful to know the rationale behind their choices and played a crucial role during the process of interpreting the outcome of the fieldwork. The Multi Sort Tasking process could be tweaked with more specific leading questions, as developed during the first set of fieldwork, during further research stage, which could be more effective and provide more focused outcome.

8.6 Further Research

This research has argued for achieving a sustainable built environment with the consent of the middle class demographics. The failure of the policy guidelines and regulation was examined in chapter 7. The major shortfall of the current national policy is its disconnect from the local context. This research demonstrates the need for more locally controlled directives which are backed by the government at State and National level. The current regulations do not include how to achieve the required reduction targets and this could be a research topic in its own right.

Other studies built on this research, for instance, other income groups from Mysore and other urban areas from other parts of India, could provide results that can strengthen the argument further. This research is focused on one study area: transition space and boundary conditions. Again, further research could be carried out on other, equally significant aspects like internal spatial organisation, material consumption and the whole lifecycle of the building at building level and lifestyle

and social and cultural values and their influence at neighbourhood and regional level.

Earlier in this chapter the role of key players was examined and in most the cases they happen to be part of the problem. Further research has to be conducted to develop how to approach the professions in order to deal with sustainable housing and carbon reduction.

This research has used qualitative and quantitative methodologies for the analysis of different building elements and to identify homeowners' preferences. This would be a useful platform for further research to examine the sustainable strategies where homeowners are willing to make adjustments. This will also provide a useful tool for further research to examine the implications of homeowners' unwillingness to adopt sustainable building elements and to explore different strategies to achieve a sustainable built environment.

The four study models were developed incorporating the different alternatives for six elements identified. The environmental modelling reflects the energy consumption and carbon emission of each study model. The IES simulation was revised to reflect peoples' choices in only one element: openings. Further research can be conducted, where the study model can be revised for each building elements and IES simulations for revised models would be useful to quantify the total carbon reduction and energy consumption.

8.7 Conclusion

In India, middle class demographics and value systems are complex; where safety and security, and display of wealth have to go hand in hand. In this context, this research provides new insight into the way sustainability can be understood in the Indian context with qualitative values are complemented by quantitative measurements.

The outcome of this research demonstrates how, in the absence of any counterbalancing regulations, social perception and economic aspirations limit the acceptability of sustainable design and construction strategies. An important facet of this research is its emphasis on the qualitative aspects of sustainable housing.

As pointed out in the research, in India, the informal economy constitutes more than 90% of the workforce, wherein the construction industry is identified as the most unorganised sector. This research has established the challenges involved in finding solutions for sustainable housing in this unregulated environment. As identified in this research, the Western approach of the top-down policy guidelines alone will not be feasible. In the meantime, relying only on traditional values will not work. What is required is a balance of inspiring and encouraging homeowners and key players with proper guidelines and awareness.

Aspirations are not unique to the middle class or to the homeowners of the Mysore. As pointed out in this research, the challenge is the way these aspirations contradict the sustainable agenda. Being in the free economy, members of the middle class can make their own choices and in this context the aspirations and choices of middle class homeowners are critical. As this research demonstrates, it is these choices which can be influenced in the direction of sustainable typologies. Further research can be carried out as to how these sustainable choices can be promoted and how the middle classes perceive them.

The underpinning factor of this research is the emphasis on the qualitative aspects of sustainable housing. In this context, this research provides new insight into the way

sustainability can be understood in the Indian context with qualitative terms, which are complemented by quantitative values.

In conclusion, this research not only provides a contextual understanding of the prevailing housing scenario, it also provides tangible evidence and a means to harmonise middle class homeowners' aspirations towards sustainable housing. The need for people to express and accommodate their desire for upward mobility has to be acknowledged against a backdrop of complex class and caste structure on one hand and consumerist-driven influences of the media and the West on the other. India has identified housing as one of the eight national missions to reduce carbon emissions as part of its commitment to reduce people's vulnerability to the impacts of climate change. In a geo-climatically, regionally and culturally diverse country like India, the top-down national policy can only be successfully implemented with an understanding of the local context. A bottom-up approach to identify sustainable strategies that acknowledge homeowners needs and aspirations should be a useful contribution to achieving carbon reduction and sustainable housing in Mysore. With minor adjustments, the methodology and research process could be adopted in other Indian cities.

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Appendix A

Fieldwork I

Questionnaire template

Owners

Architects/ builders

Semi Structured interview template

Owners

Architects/ builders

Log of Interview



Dear Participant:

Thank you for taking the time out to take this survey. This survey is part of a research project which is designed to assess your aspirations and their effect regarding low carbon housing in Mysore City, India.

Completing this survey will not take more than 10 minutes.

Confidentiality Agreement

Please note personal information collected will not be made public and identities of participants will be known only to the researcher. Only the aggregated results will be shared with others when the findings are disseminated.

P1

Name: _____ **Age group:** Under 24 25-34
 35-44 45-60
 Over 61

House: _____ **Phone:** _____
Address: _____ **E Mail:** _____

Year of construction: _____ **Approximate area:** _____
No of Rooms _____ **Approximate cost of** _____
In your house: _____ **construction:** _____
 (During construction)

Note: Where ever appropriate, Please put ✓ in the box next to the factor, which is closest to your view. If you strongly feel for more than one factor, please mark ✓ for all those factors.

P2 You are living with:

Spouse
 Spouse and children
 Parents, spouse and children
 Joint family
 Other:
 (please specify)

P3 Annual income of your family:

Less than Rs. 59999
 Rs. 60000 – 119999
 Rs. 120000 – 359999
 Rs. 360000 – 539999
 Above Rs. 540000

P4 You want your house to:

Show the character of your family Show the wealth of your family
 Show the status of your family Show the cultural / social tastes of the family
 None of the above Other
 (please specify)

P5 While choosing the location for your house, what was the priority given for the following aspects:

| | Highest | | | | | | | least |
|---|---------|---|---|---|---|---|---|-------|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Locality | | | | | | | | |
| Area | | | | | | | | |
| Neighbours | | | | | | | | |
| Family/ friend /relatives | | | | | | | | |
| Plot size | | | | | | | | |
| School | | | | | | | | |
| Amenities | | | | | | | | |
| Bus stop | | | | | | | | |
| Cost | | | | | | | | |
| Proximity to city centre | | | | | | | | |
| Built in the available site (no choice) | | | | | | | | |
| Others: (please specify) | | | | | | | | |

P6 While finalising the house design, what was the importance given to:

| | Highest | | | | | | | least |
|-------------------------------|---------|---|---|---|---|---|---|-------|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Personal activity | | | | | | | | |
| Family activity | | | | | | | | |
| Space between your neighbours | | | | | | | | |
| Community activity | | | | | | | | |
| Others: (please specify) | | | | | | | | |

P7 What was the significance of the following aspects while finalising your house design :

Rate the following aspects based on the role they played in your decision making during the construction of your house.

| | Most significant | | | | least significant | | |
|---------------------------------|------------------|---|---|---|-------------------|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Basic Requirement | | | | | | | |
| Aesthetics | | | | | | | |
| Architects input | | | | | | | |
| Family input | | | | | | | |
| Family member's advice (elders) | | | | | | | |
| Friends /relatives | | | | | | | |
| Economy /cost | | | | | | | |
| Climate | | | | | | | |
| Culture / heritage | | | | | | | |
| Vaastu | | | | | | | |
| Utility | | | | | | | |
| Comfort | | | | | | | |
| Light | | | | | | | |
| Ventilation | | | | | | | |
| Maximum use of space /plot | | | | | | | |
| Value for money | | | | | | | |
| Expression | | | | | | | |

P8 In case of constraints (financial / plot size etc), you would prefer to compromise on:

- Area of spaces / rooms
- Finishing materials
- Equipment
- No. of rooms / spaces
- Furniture
- Elevation
- Other (please specify)

P9 Apart from your daily routine, rate the frequency of other activities:

| | Weekly | Monthly | once in few months | occasionally | never |
|---|--------|---------|--------------------|--------------|-------|
| Visiting friends | | | | | |
| Visiting other family members/ relatives | | | | | |
| Going out with family for eating / recreation / movie etc | | | | | |
| Attending functions (invited) | | | | | |
| Club (memberships) | | | | | |
| Attending community activities | | | | | |
| Meeting neighbours | | | | | |
| Other: | | | | | |

P10 Rate the significance of the following aspects and their influence in your life:

Grade each aspect in a scale of 1- 7, where **1 stands for no influence** and **7 for highest influence**. Use in-between numbers based on the influence

| | Now | 15 years ago | in the next 10 years |
|---------------------------|-----|--------------|----------------------|
| Telephone | | | |
| Washing machine | | | |
| T V | | | |
| Scooter | | | |
| Electric Oven / Microwave | | | |
| Air conditioner | | | |
| Car | | | |
| Computer | | | |
| Foreign Vacation | | | |

P11 Generally the rise in temperature inside the house is due to:

- | | |
|--|---|
| <input type="checkbox"/> Change in climate | <input type="checkbox"/> Change in orientation |
| <input type="checkbox"/> Change in use of material | <input type="checkbox"/> Change in lay out planning |
| <input type="checkbox"/> Change in design pattern | <input type="checkbox"/> None |
| <input type="checkbox"/> Other (please specify) | |

P12 Sustainable features adopted in your house:

- | | |
|--|--|
| <input type="checkbox"/> Rain water harvesting | <input type="checkbox"/> Waste disposal |
| <input type="checkbox"/> Ground water recharging | <input type="checkbox"/> CFL bulbs |
| <input type="checkbox"/> Solar water heater | <input type="checkbox"/> Other (please specify) |
| <input type="checkbox"/> Solar power | |

P13 If your income were to increase substantially, you would spend more on:

- | | |
|--|--|
| <input type="checkbox"/> Standard of living | <input type="checkbox"/> Spend on planned activity |
| <input type="checkbox"/> Education | <input type="checkbox"/> Family members |
| <input type="checkbox"/> Health | <input type="checkbox"/> Charitable donations |
| <input type="checkbox"/> Shop | <input type="checkbox"/> Savings |
| <input type="checkbox"/> Other (please specify) | <input type="checkbox"/> sustainable features |

P14 Generally how satisfied are you with your family's income:

- | | |
|---|--|
| <input type="checkbox"/> Enough | <input type="checkbox"/> More than enough |
| <input type="checkbox"/> Less than enough | <input type="checkbox"/> Can't say |
| <input type="checkbox"/> Would be happy if we had some more | <input type="checkbox"/> Other (please specify) |

P15 On average, what percentage of your monthly income do you spend on the following items:

- | | |
|--|---|
| <input type="checkbox"/> Food: ___ % | <input type="checkbox"/> Shopping : ___ % buying goods/ products |
| <input type="checkbox"/> Housing (loan): ___ % | <input type="checkbox"/> Family : ___ % (giving / sending money to family) |
| <input type="checkbox"/> Utilities: ___ % (water/ electricity/ gas bills) | <input type="checkbox"/> Saving: ___ % |
| <input type="checkbox"/> Transportation / Fuel: ___ % | <input type="checkbox"/> Other ___ % (please specify) |

P16 Generally, apart from your family responsibilities, you tend to:

- | | |
|--|---|
| <input type="checkbox"/> Help your friends and extended family | <input type="checkbox"/> Contribute to community activities |
| <input type="checkbox"/> Help your neighbours | <input type="checkbox"/> Contribute to activities at city level |
| <input type="checkbox"/> Contribute to local activities | <input type="checkbox"/> Other (please specify) |

P17 Living in a major democratic country, you are empowered to vote: according to you, your vote:

- | | |
|--|--|
| <input type="checkbox"/> Makes a major impact | <input type="checkbox"/> Matters to some extent |
| <input type="checkbox"/> Has least impact | <input type="checkbox"/> Who ever wins, it will have no impact on daily life |
| <input type="checkbox"/> Other (please specify) | |

P18 Generally, for the prevailing public health and education system, whom do you consider responsible:

- | | |
|--|--|
| <input type="checkbox"/> Government of India | <input type="checkbox"/> Government of Karnataka |
| <input type="checkbox"/> Both | <input type="checkbox"/> Neither |
| <input type="checkbox"/> Can not say | <input type="checkbox"/> Other (please specify) : |

Thank you for your time and valuable information. If you have further comments / suggestions or wish to discuss further about Sustainable built environment, you could contact me at),

Satish.B.K; PhD student, Architect & Planner
Architecture: School of Arts, Culture and Environment
The University of Edinburgh
20 Chambers Street
Edinburgh. EH1 1JZ UK; satish.bk@ed.ac.uk;



Dear Architect:

Thank you for taking the time out to take this survey. This survey is part of a research project which is designed to assess client and architect aspirations and their effect regarding low carbon housing in Mysore City, India.

Completing this survey will not take more than 10 minutes.

Confidentiality Agreement

Please note personal information collected will not be made public and identities of participants will be known only to the researcher. Only the aggregated results will be shared with others when the findings are disseminated.



A1

| | |
|--------------|----------------------|
| Name: | Firm / Organisation: |
| Address: | Year of Graduation: |
| | Phone: |
| | E Mail: |

Note: Where ever appropriate, Please put ✓ in the box next to the factor, which is closest to your view. If you strongly feel for more than one factor, please mark ✓ for all those factors.

A2

Rate the selection process of your clients, while choosing the location for their house:

| | Highest | | | | | | | least |
|---|---------|---|---|---|---|---|---|-------|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Locality | | | | | | | | |
| Area | | | | | | | | |
| Neighbours | | | | | | | | |
| Family/ friend /relatives | | | | | | | | |
| Plot size | | | | | | | | |
| School | | | | | | | | |
| Amenities | | | | | | | | |
| Bus stop | | | | | | | | |
| Cost | | | | | | | | |
| Proximity to city centre | | | | | | | | |
| Built in the available site (no choice) | | | | | | | | |
| Others: (please specify) | | | | | | | | |

A3 Rate the influence of following aspects during the material selection process:

| | Most | | | | | | | least |
|-------------------------------------|------|---|---|---|---|---|---|-------|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Owner requirement | | | | | | | | |
| Architects style / choice | | | | | | | | |
| Locally available | | | | | | | | |
| Embodied energy | | | | | | | | |
| Economy | | | | | | | | |
| Aesthetics | | | | | | | | |
| reusability | | | | | | | | |
| Natural Material | | | | | | | | |
| Natural material-from beyond 200 km | | | | | | | | |
| Material processed locally | | | | | | | | |
| Material processed beyond 200 km | | | | | | | | |

A4 You are aware of “Sustainable Built Environment” through:

- Taught Academic curriculum
- Colleague discussion
- Professional body
- Global awareness
- Client demand
- Other (please specify)

A5 Significance of following aspects while finalising house design :

Rate the following aspects based on the role they play in your design process.

| | Most | | | | | | | least |
|-------------------------------|------|---|---|---|---|---|---|-------|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
| Client - led | | | | | | | | |
| Architect- led | | | | | | | | |
| Functionality | | | | | | | | |
| Climate | | | | | | | | |
| Vaastu | | | | | | | | |
| Orientation | | | | | | | | |
| Road | | | | | | | | |
| Neighbour site | | | | | | | | |
| Requirements | | | | | | | | |
| Regulations / by-laws | | | | | | | | |
| Clients input | | | | | | | | |
| Any other (please specify) | | | | | | | | |

A6 Selection of material for different components:

Select the most important aspect, which influence the most, while finalising the choice of materials:

| | Flooring | Woodwork | Elevation | Electrical | Sanitary fittings |
|------------------------|----------|----------|-----------|------------|-------------------|
| Comfort | | | | | |
| economy | | | | | |
| best in business | | | | | |
| status symbol | | | | | |
| life of the material | | | | | |
| architect's preference | | | | | |
| owner choice | | | | | |
| others: please specify | | | | | |

A7 Sustainable Features adopted in your projects:

- Rain water harvesting
- Ground water recharging
- Solar water heater
- Solar power
- Waste disposal
- Materials
- Construction process.
- Other:
(please specify)

A8 Living in a major democratic country, you are empowered to vote: according to you, your vote:

- Will make a major impact
- Will have least impact
- Other
(please specify)
- Will matter to some extent
- Who ever wins, will have no impact on daily life.

A9 According to you, generally the rise in temperature inside the house is due to:

- Change in climate
- Change in use of material
- Change in design pattern
- Other
(please specify)
- Change in orientation
- Change in lay out planning
- None

A10 Generally, for the prevailing public health and education system, whom do you consider responsible:

- Government of India
- Both
- Cannot say
- Government of Karnataka
- Neither
- Other
(please specify) :

Thank you for your time and valuable information. If you have further comments / suggestions or wish to discuss further about Sustainable built environment, you could contact me at
 Satish.B.K; PhD student, Architect & Planner
 Architecture: School of Arts, Culture and Environment
 The University of Edinburgh
 20 Chambers Street
 Edinburgh. EH1 1JZ UK satish.bk@ed.ac.uk





Dear Architect:

Thank you for taking the time out to take this Interview. This Interview is part of a research project which is designed to assess middleclass aspirations and their effect regarding low carbon housing in Mysore City, India.

Completing this interview will not take more than 20 minutes.

Confidentiality Agreement and permission to record this interview

Please note personal information collected will not be made public and identities of participants will be known only to the researcher. Only the aggregated results will be shared with others when the findings are disseminated.

Thank you for your time and valuable information. If you have further comments / suggestions or wish to discuss further about Sustainable built environment, you could contact me at

Satish.B.K; PhD student, Architect & Planner.

Architecture: School of Arts, Culture and Environment,

The University of Edinburgh, 20 Chambers Street, Edinburgh. EH1 1JZ UK; satish.bk@ed.ac.uk;

Name:
Address:

AI. Design process:

1. Client – Architect interaction: design process: in Brief

Yardstick followed in finalising requirements.

Clients input:

How much influenced by: social/ cultural aspects, friends, relatives, exposure, and neighbors'.

Do they ask you to design like X's res? Explore any established pattern

Architects current and recent projects?

(To be located on the map)

Why do you think clients come to you?

Are you following any set procedure? (Have you developed your own?)

2. Practice over a period of time:

How do you look at the transformation in house design over period of time?

Can you relate house design to external spaces: in the past? Contemporary?

Its use as social shared space, as defensive (protective).

(Can you relate this to their social, cultural and economic conditions or changes – if yes elaborate.)

Cluster and row housing:

Their relevance in present scenario.

According to you, why have we moved from cluster / row housing to today's plot development?

How have we effectively used in reconfigured external spaces.

(Do the elements like: Jagali, Court etc has relevance in today's context).

Available materials and its impact on design process.

3. Sum up:

Architect's take on house pattern, change design process over period, peoples choice – their requirements and its relation to their social and economic condition.

All. Middle-class people aspirations:

1. Client's expectations:

In your experience, what are the crucial aspects / issues they give most importance.

(If they cannot meet all of them) how they address constraints? Can we derive any pattern out of this?

Can this be related to their social, cultural background?

What background do your clients come from: Professional, Business, Govt etc.

2. Change in Economic condition:

Do you feel its impact on Design, spaces etc.

Critically, 1991 economic liberalisation and significant stages like: Pay scale revision, Huge Bonus for public sector employees etc (mention if they have come across any such): have they influenced?

3. Social / Cultural:

Do you recognise change in family system? If yes, does it have any implication on house design?

Can you relate the requirements of the clients to their social / cultural background? If yes elaborate.

Do you feel any impact of Media, Western influence in house design?

What do clients provide when briefing architects?

Size – no of rooms

Cost

Grandness / finishes

Examples – sources?

What type of houses your clients like?

All. Sustainable Built Environment:

1. Comfort:

How do you define comfort: architecturally, technically and from people's perspectives: are they different? (technology fix or responsive design)

Your understanding of "Climate responsive Design"

How it is reflected in your design.

Can you relate vernacular architecture to comfort?

Are you implementing / inspired by vernacular architecture?

If yes to what extent: Totally, elements, spaces, materials.

Energy costs – carbon reduction: are these terms understood by clients?

2. S B E

Your understanding of SBE

How can we achieve SBE

Public interest, architects commitment, guideline, policy?

Relate to Universal design, Voting etc

3. Contribution:

The major challenges in relating social, economic background to housing.

Does the architect have a role in educating clients on SBE?

Who else is responsible?

Your contribution to SBE

According to you how can we achieve SBE in general and

At Mysore in particular.

Dear Participant:

Thank you for taking the time out to take this Interview. This Interview is part of a research project which is designed to assess you aspirations and their effect regarding low carbon housing in Mysore City, India. Completing this interview will not take more than 20 minutes.



Confidentiality Agreement and permission to record this interview

Please note personal information collected will not be made public and identities of participants will be known only to the researcher. Only the aggregated results will be shared with others when the findings are disseminated.

Thank you for your time and valuable information. If you have further comments / suggestions or wish to discuss further about Sustainable built environment, you could contact me at

Satish.B.K; PhD student, Architect & Planner.

Architecture: School of Arts, Culture and Environment,

The University of Edinburgh, 20 Chambers Street, Edinburgh. EH1 1JZ UK; satish.bk@ed.ac.uk;

Name:
Address:

PI. General:

1. House construction process:

How you derive at site, no. of rooms and types of rooms.
Who all assisted in finalizing house design?
How you arrived at different spaces?

2. Vastu:

How has vastu influenced your house design?
If you believe reason for the belief: knowledge and consequences:
Is there any social or cultural values attached (are you satisfying some one in the process?)

3. Compound:

Why do you leave space between buildings?
How influential are planning laws?
What happens if there is no compulsion- do you still leave space, how you use this space
What do you see is the importance of space around house? Why?

4. Beyond house:

Use of play ground, park etc and its relation to your house.

PII. Economy:

1. Owning a house:

Significance of owning a house:

How is house funded?

For you what are the most important elements of house?

Quality of materials, space, security.

(What would have been the difference if they had more money (similarly for less money))

2. Growth:

Do you find any difference in economic condition: looking back for 15 – 20 years and looking ahead for 15 -20 years.

Its implication on standard of living, affordability etc.

Usually your earning is spent mostly on: food, health, education, etc

3. Aspirations:

Your expectations: how is it derived? (loose fabric set by relatives, friends, society)

What is your ideal form of life style?

Ownership- what defines your aspirations? – car, tv, a/c, luxury, pool etc.

Your aspirations: if you win lottery: you would like to:

If you had option to own a much bigger house:

How is look at saving, taking loan, use of credit card etc

PIII. Social and Cultural:

1. Activity- house pattern: interrelation

“Athithi devo bhava” (guest is GOD) - how relevant is this today.

Importance given to guest and personal interest.

Narrate your daily practice: difference between Parents and children (wife, if not working).

How house responds to their activity.

How different in week ends.

Do you find any changes in custom, practices and activities?

If yes, can you track change in last 10 -15 years – now to future? Reflect on housing

2. Neighbors:

Your relation with them?

Social

Boundary – role?

Shared spaces

How often you interact? How house design helps / hinders

3. Beyond:

How much importance do you attach for bond between friends, family members, relatives?

In case of emergency you can get help from – who would you go to first?

(Family, friends, relatives, loan, credit card etc)

Volunteer works?

PIV. S B E

1. Comfort:

What makes the ideal environment? – Lighting, ventilation, cooling, security etc.
(Physical, physiological, material, design, construction technique, equipments)

What are the major changes to the urban fabric at Mysore?

Road, planning.

Housing development?

Are these positive or negative?

Expand

(How was Mysore 20 years ago? Has it changed? If yes, what? How?)

2. S B E:

What are the measures you are incorporating to reduce energy consumption:

Reuse of material, conserve water, electricity, etc

3. Contribution:

What do you believe is the importance of global warming and
energy consumption?

What, if any, is your personal responsibility to this?

Who can contribute in the process and how?

(govt, Development authority, architects)

How can you contribute in the process of SBE?

Fiedwork I

Log
2009

| Respondent Number | Sl.No | Person/ Company | Date |
|-------------------|-------|--|--------|
| 1 | 1 | Dr. Bhooshan | 18-Jun |
| 2 | 2 | K Narasimha Murthy | 17-Jun |
| 3 | 3 | Prof Reddy, IISC | 27-Jul |
| 4 | 4 | Prof Sastri, ATI | 30-Jun |
| 5 | 5 | Dr. Sridhar Babu, TERI | 23-Jun |
| 6 | 6 | Chandrashekar Swamy, MUDA | 03-Jul |
| 7 | 7 | Dr. Aswin. | 23-Jun |
| 8 | 8 | Prof. Narasimha Murthy: UoM | 12-Jul |
| 9 | 9 | PROF. Basu-Hassan | 27-Jul |
| 10 | 10 | Krishna Murthy_ SAI Consultants | 30-Jun |
| 11 | 11 | Chitra Viswanath Architect Bangalore | 27-Jul |
| 12 | 12 | MV Chandrashekariah, PLANNING COMMISSION | 23-Jul |
| 13 | 13 | Jeeth lype: good homes, Architect | 27-Jul |
| 14 | 14 | Dr. Hari Murthy, MSRIT, Bangalore | 27-Jul |

Architects

| | | | |
|----|----|-------------------|--------|
| 15 | 1 | Suresh Hampi | 28-Jun |
| 16 | 2 | Parvathi | 27-Jul |
| 17 | 3 | Wari | 29-Jun |
| 18 | 4 | SUDHEENDRA | 26-Jun |
| 19 | 5 | Sharath | 27-Jun |
| 20 | 6 | CHAMPA | 30-Jun |
| 21 | 7 | Sunil Nayak | 27-Jun |
| 22 | 8 | Bhat | 26-Jun |
| 23 | 9 | Muddaiah | 26-Jun |
| 24 | 10 | Anu | 01-Jul |
| 25 | 11 | Lalitha Raj | 11-Jul |
| 26 | 12 | Rajesh Kumar Jain | 10-Jul |
| 27 | 13 | Chandra Shekar | 30-Jun |
| 28 | 14 | Mobin | 25-Jun |
| 29 | 15 | Nagesh | 29-Jun |
| 30 | 16 | Vijaya Kumar | 29-Jun |

| Respondent Number | Sl.No | Person/ Company | Date |
|-------------------|-------|--|--------|
| Homeowners | | | |
| 31 | 1 | Satish B R (45 y) | 28-Jun |
| 32 | 2 | Rajappa CFTRI (55 y) | 07-Jul |
| 33 | 3 | Pushpa JP Nagar | 04-Jul |
| 34 | 4 | Venkatesh Murthy (HUDCO) 40 | 08-Jul |
| 35 | 5 | Balasubramanya JP Nagar (50 y) | 04-Jul |
| 36 | 6 | Nirmala Subramanya JP Nagar (50 y) | 04-Jul |
| 37 | 7 | mahadeva Mahajan (40 y) | 07-Jul |
| 38 | 8 | Lakshmi Narayan JP Nagar (55 Y) | 04-Jul |
| 39 | 9 | Krishna Swamy (HUDCO) (MIG) (72 y) | 08-Jul |
| 40 | 10 | Khadar- TREES (40 y) | 14-Jul |
| 41 | 11 | Gundamma- GOKULAM | 14-Jul |
| 42 | 12 | Gowda_ Uaha JP Nagar (38 y) | 18-Jul |
| 43 | 13 | Geetha Shivaprasad- Gokulam (48 y) | 14-Jul |
| 44 | 14 | Geeta Nagaraj JP Nagar (35 y) | 04-Jul |
| 45 | 15 | Druva Kumar- Gokulam (28 y) | 16-Jul |
| 46 | 16 | Doreswamy - Gokulam (85 y) | 14-Jul |
| 47 | 17 | Ananda Lakshmi- Gokulam (71y) | 14-Jul |
| 48 | 18 | Jagadeesh AIR | 07-Jul |
| 49 | 19 | Subramanya AIR | 07-Jul |
| 50 | 20 | Yadurajan / Shashikala VASU | 11-Jul |
| 51 | 21 | Madhava Rao, Gokulam | 14-Jul |
| 52 | 22 | Arun, Gokulam | 14-Jul |
| 53 | 23 | Raganathan, SPI | 10-Jul |
| 54 | 24 | Vijaya Kumar, Gokulam. | 14-Jul |
| 55 | 25 | Hanumantha Rao, SPI | 10-Jul |
| 56 | 26 | Dr. Jayashree, Agrahara (and Narashiman) | 29-Jun |
| 57 | 27 | Rajalakshmi Sridhar, AIR | 07-Jul |
| 58 | 28 | Keshava Murthy, AIR | 07-Jul |
| 59 | 29 | Mahendrakar, CFTRI | 07-Jul |
| 60 | 30 | Dr. Modi, CFTRI | 07-Jul |
| 61 | 31 | Alexander, HUDCO | 08-Jul |
| 62 | 32 | Nandan, Agrahara | 01-Jul |
| 63 | 33 | NAGARAJA CONT Gokulam | 15-Jul |

Builders

| | | | |
|----|---|-------------------------|--------|
| 64 | 1 | Badari Nath | 18-Jul |
| 65 | 2 | Jagadeesh Babu_ Sankalp | 18-Jul |
| 66 | 3 | Nagaraja Cont Gokulam | 15-Jul |
| 67 | 4 | Nanda Kumar | 14-Jul |
| 68 | 5 | Prakash Kumar- PRAMUR | 16-Jul |
| 69 | 6 | Somanna_ Gokulam | 14-Jul |
| 70 | 7 | Sriram_Enclave | 17-Jul |

Appendix B

Fieldwork II

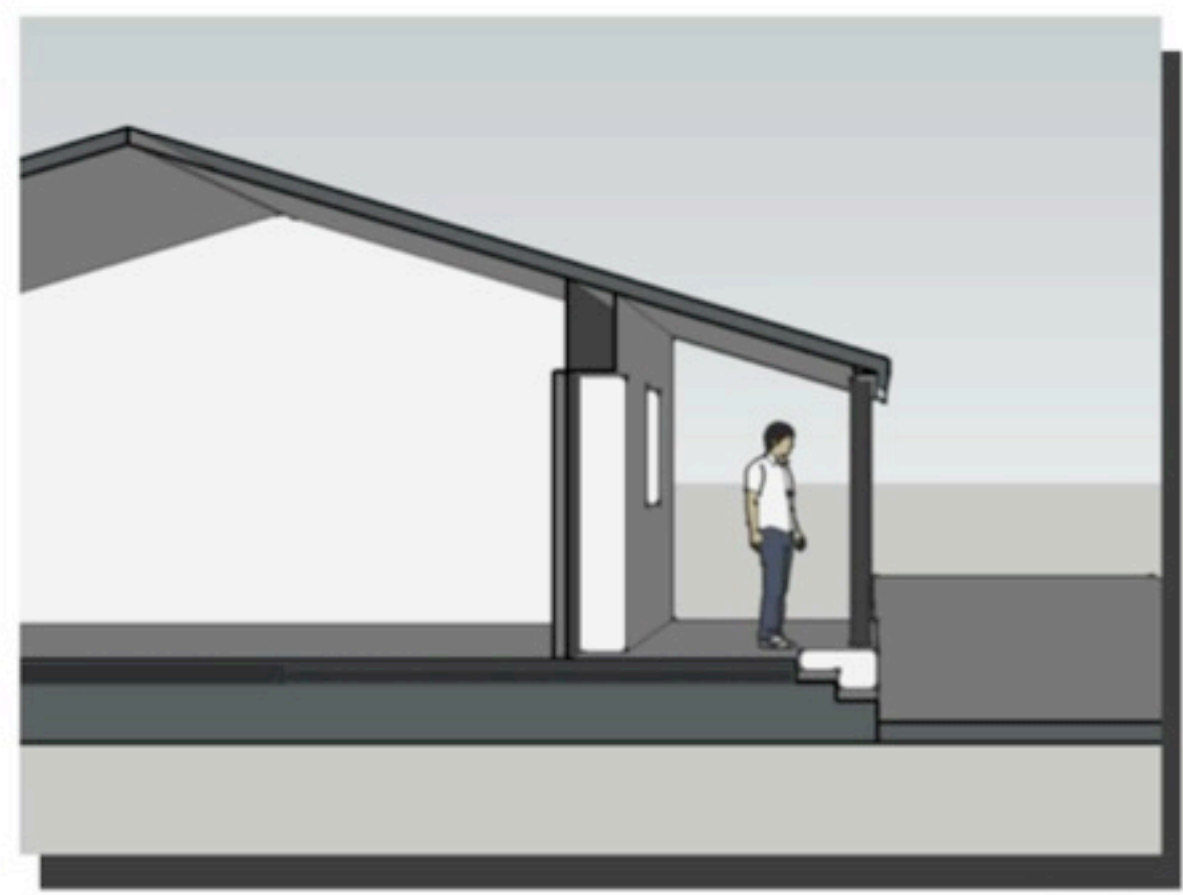
Multi Sorting Task (MST)

MST Cards

Chart

Log Sheet

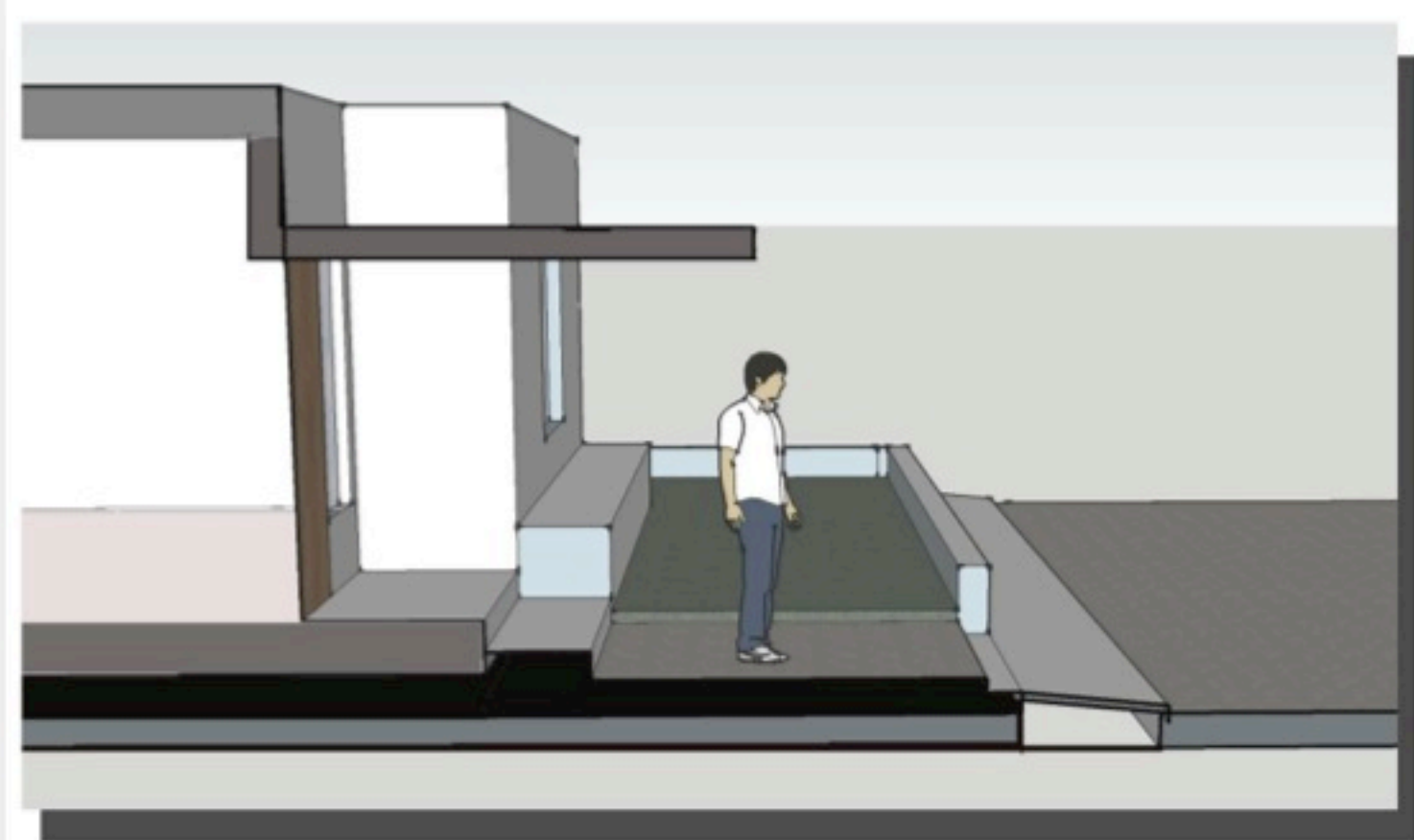
Log of Interview



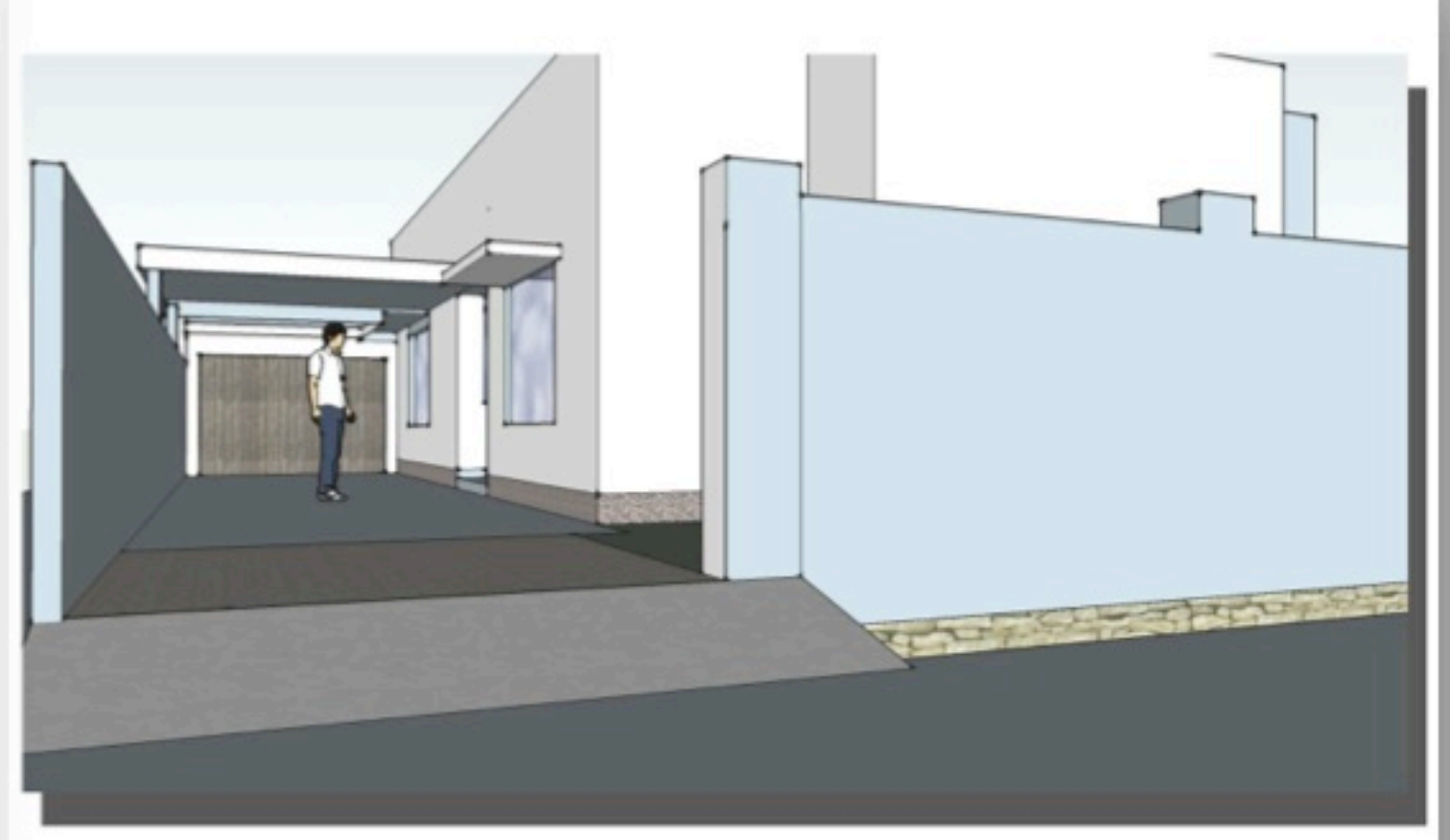
VJ



VP



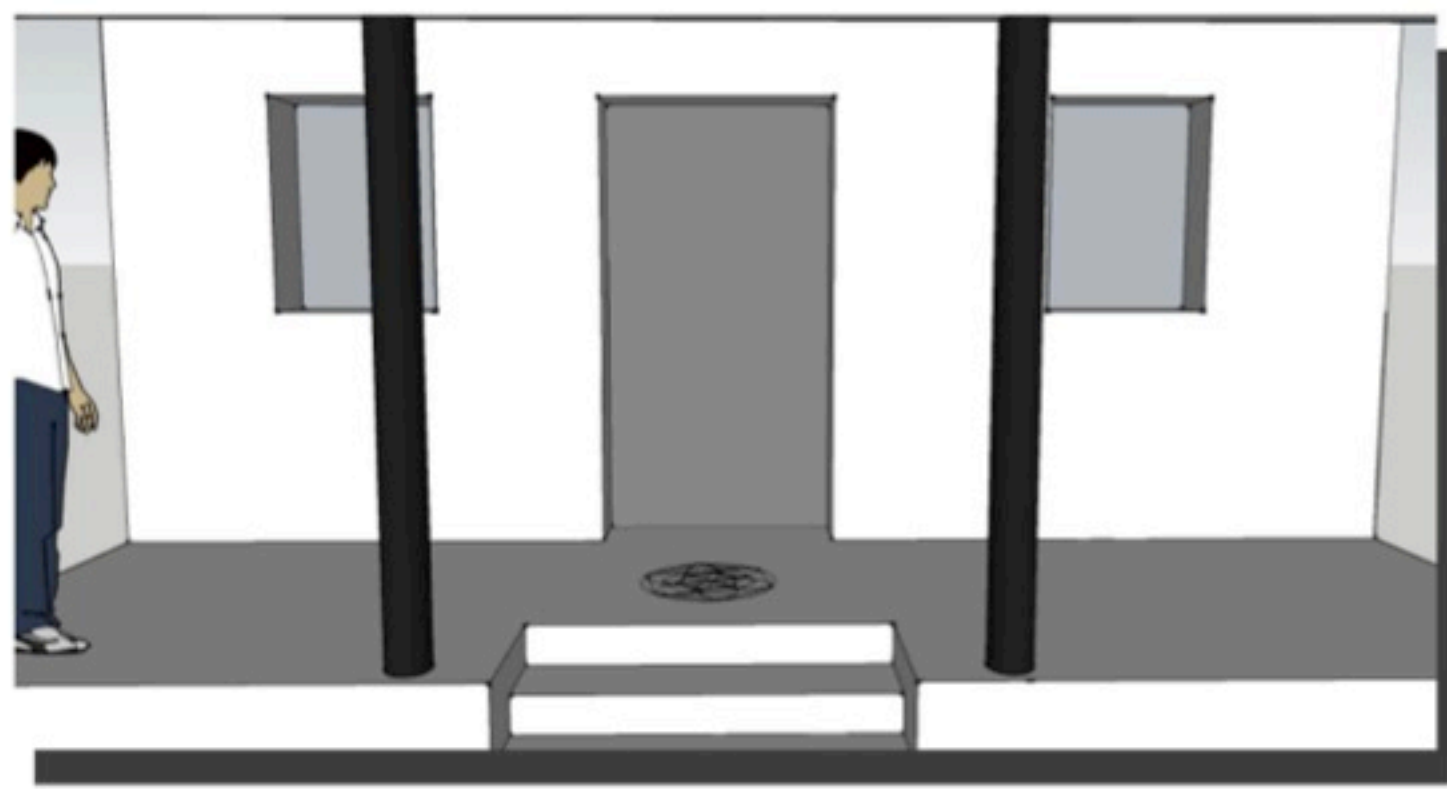
VN



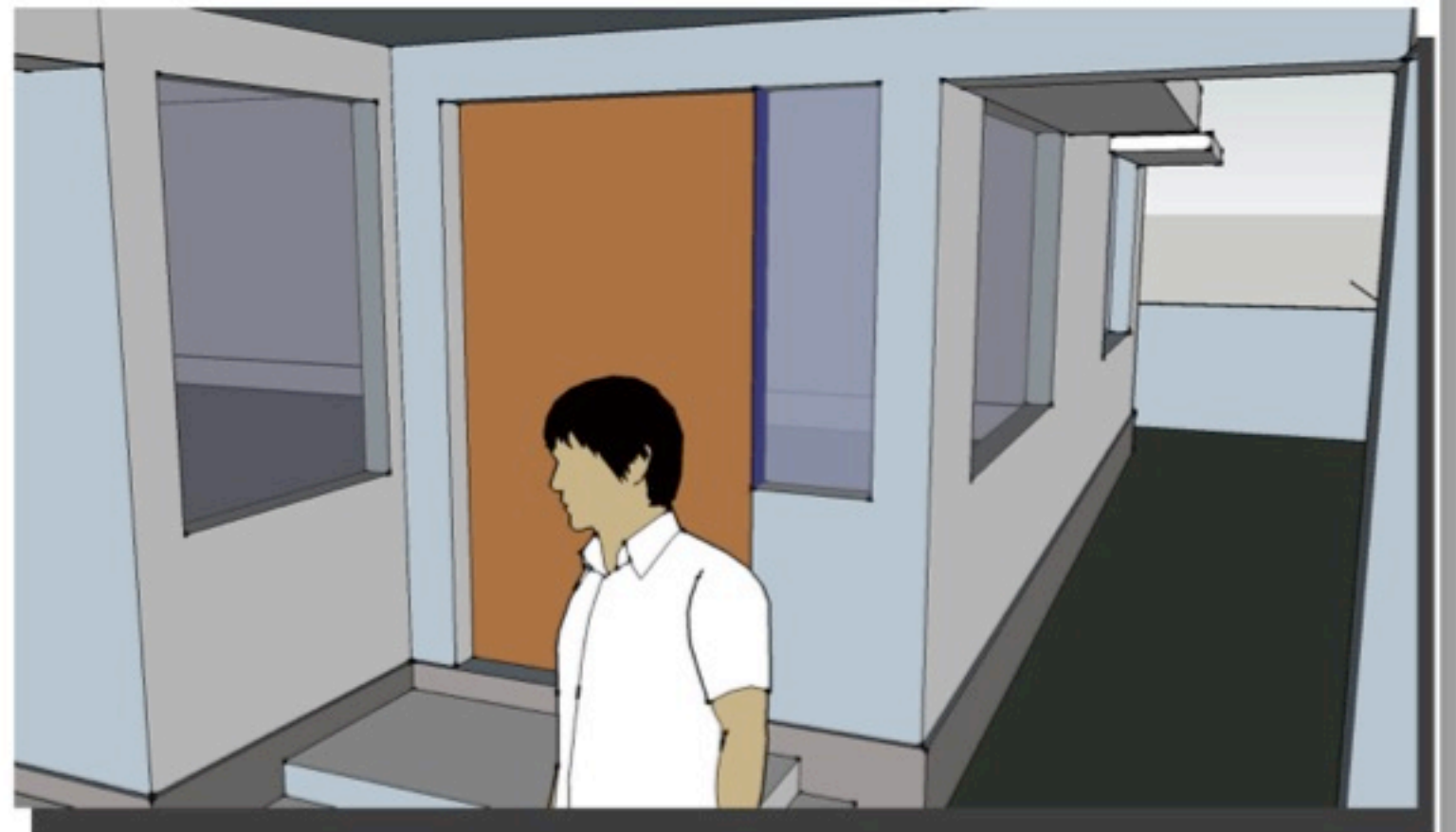
VH

Multi-sorting task cards

Building Volume



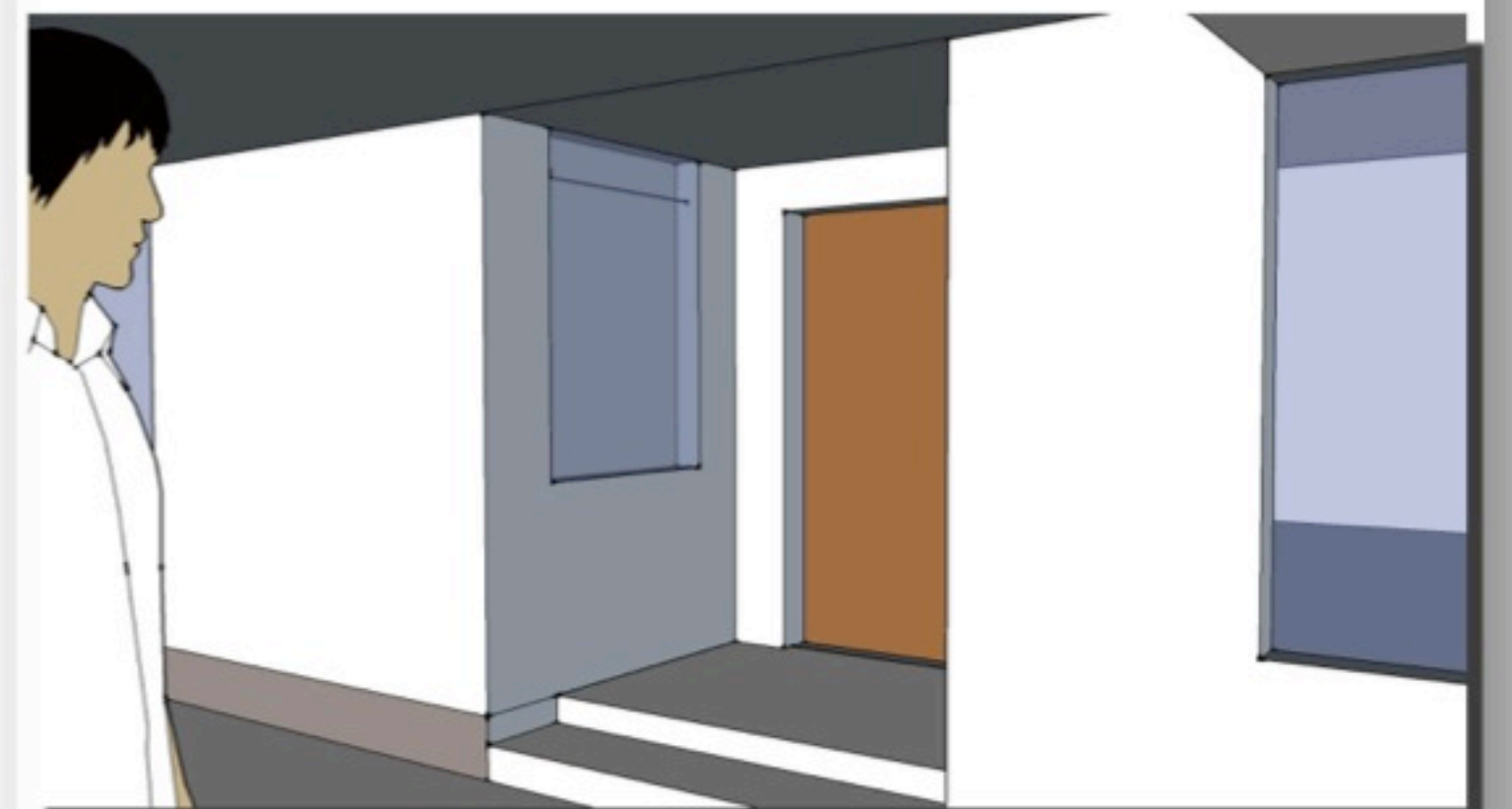
EJ



EP



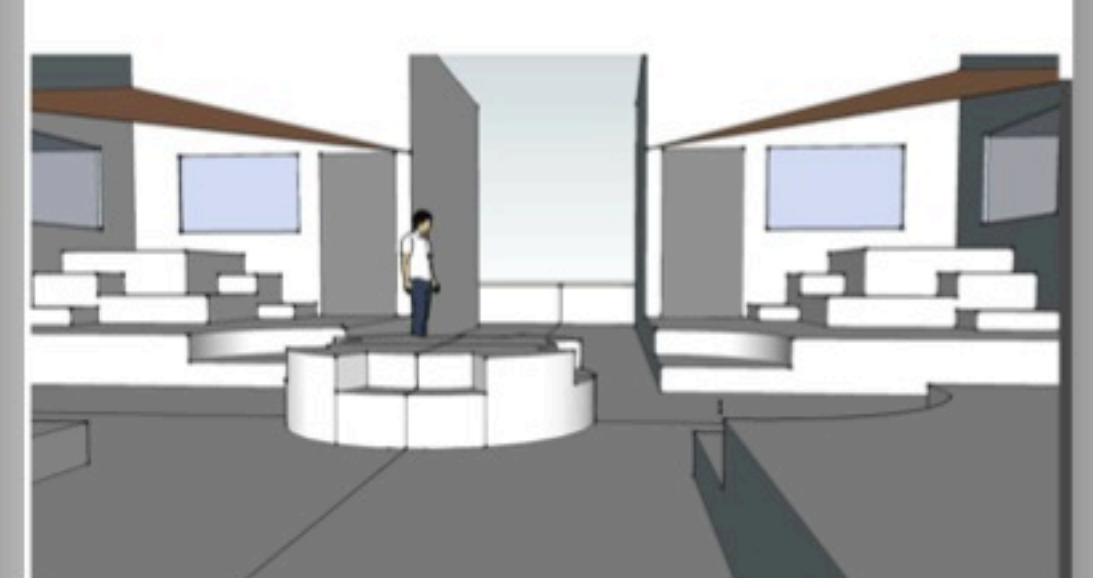
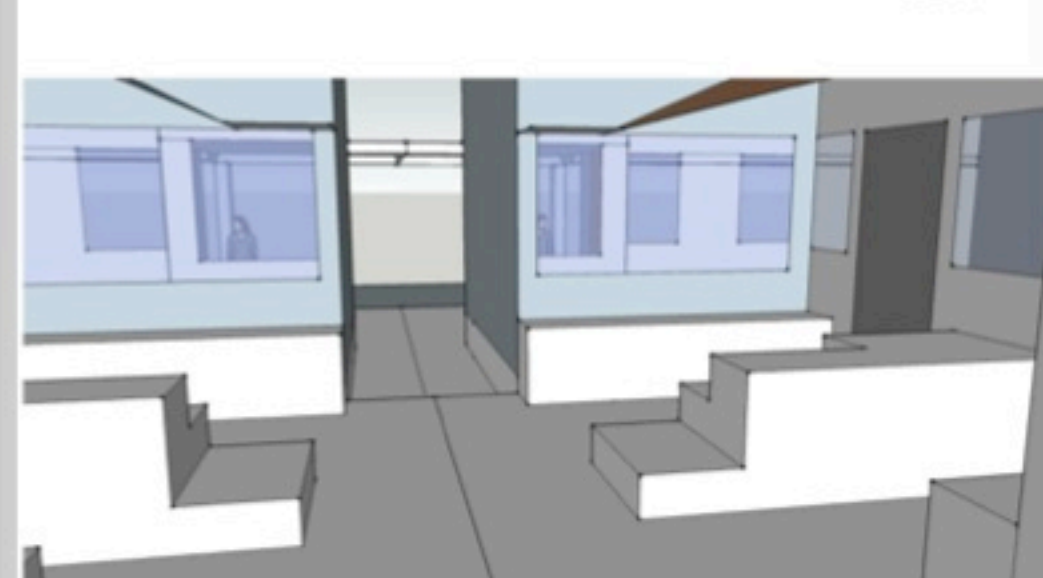
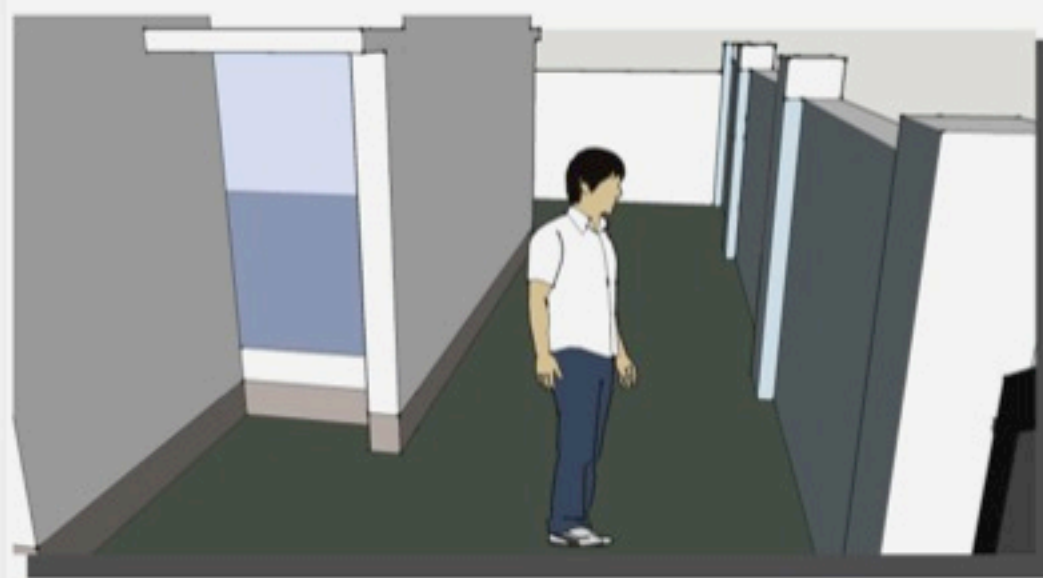
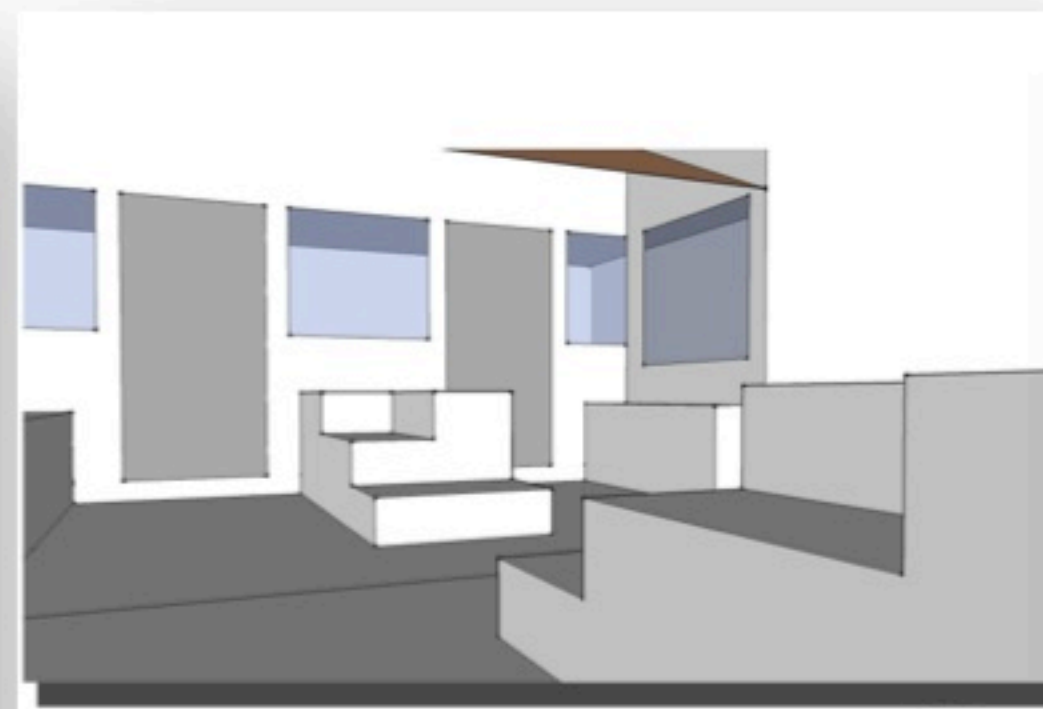
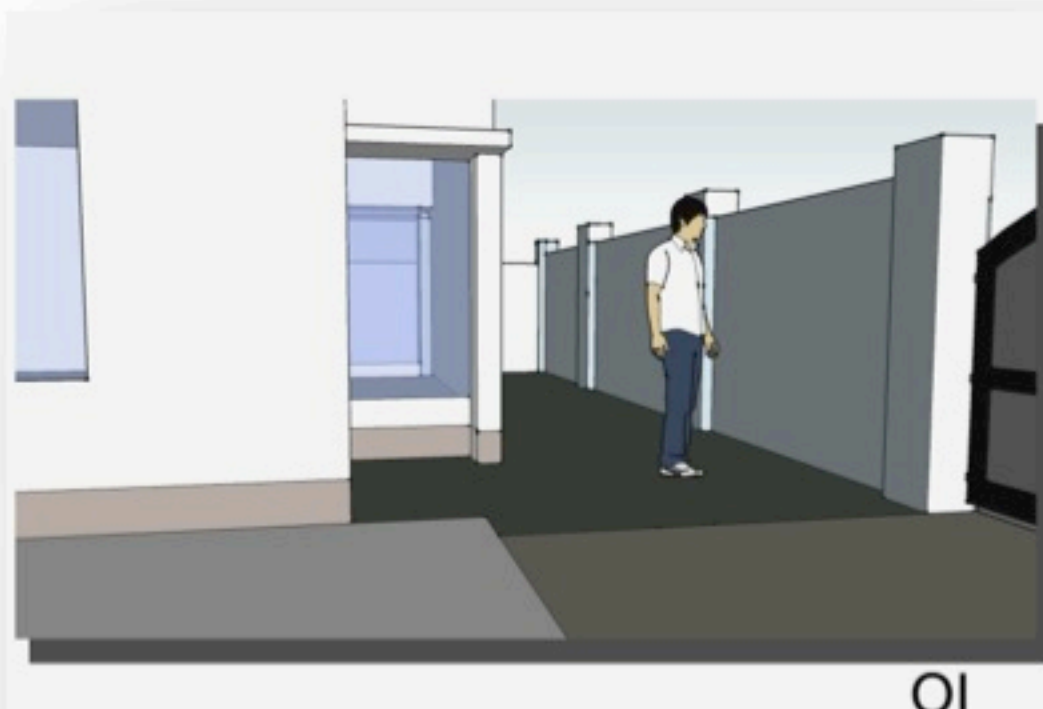
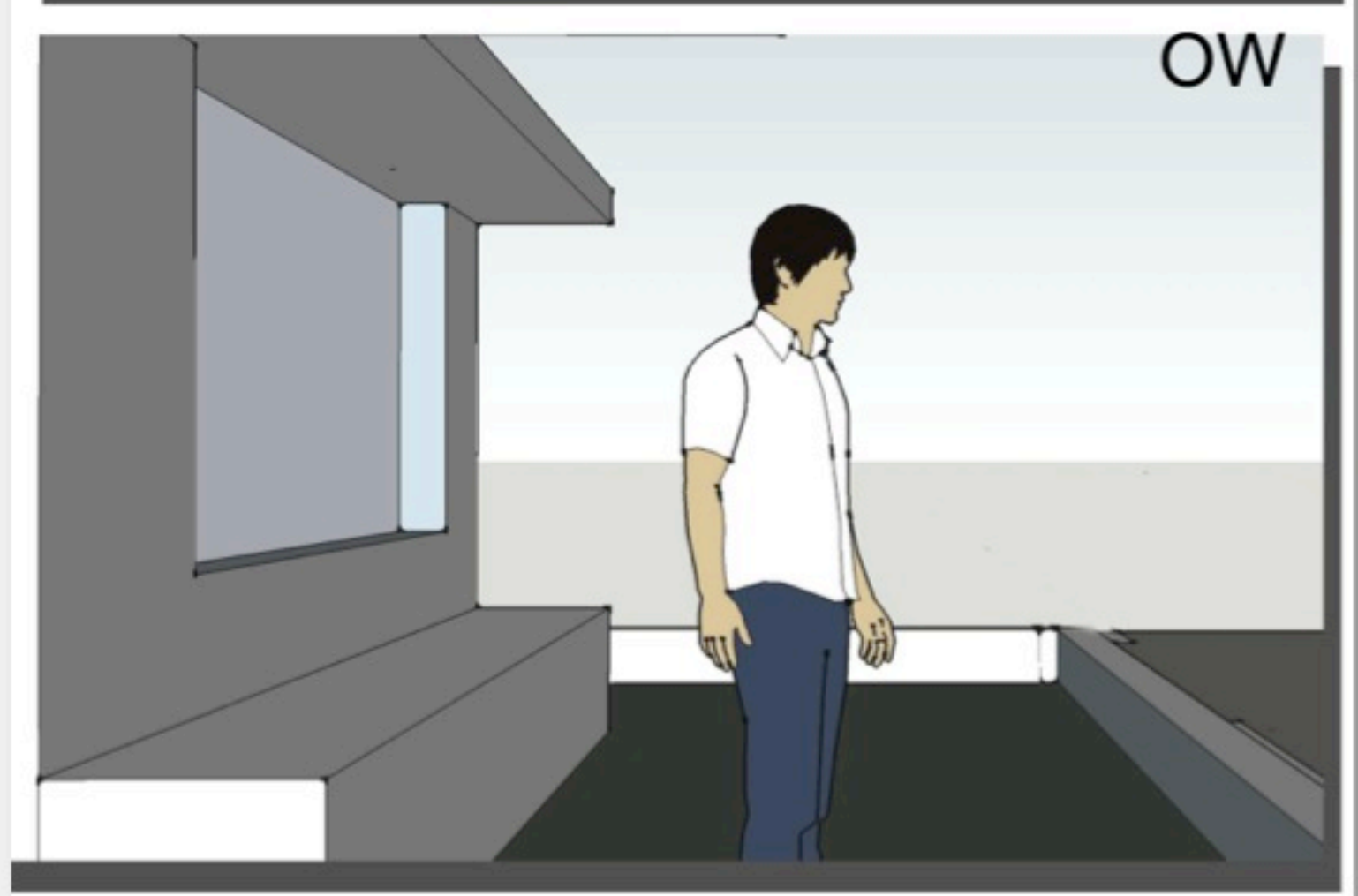
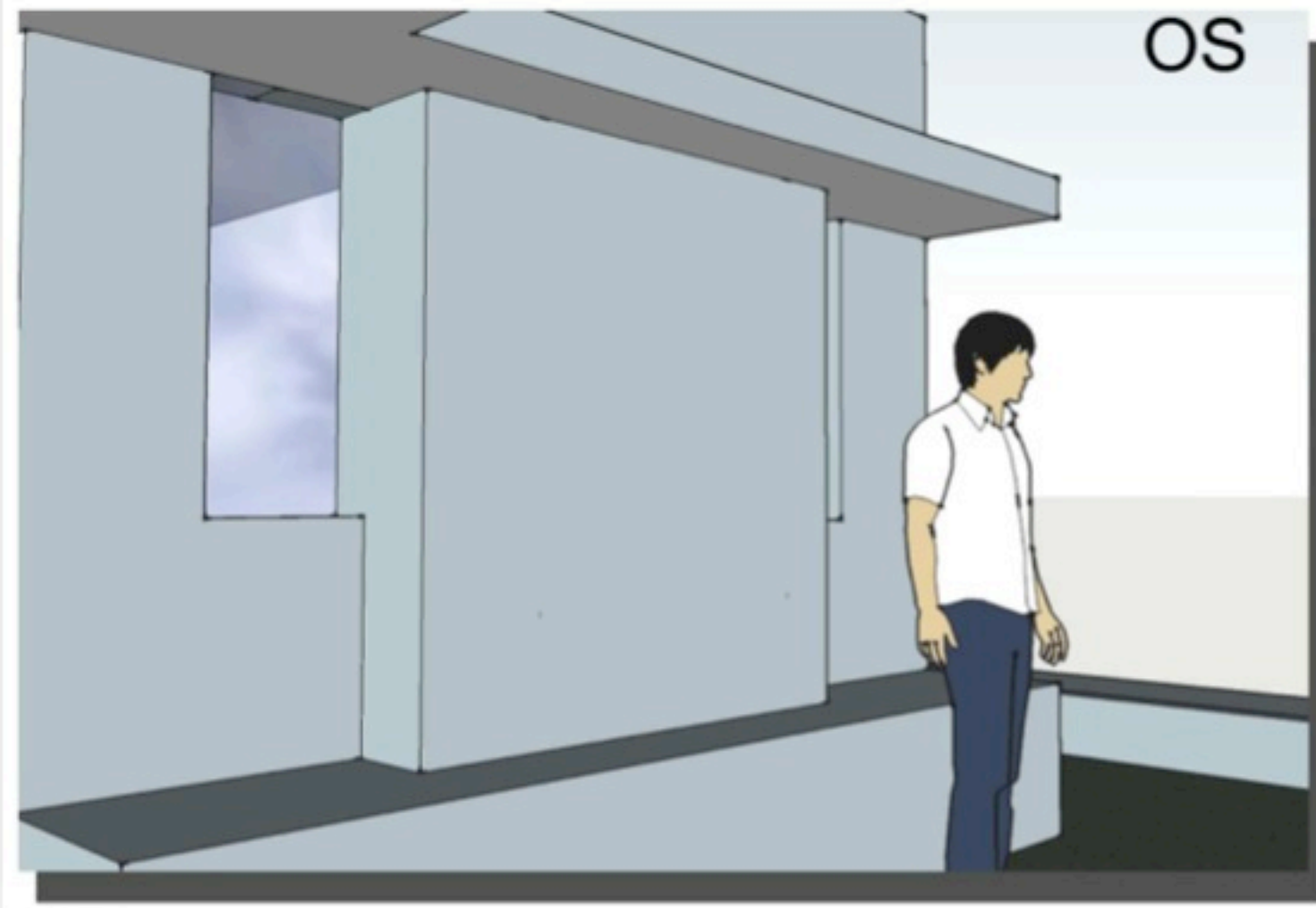
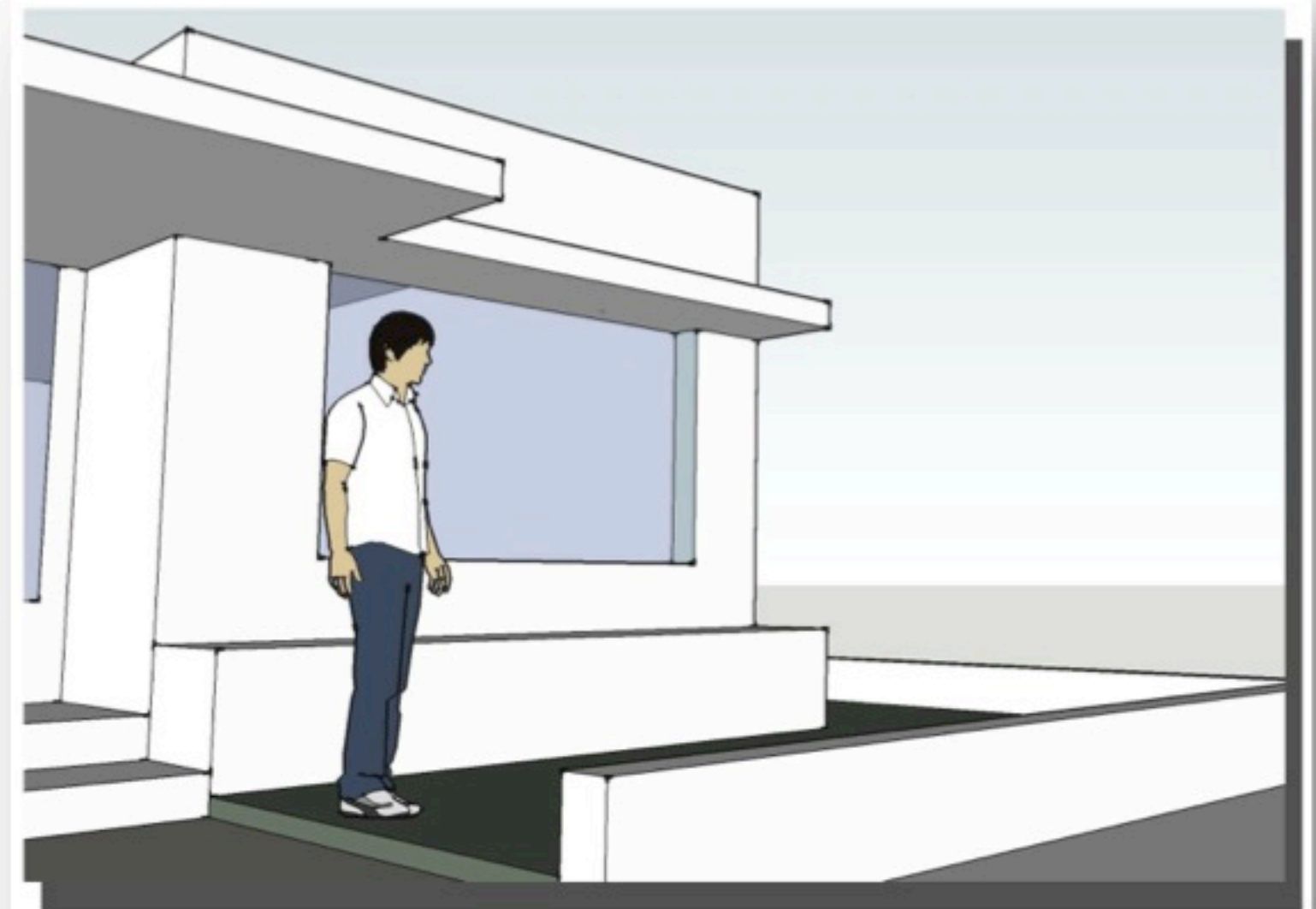
EN



EH

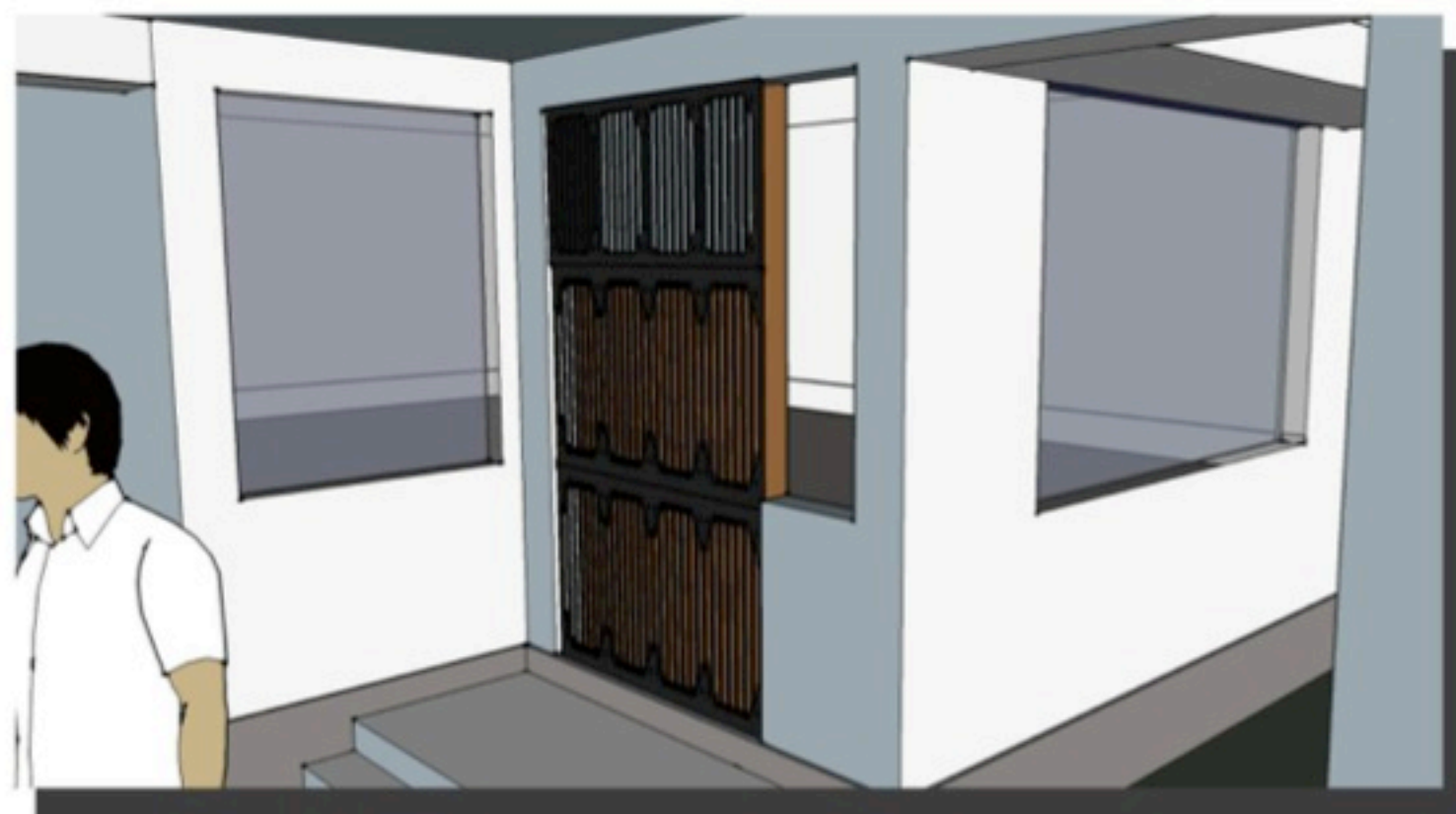
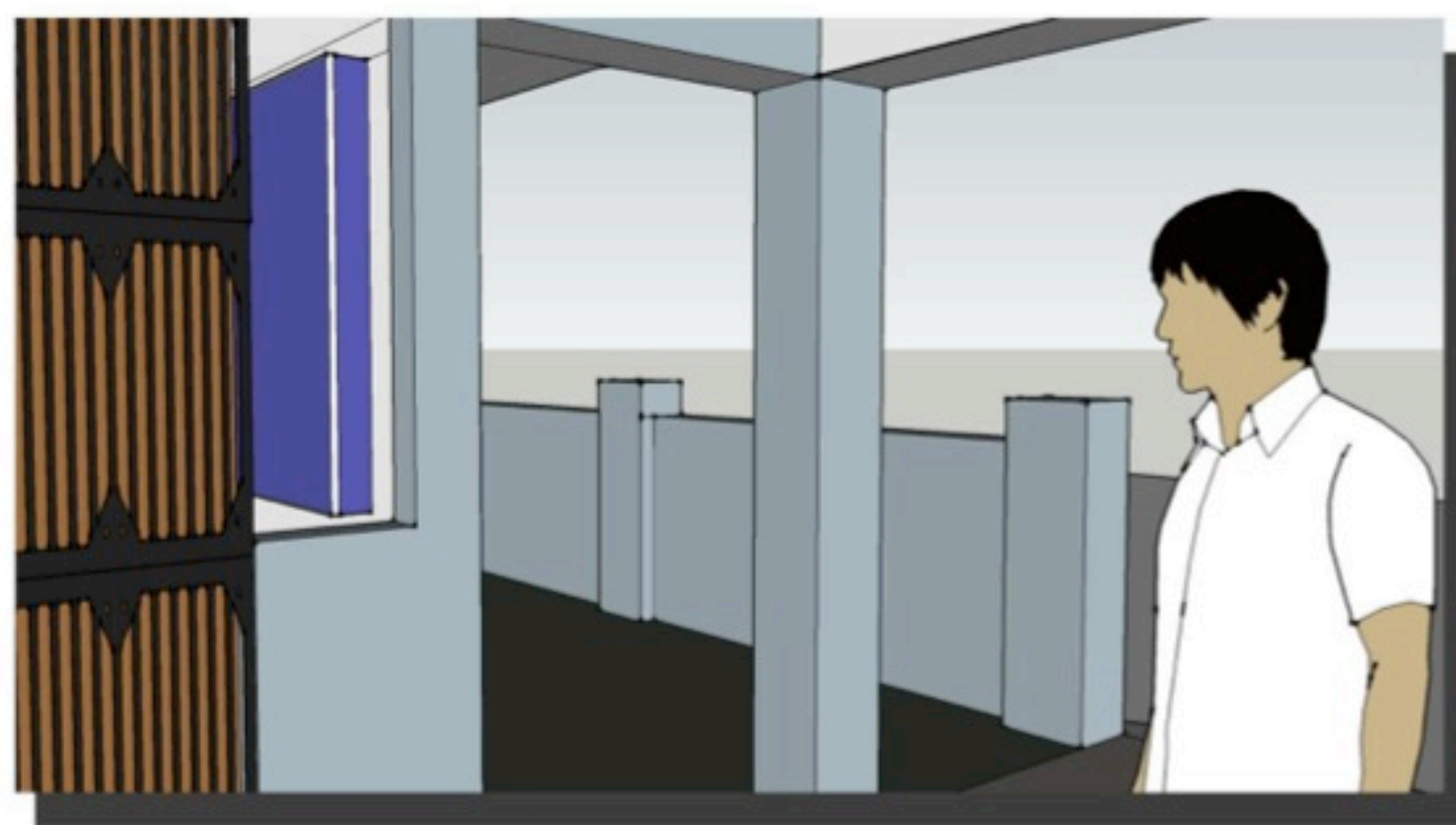
Multi-sorting task cards

Entrance Sequence

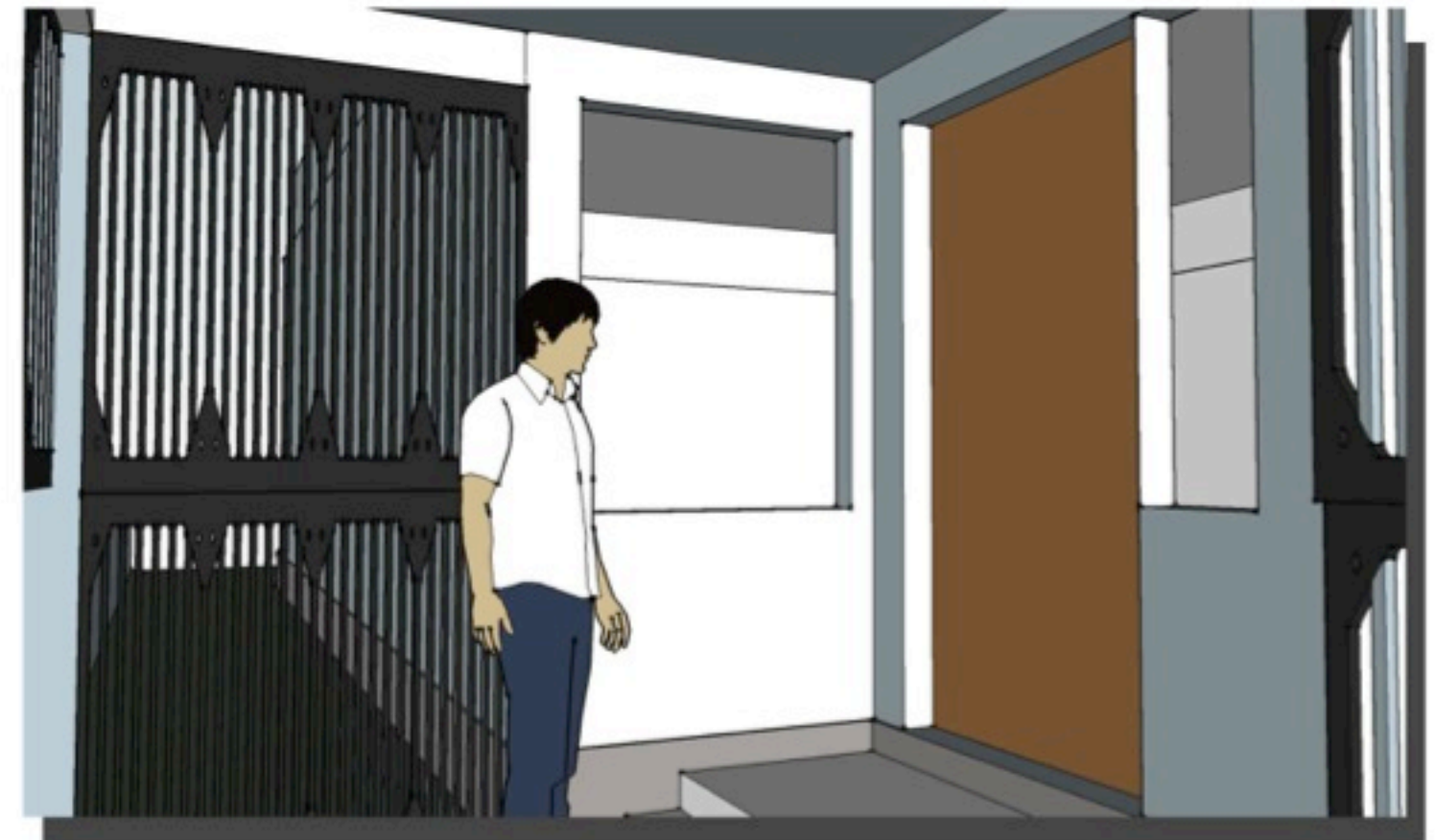


Multi-sorting task cards

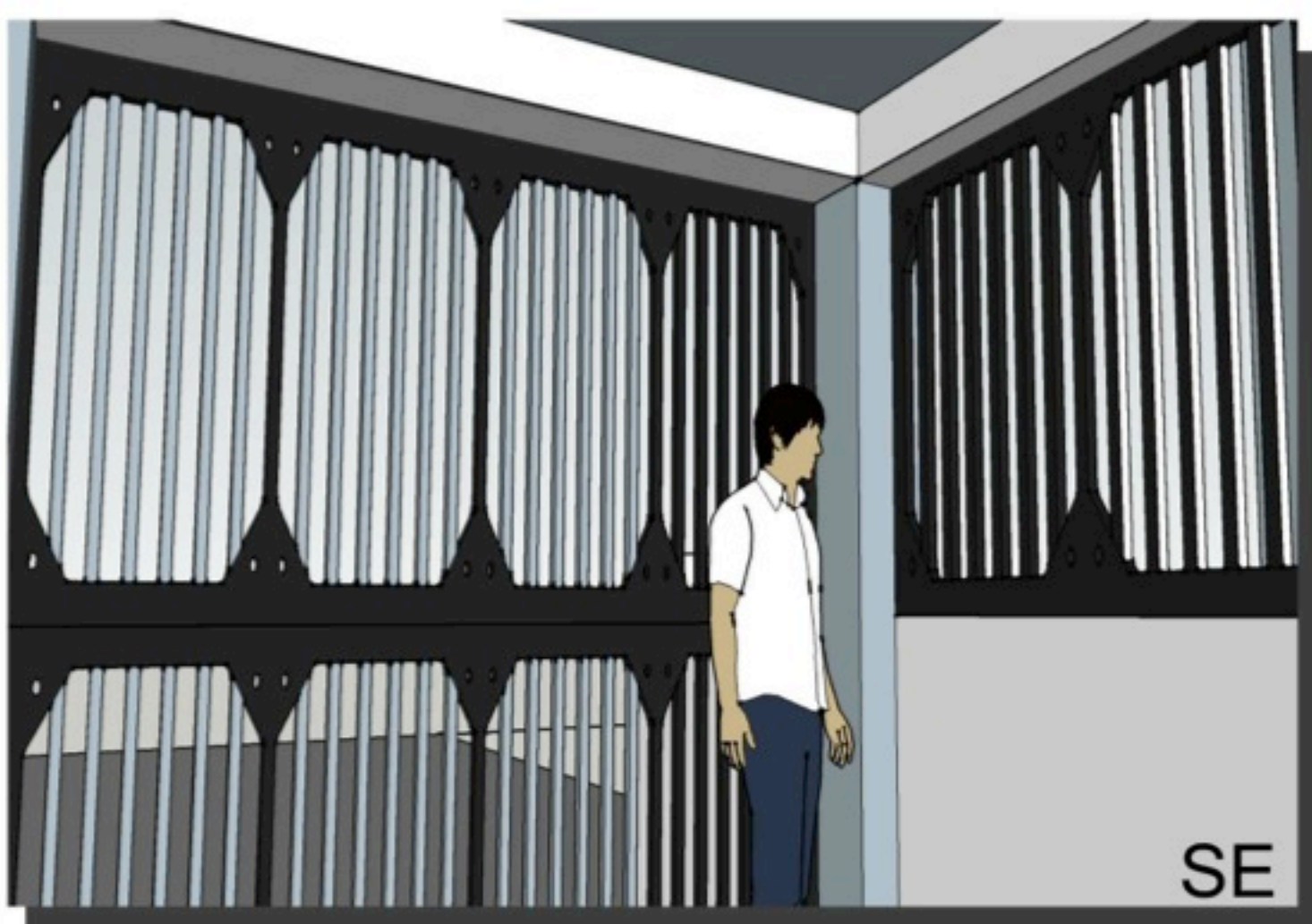
Opening Configuration



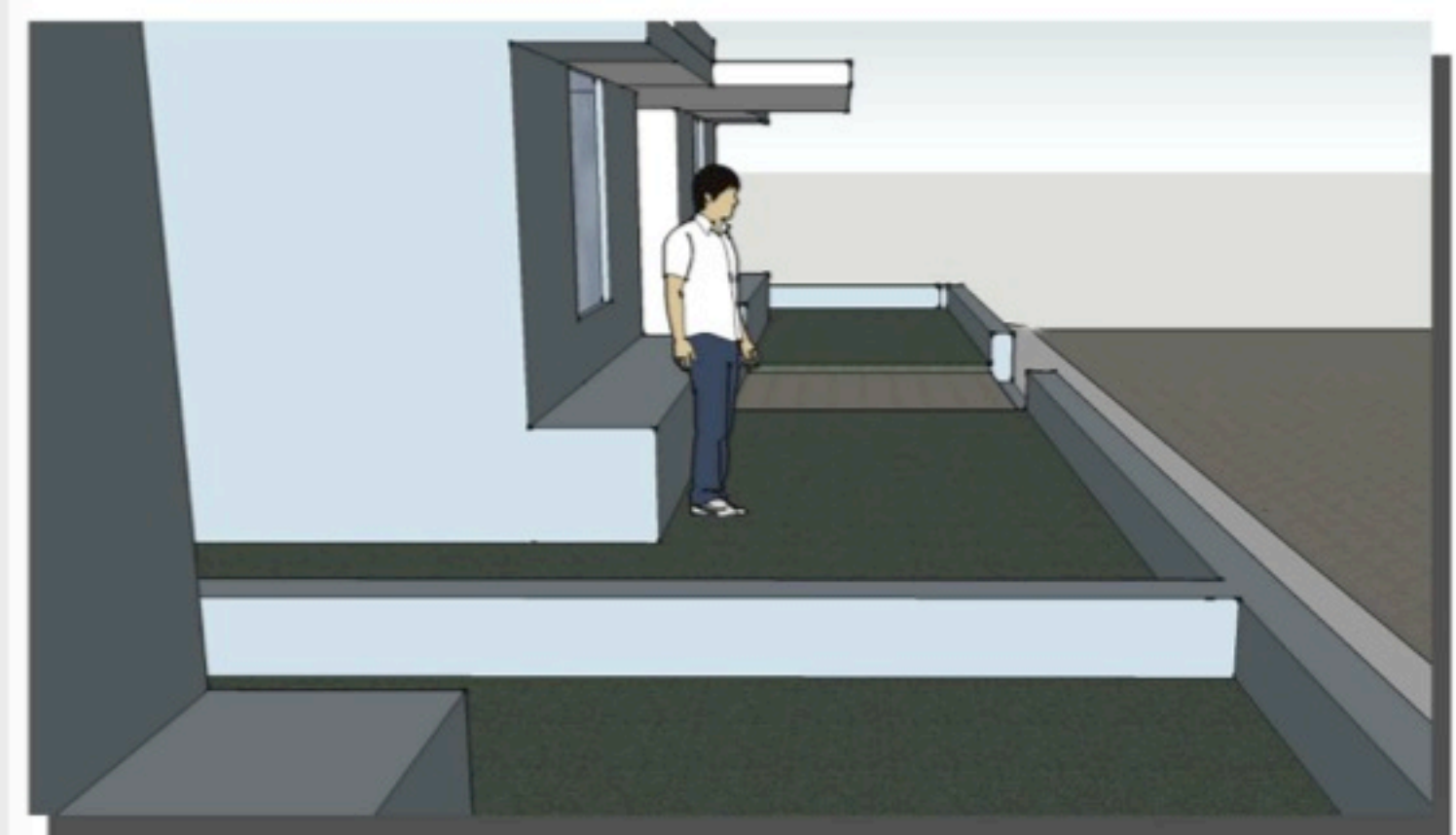
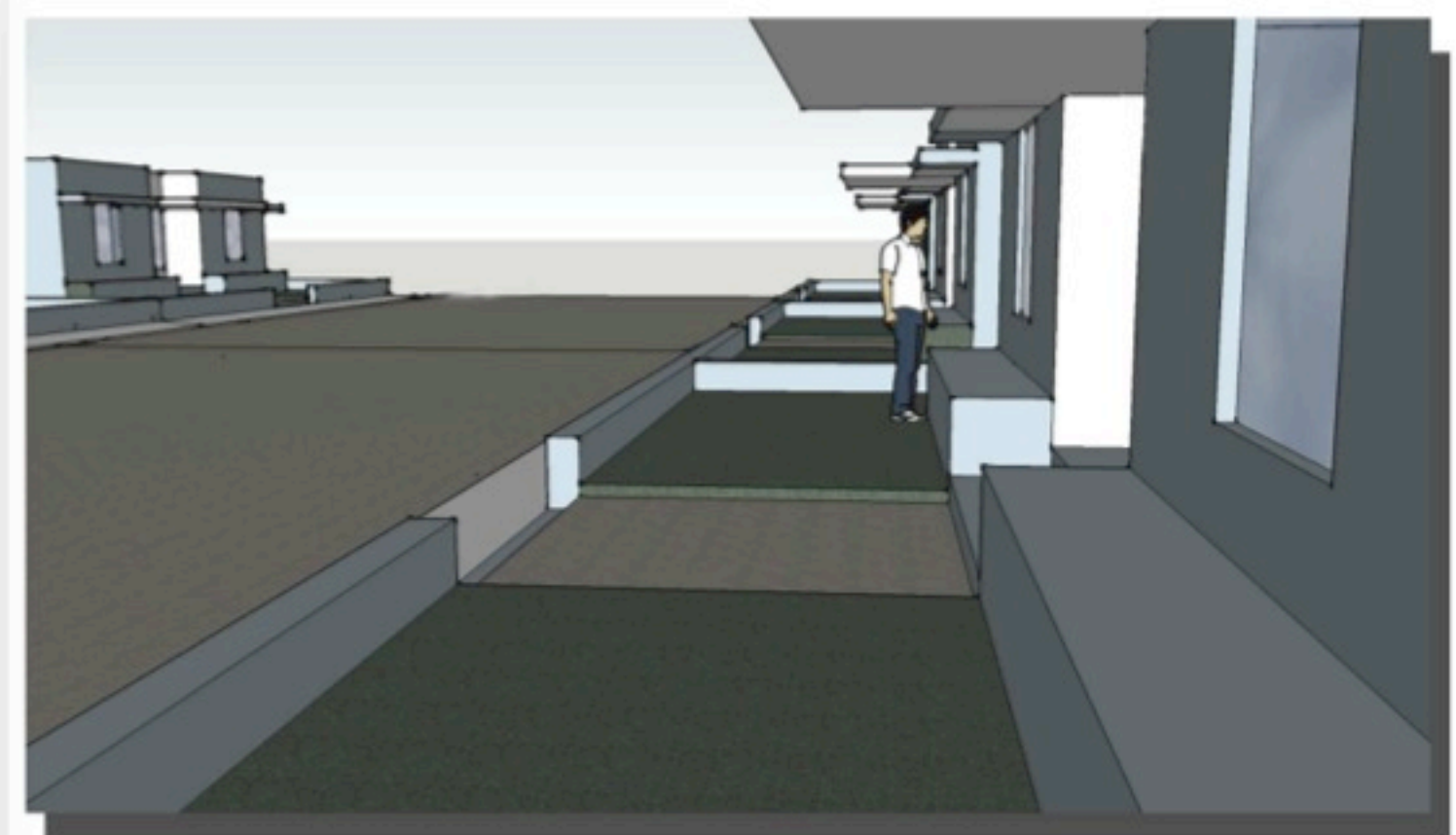
SD



SP



SE



SS

Multi-sorting task cards

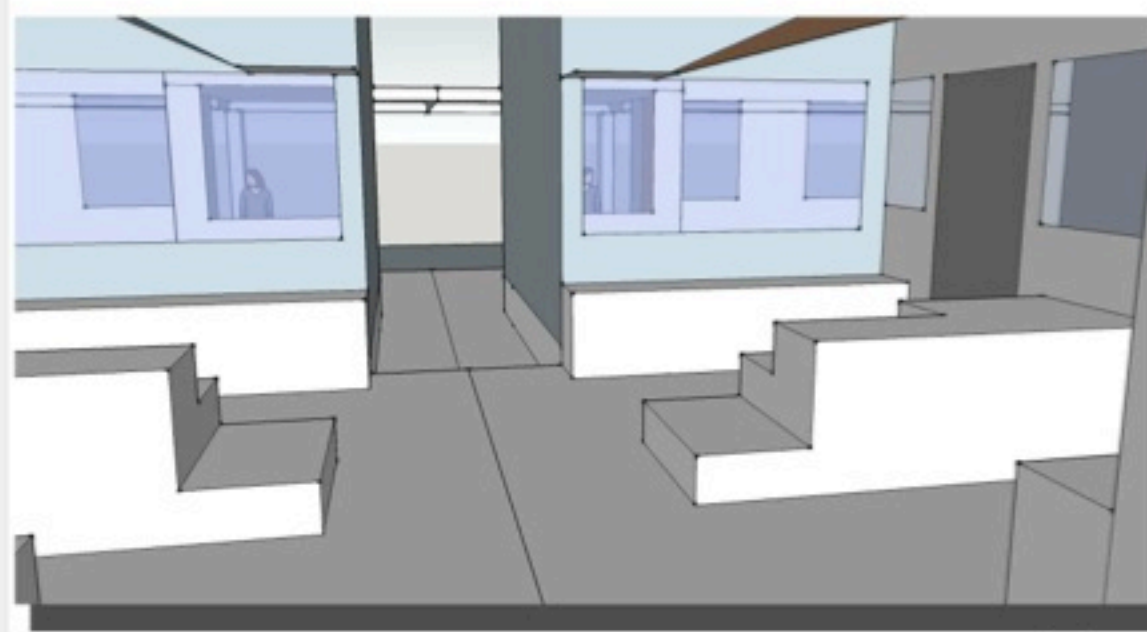
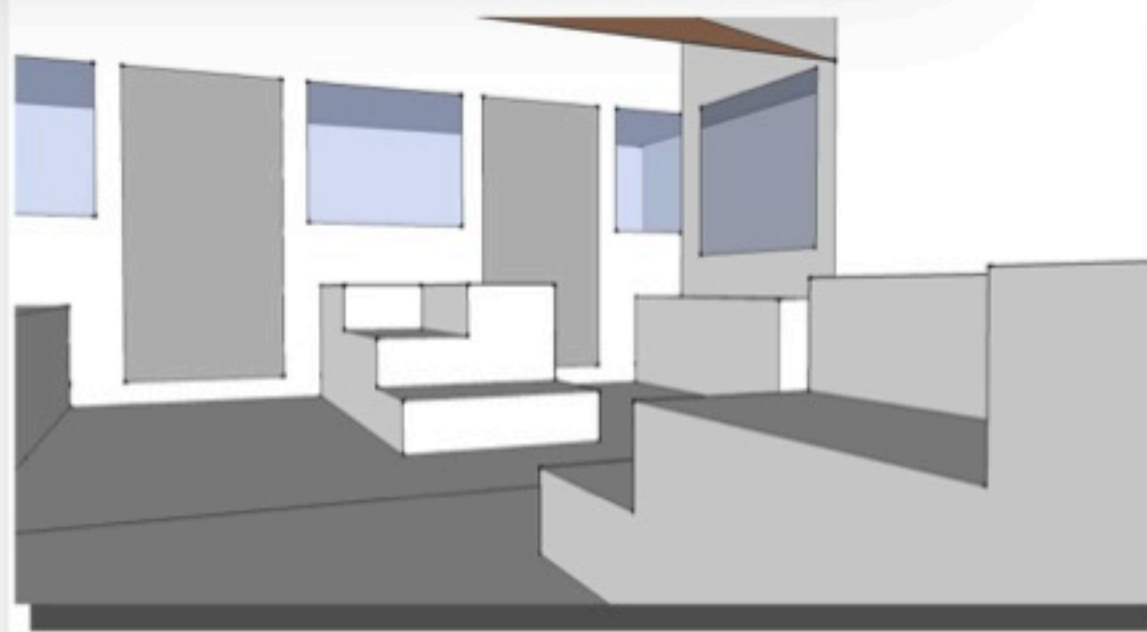
Building Security



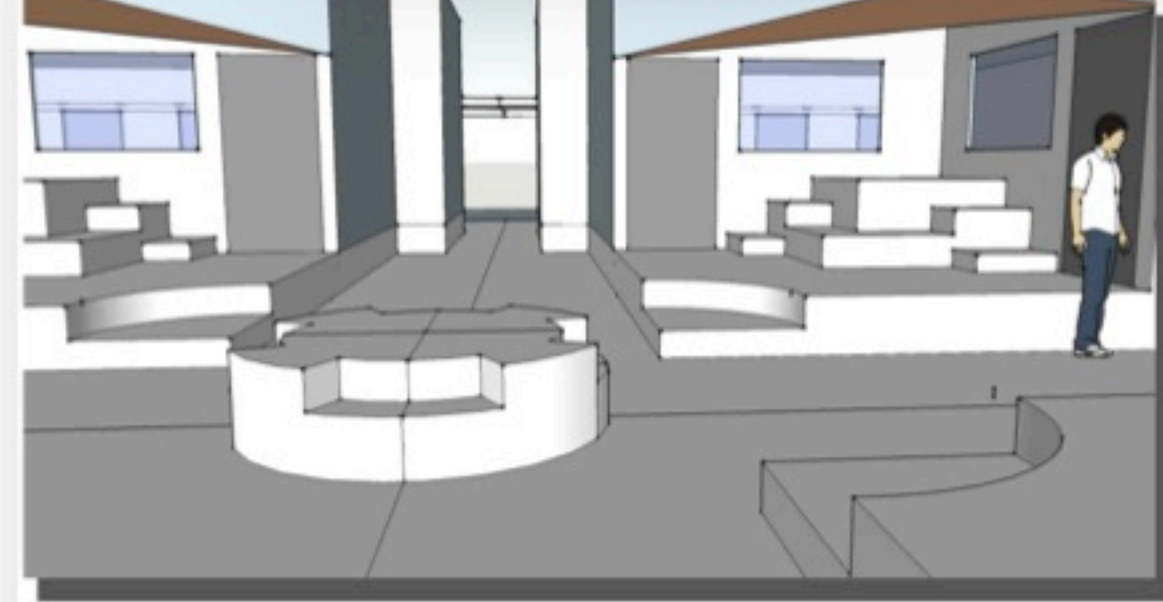
IJ



IP



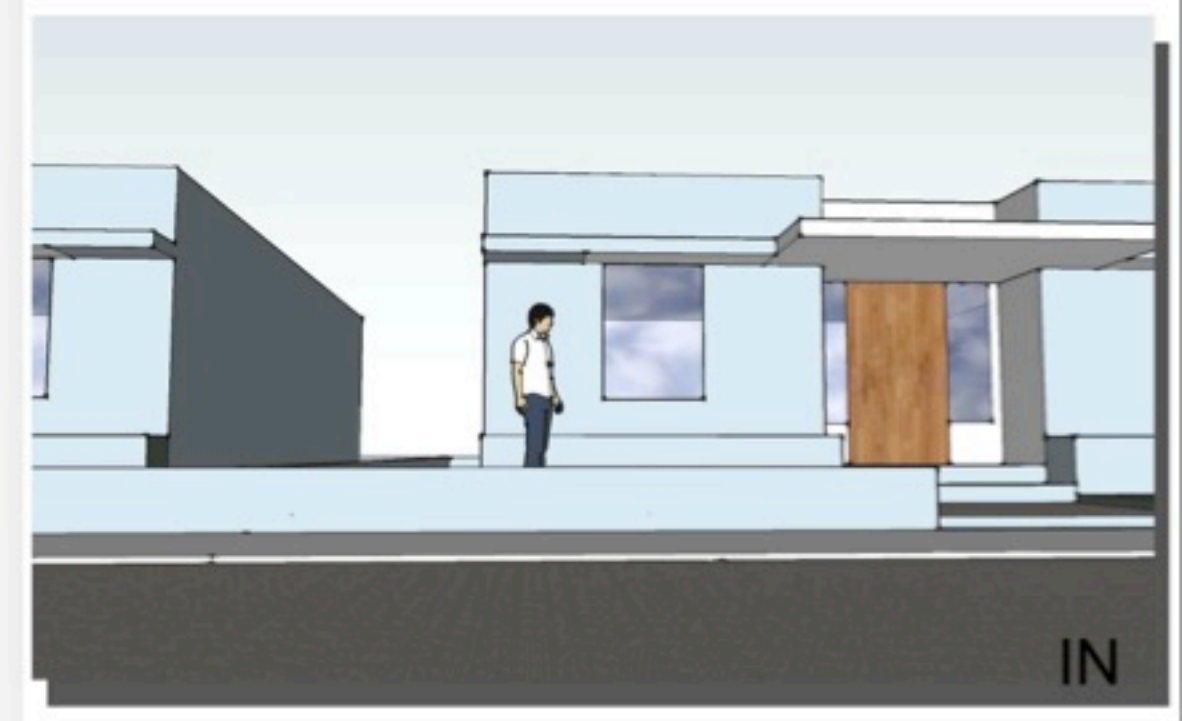
IT



IF



IH



IN

Multi-sorting task cards

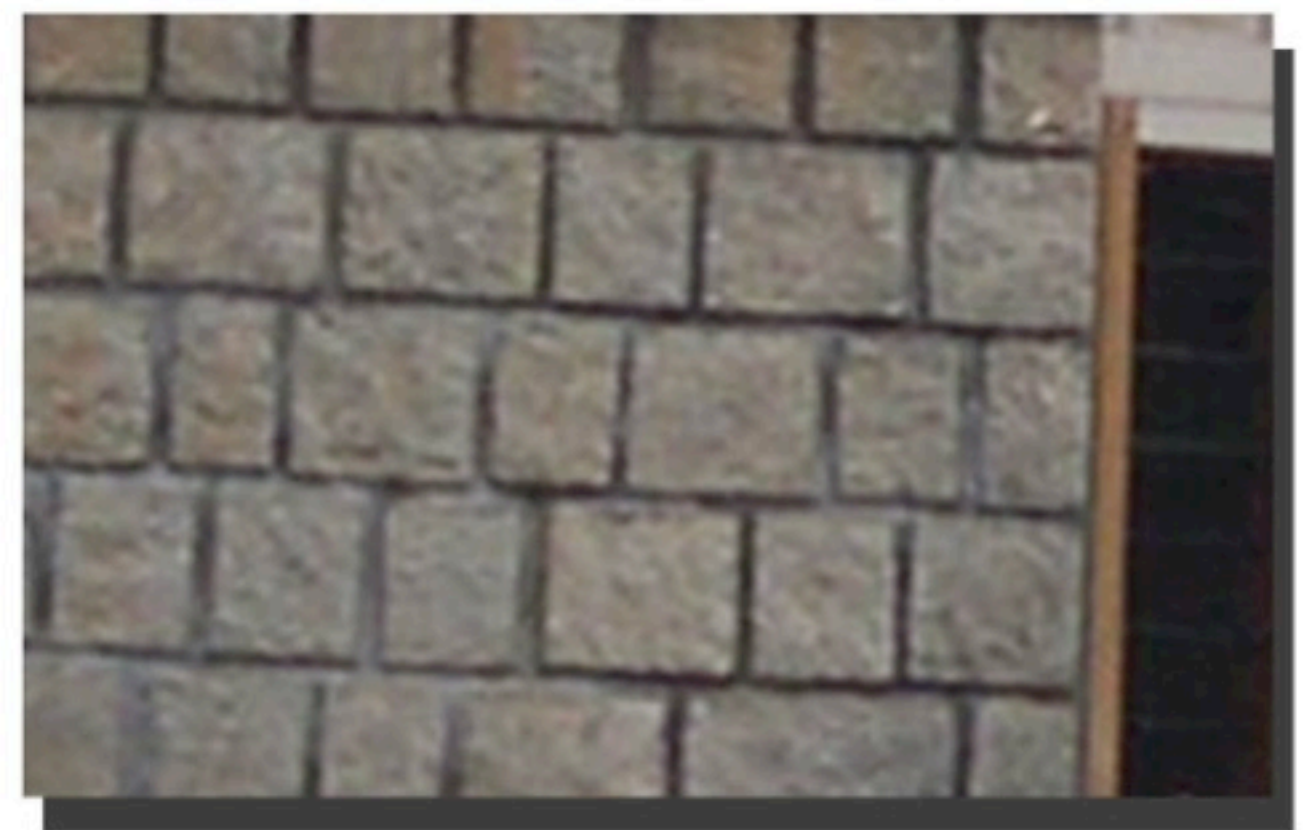
Social Interaction



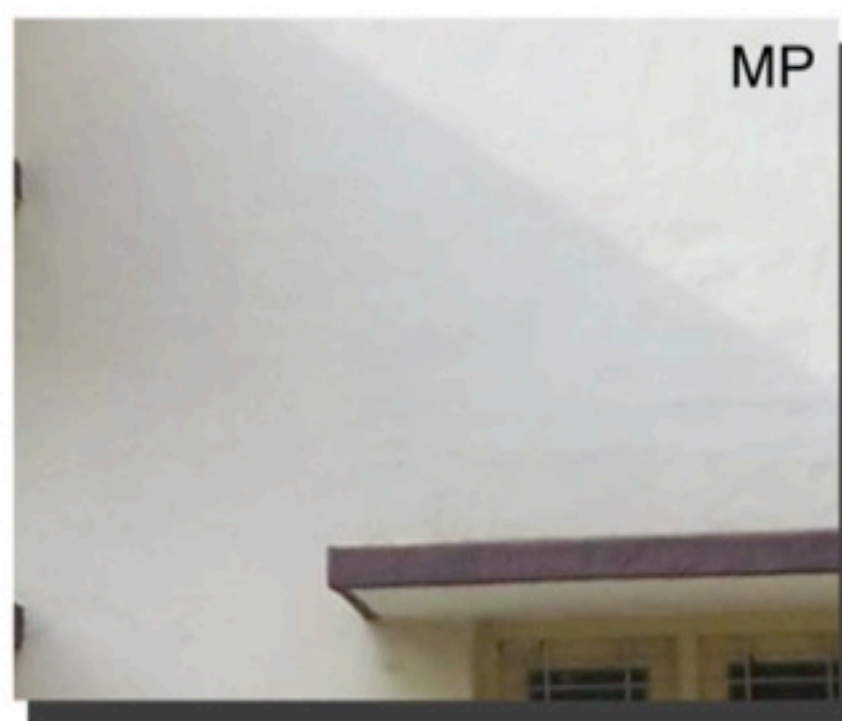
MB



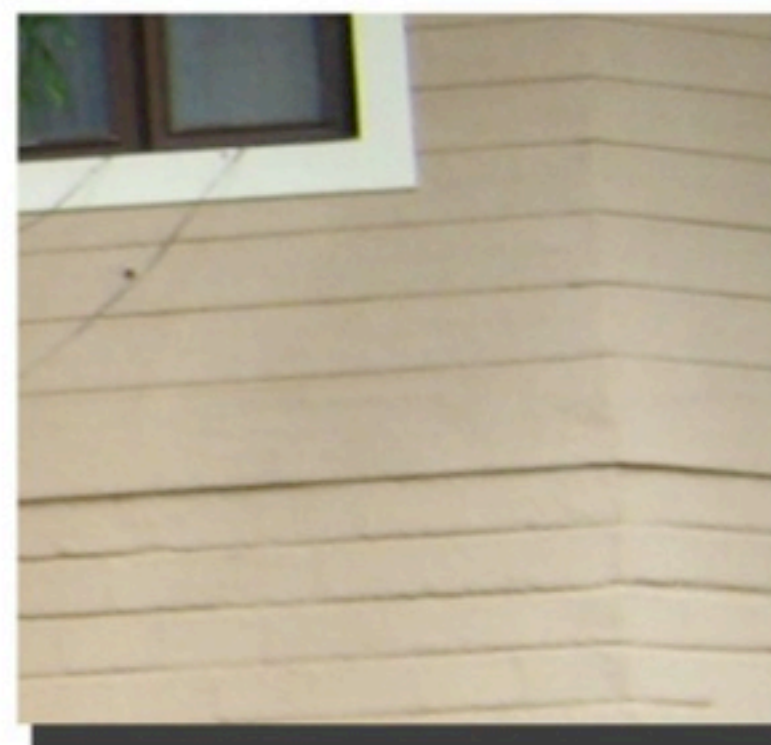
MS



MP



MC



MT



Multi-sorting task cards

Building Skin

| | | | | |
|--------------------------------|---|---|---|---------------------------------|
| 5 Most likely to use | 4 | 3 | 2 | 1 Least Likely to use |
| 5 | 4 | 3 | 2 | 1 |

| Name | | | | | Experience | | | | Architect |
|---------------------------|--------|------|---|---|------------|---|---|-------|------------------|
| | | | | | | | | | Remarks |
| | | most | 5 | 4 | 3 | 2 | 1 | least | |
| Volume | First | | | | | | | | |
| | Second | | | | | | | | |
| Entrance | First | | | | | | | | |
| | Second | | | | | | | | |
| Opening | First | | | | | | | | |
| | Second | | | | | | | | |
| Security | First | | | | | | | | |
| | Second | | | | | | | | |
| Interaction | First | | | | | | | | |
| | Second | | | | | | | | |
| Skin | First | | | | | | | | |
| | Second | | | | | | | | |
| Other relevant Discussion | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

| Name | | | | | Experience | | | | Architect |
|---------------------------|--------|------|---|---|------------|---|---|-------|------------------|
| | | | | | | | | | Remarks |
| | | most | 5 | 4 | 3 | 2 | 1 | least | |
| Volume | First | | | | | | | | |
| | Second | | | | | | | | |
| Entrance | First | | | | | | | | |
| | Second | | | | | | | | |
| Opening | First | | | | | | | | |
| | Second | | | | | | | | |
| Security | First | | | | | | | | |
| | Second | | | | | | | | |
| Interaction | First | | | | | | | | |
| | Second | | | | | | | | |
| Skin | First | | | | | | | | |
| | Second | | | | | | | | |
| Other relevant Discussion | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Fiedwork II

Log
2011

| Respondent Number | Sl.No | Person/ Company | Date |
|-------------------|-------|--------------------|--------|
| 71 | 1 | Sridhar Nayak: KEB | 25-Mar |
| 72 | 2 | Bhooshan | 28-Mar |

Architects

| | | | |
|----|----|-------------------|--------|
| 73 | 1 | Rajesh kumar jain | 08-Mar |
| 74 | 2 | Mobin | 08-Mar |
| 75 | 3 | Vijaya kumar | 09-Mar |
| 76 | 4 | Ananta ram | 09-Mar |
| 77 | 5 | Chandan | 10-Mar |
| 78 | 6 | Bhat | 10-Mar |
| 79 | 7 | Lalitha Raj | 10-Mar |
| 80 | 8 | Surendra | 11-Mar |
| 81 | 9 | Muddaiah | 12-Mar |
| 82 | 10 | sunil nayak | 15-Mar |

Homeowners

| | | | |
|-----|----|------------------|--------|
| 83 | 1 | Satish | 06-Mar |
| 84 | 2 | Srinivasan | 11-Mar |
| 85 | 3 | Vasudevan | 13-Mar |
| 86 | 4 | Manjunathaiah | 14-Mar |
| 87 | 5 | Haran | 16-Mar |
| 88 | 6 | Keshava prakash | 16-Mar |
| 89 | 7 | Keshava murthy | 16-Mar |
| 90 | 8 | Lokesh | 17-Mar |
| 91 | 9 | Channakeshava | 17-Mar |
| 92 | 10 | Mahendrakar | 17-Mar |
| 93 | 11 | Meera Murthy | 17-Mar |
| 94 | 12 | Subramanya | 18-Mar |
| 95 | 13 | Nagalatha | 19-Mar |
| 96 | 14 | Lakshmi narayana | 19-Mar |
| 97 | 15 | Nagaraj | 19-Mar |
| 98 | 16 | Ramanath | 19-Mar |
| 99 | 17 | Anjana | 21-Mar |
| 100 | 18 | Druvakumar | 23-Mar |
| 101 | 19 | Avinash | 23-Mar |
| 102 | 20 | Praveen | 24-Jan |
| 103 | 21 | Pooja | 24-Jan |
| 104 | 22 | Prathiba | 24-Jan |
| 105 | 23 | Pragati | 24-Jan |
| 106 | 24 | Dinesh Adiga | 25-Mar |
| 107 | 25 | Kusuma prabha | 26-Mar |

| Respondent Number | Sl.No | Person/ Company | Date |
|-------------------|-------|-----------------|------|
|-------------------|-------|-----------------|------|

Builders/ Contractors

| | | | |
|-----|----|------------------|--------|
| 108 | 1 | Muralidhar | 06-Mar |
| 109 | 2 | Rudina | 10-Mar |
| 110 | 3 | Sundara murthy | 11-Mar |
| 111 | 4 | Mahadeva swamy | 11-Mar |
| 112 | 5 | Ramesh | 11-Mar |
| 113 | 6 | Irshad | 12-Mar |
| 114 | 7 | Nirmala Prasad | 12-Mar |
| 115 | 8 | Harsha | 13-Mar |
| 116 | 9 | Venkatesh Prasad | 14-Mar |
| 117 | 10 | Kiran | 15-Mar |
| 118 | 11 | Puranik | 15-Mar |
| 119 | 12 | Phaneesha | 19-Mar |

Day-long study

| | | | |
|-----|---|----------------|--------|
| 120 | 1 | Keshava Murthy | 22-Mar |
| 121 | 2 | Dinesh Adiga | 25-Mar |
| 122 | 3 | Sudha mani | 29-Mar |

School Teachers

| | | | |
|-----|---|---------------------------|--------|
| 123 | 1 | Shambu lingappa | 23-Mar |
| 124 | 2 | Pradeep | 23-Mar |
| 125 | 3 | Pallavi and Savita kumari | 23-Mar |
| 126 | 4 | Mrs Narayan | 26-Mar |
| 127 | 5 | Sarojamma | 26-Mar |

Light and Ventilation study

| | | | |
|-----|----|--------------------|--------|
| 128 | 1 | Haran | 26-Mar |
| 129 | 2 | Suman | 28-Mar |
| 130 | 3 | gayatri | 28-Mar |
| 131 | 4 | Srinath | 28-Mar |
| 132 | 5 | Rajendran | 28-Mar |
| 133 | 6 | Vasudevan | 29-Mar |
| 134 | 7 | ramachandra | 30-Mar |
| 135 | 8 | venkataram | 30-Mar |
| 136 | 9 | shankarappa | 30-Mar |
| 137 | 10 | prasad | 30-Mar |
| 138 | 11 | manjula | 30-Mar |
| 139 | 12 | Sundara murthy | 31-Mar |
| 140 | 13 | Ravindranath | 31-Mar |
| 141 | 14 | Prabhakar | 31-Mar |
| 142 | 15 | Rajgopal | 31-Mar |
| 143 | 16 | Ravet Ramesh | 31-Mar |
| 144 | 17 | Lalitha | 31-Mar |
| 145 | 18 | Sharada prasad | 31-Mar |
| 146 | 19 | Shankara mahadevan | 31-Mar |

Appendix C

Publications

B K Satish, S Shahzad (eds.) 2013. Methodologies for Sustainable Projects, Edinburgh Architecture Research Journal (EAR), Edinburgh: Edinburgh University. <http://sites.ace.ed.ac.uk/ear/33-2013/>

B K Satish, J Brennan and R Pedreschi (2011) Influence of affluence on sustainable housing in Mysore, India. Journal of Engineering Sustainability, Proceedings of the Institution of Civil Engineers, London, volume 164, Issue ES4, Dec 2011, p 249-260. ISSN: 1478-4629, E-ISSN: 1751- 7680

B K Satish, J Brennan. (2010) “Harmonising middle-class aspirations for low-carbon housing: contextual study of Mysore, India”, International conference: Sustainable Architecture & Urban Design 2010, 3-4th March 2010, Universiti Sains, Penang, Malaysia.

B K Satish, J Brennan. (2012) “Sustainable housing strategies for the growing Indian demographics: contextual study of Mysore, India”, The Asian Conference on Sustainability, Energy & the Environment , Official Conference Proceedings, 3-6th May 2012, Osaka, Japan

B K Satish. (2009) “Shifting barriers around the sustainable built environment: a study of Mysore, India”, poster presentation, International conference: “Transilient boundaries in/of architecture”, March 30th - 31st, 2009, the University of Edinburgh, UK.

Influence of affluence on sustainable housing in Mysore, India

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Mysore, the second largest city in the state of Karnataka, India, can be identified as an early adopter of sustainable design practices. Between 1903 and 1947 the use of local construction materials, the Swadeshi movement of 1905, robust planning and clear legislation resulted in sustainable urban development. However, post-colonial development fuelled by economic globalisation after the 1980s has transformed perceptions of the house among the growing middle class, becoming a commodity to demonstrate affluence and status. This paper examines the impact of changing social and cultural values on the aspirations of the growing middle classes on sustainable housing and neighbourhood development in Mysore. The methodology comprises literature and archive research to establish the historical content and review some important recent trends. Extensive fieldwork studies, including questionnaires over a wide range of participants (owners, builders and designers) and semi-structured interviews with key players, including academics, architects and government agencies. The focus of development has shifted from community to individual, from energy conserving to a more consumerist attitude in the procurement of materials and finishes. The paper examines the impact of these changes. The results of the survey are summarised and reviewed under the categories of communities, site, entrance, house layout and materials.

Glossary

Agrahara layouts: *Agrahara* (small Brahmin villages) that was prevalent 150–200 years ago was used as one of the prototypes for residential layouts adopted during the development plan prepared in 1904. They are row houses built around a park in a U-shape. The central park area was used for community socialising and as a children's play area. Each two-room house with a shared party wall had a small veranda and back yard. *Athithi devo bhava*: This is the verse in the '*Taittiriya upanishad*' that says '*Matru devo bhava, pitru devo bhava, acharya devo bhava, atithi devo bhava,*' which means one should worship mother, father, teacher and guests as God. *Jagali*: *Jagali* is a semi-open raised space, which acts as a transition from the road to the inner part of the house. These places are always in the shade, it is a perfect space for socialising and acted as a meeting area for the inhabitants.

They were actively used as interaction areas. People shared their leisure activities and entertainment with their neighbours in these informal spaces. *Swadeshi* movement: *Swadeshi* means 'indigenously manufactured'; it was the first of the four formally organised movements by Congress nationalists against the British Raj in 1905.

1. Introduction

Sustainable strategies followed in post-independence India have been described as either 'eco-technical' or 'eco-cultural' (Guy and Farmer, 2001). These technically complex or primitive approaches to a low carbon building do not address the social and cultural issues that underpin sustainable built environments. It is important to understand housing as a social

and cultural phenomenon that can allow insights into the effective formulation of localised and relevant low sustainable housing strategies.

The complex and multifaceted society of India is interwoven with caste, religion and regional disparities, in which new-found economic status and affluence in the middle class have a critical impact in the process of sustainable development. Rapid economic development has enabled the middle class to obtain greater dominance in the power structure of society (Singh, 2009). This research looks into the implications for sustainable building design for a newly affluent middle class, which has the financial strength to consume finite resources at a rate that starts to match that of the developed world.

The initial development of post-independence India was dominated by Mahatma Gandhi and the first Prime Minister, Nehru. In an immediate post-colonial context, the Indian middle class had historically followed Gandhian principles and restrained themselves from the obvious display of wealth (van Wessel, 2004). To give coherence to a country of diverse ethnic and cultural groupings, a national government prioritised the promotion of shared national value. Pre-eminent in this was a value attached to the notion of community over the needs and desires of the individual.

Continuing economic empowerment has drastically changed such uniformity and, as established by commentators like Leela Fernandes and Pavan Varma, economic development has in turn changed the social and cultural values of Indian middle class people. It has transformed the cautious mentality of the thrifty middle class to one of affordable indulgence (Varma, 2007). According to Andre Beteille, although the aspirations of the new middle class Indian typically centre around career (Imtiaz and Helmut, 2001), it is consumerism that has clearly become the primary Indian value (Fernandes, 2000b). The media exploited the middle class to create a new consumer culture. They did this effectively by targeting the materialist middle class. While some segments of a culturally sensitive Indian middle class still assign value to active citizenship (Khilnani, 2004; Varma, 2007), confident expressions of upward social and economic mobility are demonstrated in the desire and aspiration to construct their own homes.

At present, India is the second fastest growing economy of the world with an average annual growth rate (gross domestic product) expected to be 7–7.5%, increasing the affluence of approximately 350 million middle class people. Their consumption is evident in the construction sector, which has a growth rate of 15% (Swarup, 2007). Although increased affluence and consumption benefits middle class

people, it has also increased carbon emissions. Sixty per cent of the emissions originating from construction activities are attributed to the housing sector (Tiwari, 2003).

The increase in house building activity that comes with growing prosperity and a propensity towards ostentation has a deep impact on the built environment in respect of both embodied and operating resource impacts. The impact can be mitigated by deploying intelligent design solutions that work in concert with middle class values and aspirations. In the first step to establish sustainable design methodologies, a fieldwork study was undertaken in the southern city of Mysore (Figure 1). The purpose of this research is to ascertain the key factors that govern the design of middle class housing and what indications this might give to the establishment of robust methodologies for the design of sustainable homes.

Mysore city was the capital of the former south Indian kingdom of Mysore, and is situated approximately 140 km south-west of Bengaluru (Bangalore). In 1904, the monarch, Krishnaraja Wadiyar, proposed the first development plan for Mysore to improve health and hygiene and decongest the central fort area that was the centre of political power. In the process he had established a reputation for sound, sometimes



Figure 1. India map: Mysore location

technocratic government that consciously encouraged climate responsive and low impact urban planning solutions. This has been recognised as a useful forerunner for contemporary strategies for sustainable architecture in Mysore (Satish and Brennan, 2010; Vandana, 2008). It is now an important city in the state of Karnataka, and is recognised as having a significant cultural status. Although Mysore has had sustained growth from tourism and industry, the more recent growth of IT industries in the 2000s has resulted in the city becoming an important hub after Bangalore. Overspill from Bangalore and its growth rate has resulted in a city of 124.82 km² in area, with an urban population of 780 000 people (see Mysore City Corporation, 2010). Development pressures after independence and economic liberalisation have drastically changed neighbourhood patterns and housing typologies. This study traces how economic empowerment has changed social and cultural values and created significant implications for sustainable development in Mysore.

The fieldwork undertaken for this research explores the attitudes of building users, designers, business and government towards the current housing provision in Mysore. This is framed in a series of changes in scale, from that of the neighbourhood to the selection of finishes in a home. Each of the study sections is explored within the context of past and present characteristics of housing within Mysore. The fieldwork was carried out by the first author during June 2009 and August 2009. This paper presents a summary of some of the key findings.

2. Methodology

A review of the literature was used to establish traditional, sustainable practice and identify important current trends. Towards the end of the twentieth century a more Western lifestyle has evolved in India. The review also indicates a change in people's attitudes and aspirations that has a direct bearing on sustainable housing. In order to understand these changes in depth, a field survey of house owners was conducted in Mysore. The fieldwork examines builders' and architects' attitudes to design and procurement along with contemporary practice. The paper draws particular inferences related to communities, layout, house design and materials from the questionnaires and interviews.

In order to understand the composition, practices, trends and attitudes of the middle class, the research engages with a wide field of built environments and social contexts, and as such requires methodologies that allow rigorous but flexible interpretation of fieldwork. Verification is sought using triangulation methodologies (Bryman, 2008; Groat and Wang, 2002) that can allow the usefulness of data to be reviewed from a variety of different sources. In this case, research has been conducted through literature review, scoping

questionnaires and structured interviews. A key aspect of the methodology is, therefore, to assess each aspect of the research critically in relation to themselves (Figure 2).

The review has been employed specifically to study and chart the rapid transformation and enlargement of the Indian middle class. The utilisation of building products and technologies is, in this context, driven as much by cultural aspiration as performance and price. This literature review then underpins the structure of the fieldwork, interviews and questionnaires.

In undertaking the survey work, attitudinal differences between occupation and social profile are identified through the use of common questions. Survey questionnaires were collected from 220 persons, who included the majority of practising architects and builders along with owners in Mysore. While distributing the questionnaires among owner-occupiers, special care was taken to ensure that different settlement patterns were represented. This included the old quarter of Mysore around the fort and palace that featured *Agrahara* layouts, those living in post-independence planning schemes and those in recent private sector developments. A wide spectrum of respondent occupations was collected, including government employees, state agencies in addition to more recent additions such as software and IT sectors (Figure 3).

In addition to this, a series of structured interviews was undertaken with key personnel involved in the built environment (Figure 4). Seventy interviews were conducted including architects, developers, local government, academic representatives, and owner-occupiers. The structured interviews dealt with similar issues as those found in the questionnaires but allowed in-depth discussion, facilitating a nuanced series of responses to contextualise the questionnaire data.

Triangulation of the research is thus through the complementary use of literature review, questionnaire and structured interview. Within the context of fieldwork, this triangulation methodology is further used through collecting responses of those lying within client/consumer, development and regulatory fields.

In order to analyse the impact of development on neighbourhoods and housing, collected data are examined for key indicators of sustainability from the macro to the micro scale that comprise community living, site layout, entrance, house planning, finishes and facade.

3. Community living

Commentators such as Leela Fernandes and Verma have argued that economic empowerment supplemented by exposure to media has transformed culturally rooted people to explore redefined values, which have major impacts on an

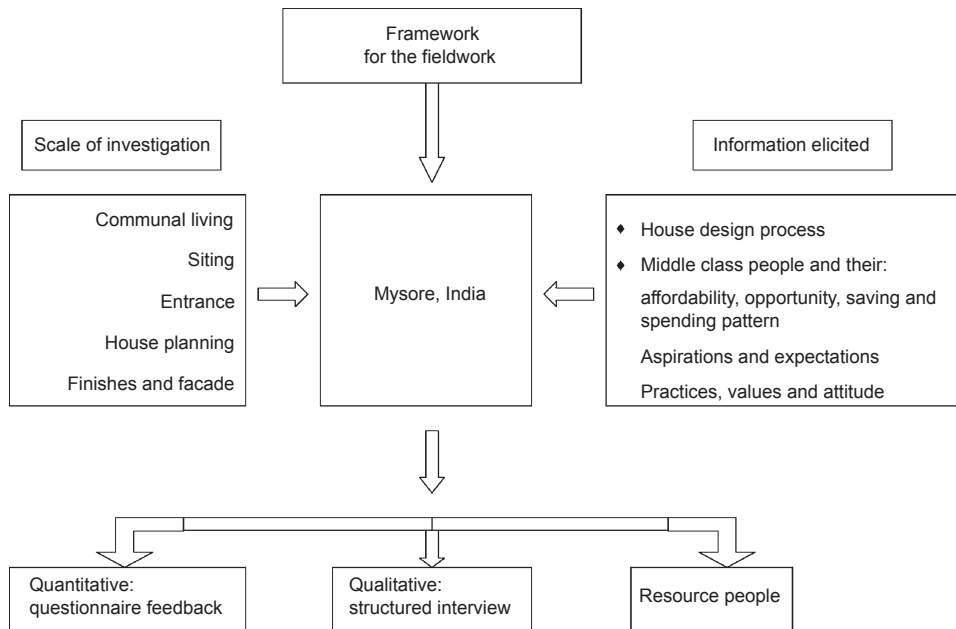


Figure 2. Framework for the fieldwork – overview of the fieldwork undertaken at Mysore, India

otherwise sustainable lifestyle (Fernandes, 2006). In the case of Mysore, these values along with occupation have a bearing on the typology of housing.

Earlier housing patterns were developed in response to the strong 'joint family system' (in the Indian subcontinent, joint family is an extended family where many generations live under

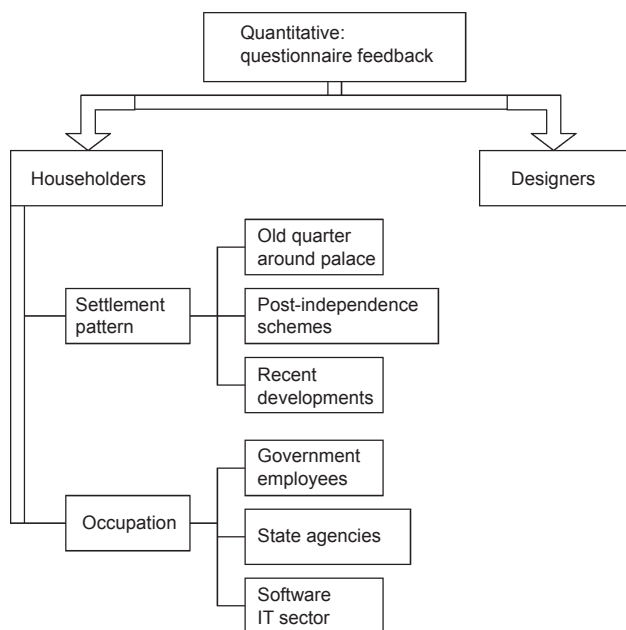


Figure 3. Quantitative study structure followed during the fieldwork undertaken at Mysore, India

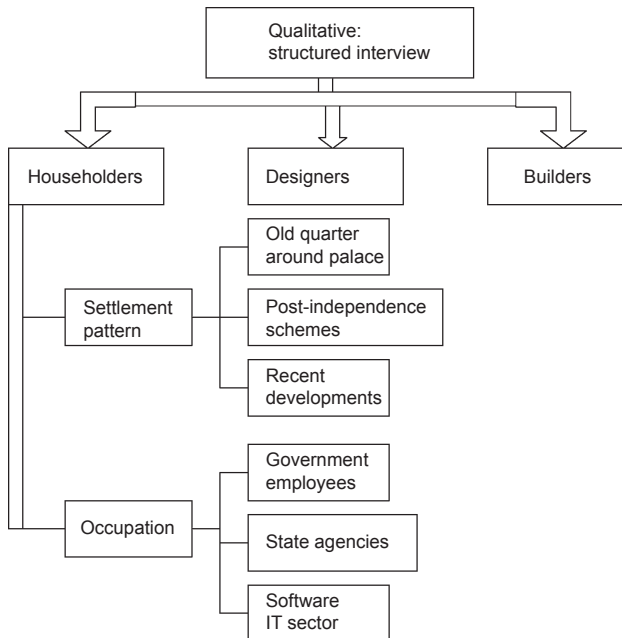


Figure 4. Qualitative study structure followed during the fieldwork undertaken at Mysore, India

the same roof. Usually the male members are blood relatives). Shared spaces were given most importance due to their use for community socialising and dining. This resulted in spacious multipurpose central areas used for the most part of the day and a number of smaller rooms used mostly for storage. The data collected at Mysore clearly show a movement away from the joint family system. As people move away from family-based occupation, sharing of common spaces diminishes or becomes obsolete, and families move towards owning individual houses. Feedback from the questionnaires indicates that less than 5% of respondents live in a joint family household. This has resulted in the most commonly used spaces in traditional shared family compounds being no longer relevant, while private spaces become more important. According to many of the architects interviewed, clients prefer separate rooms based around particular activities like the computer or television.

A key dimension of social interaction of an Indian family is the guest. Traditionally, a guest was treated equal to God (*athithi devo bhava*). While understanding the transformation of house design, the role of a guest and neighbours is examined in today's context to understand changing cultural and social values. According to one respondent, a guest is equal to a family member, and they treat guests equal to their family even today. Another respondent felt strongly that hospitality and respect depended on the social or economic status of the guest. This change in attitude towards guests and neighbours has

clearly reflected in their redefined housing typology (CITB, 1987). For instance, the traditional '*jagali*', a semi-open raised space that acts as a transition from the road to the inner part of the house, overlooking the community area, was a welcoming space for guests and neighbours as the layout was developed based on their socio-cultural background. Work-related mobility has increased substantially among skilled and unskilled workers with different socio-cultural backgrounds. This has resulted in redefined requirements. Community areas are replaced by an introverted house design, in which fencing each plot for one's identity has become more of a physical barrier for neighbours and guests.

The change in community living and social values has a major impact on sustainable housing. Independent houses rather than clustered housing have increased the footprint of dwellings by 50% (Satish and Brennan, 2010), which has clear implications on the proportional increase in resource consumption and embodied energy. The use of individual spaces over shared spaces increased the consumption of operational energy of a household and, consequently, the carbon footprint.

Changing family patterns along with a change in work pattern also contribute to an increased carbon footprint. The nuclear family compared with a joint family occupies more space per person and further increases energy consumption.

4. Siting

The city of Mysore originally grew from considered, planned development even during the colonial period. The coming together of *Swadeshi* narratives of self-help (and self-determination) ensured a preference for localised material sourcing and responsive planning configurations (Vandana, 2008). Post-independence (1947), social change encouraged by the state development authority has promoted middle income demographics to favour discrete plotted developments in the Western model.

Agraharas were used as a prototype for the new residential layouts during the preparation of the development plan in 1904 (Issar, 1991). Typically, residences were distributed around an open space or aligned linearly with a shared party wall (terraced) built to the edge of the road. People shared their leisure activities and entertainment with their neighbours in these informal spaces (Figure 5). This inherently environmentally responsive form derived from the social classification based on occupation had clear advantages of shared security and social interaction.

Planning, housing and built environment practices changed drastically after independence. There was a clear shift from a homogenous to a heterogeneous society and from joint to nuclear family, resulting in people being attracted towards



Figure 5. A typical *agrahara*, where one enters the semi-opened raised area from inside, which is open to the road, which further leads to the community open space (compound to community area is later addition)

plotted development. As one town planner recalls, 'European modelled, plotted development, started as part of town and country planning in Bombay (Mumbai), Madras (Chennai), Delhi and Calcutta (Kolkata). Later, development authorities implemented them in other cities' (respondent no. 1, interviewed on 17 June 2009). As an executive engineer responsible for urban housing development recalls, in the initial stages of the City Improvement Trust Board (CITB), the government allotted some sites free of cost for those who bought houses from the CITB, away from the city centre. According to a respondent, during the 1980s, the CITB sold $15\text{ m} \times 24\text{ m}$ plots with a house of 126 m^2 area for Rs. 40000 (£514:30). A plot in the same area currently costs nearly 10 million rupees (£128 585) (respondent no. 38, interviewed on 14 July 2009).

Altered social and cultural values have played a crucial role in the adoption of new housing typologies. Changed social conditions meant that people started to associate the strengths of community living as weaknesses. For instance, shared facilities were interpreted as leading to a lack of privacy. Interview response suggests that the occupiers identify issues such as sanitation, ventilation and maintenance as key reasons for moving away from cluster and row housing to plotted developments. More than 70% of the householders indicated that they would experience good conditions of light and ventilation only by living in a detached house.

A shift in perception is reflected in the feedback, in which respondents attach the highest priority to building location, which mostly relates to land cost, and least importance to

interaction with and proximity to neighbours, family and friends. Homogenous interactive spaces are thus replaced by individual plots, which are further emphasised by gated compounds that have become necessary to establish territory and status (Figure 6).

When asked about revisiting vernacular and traditional modes of shared space, the study indicated that building designers and procurers felt it a challenge to work against consumer preference. One householder remarked, 'we cannot have party wall because of compatibility between neighbours. One could be emotionally closer but has to be physically separate. It has to be a single entity. A group house does not sound like a whole house' (respondent no. 33, interviewed on 11 July 2009). Current housing typology at Mysore has therefore moved away from community planning and inherent sustainable practices. These were organisational approaches and strategies that were sustainable, which have now been overtaken by increased affluence.

Community living, which encouraged shared facilities and the use of locally sourced materials, resulted in low energy consumption for transportation. Environmentally responsive design resulted in comfortable interior spaces that required very low operational energy.

Additional construction for independent houses and individual security to protect the property in the form of a compound has further increased the consumption of building materials. In spite of higher land values, being away from the city and workplace, middle class people are spending more money to



Figure 6. New layout. Reflects typical plotted development away from road, built with clear open spaces on all sides, independent of each other

own a plot increasing the dwelling footprint. The social value attached to the individual house has a high environmental cost.

5. Entrance

Entrances have always been more than just a threshold to the interior of homes. In the past, people used the semi-open raised spaces forming the entrance as a climate modifier, which then naturally became a place of social and community interaction throughout the day. This smooth transition space from the street to the interior of a home is very different in contemporary developments. The changes to this transition space are considered in the following section.

The *jagali* acts as a fluid transition between interior and exterior spaces (Figure 7). People shared their leisure activities and entertainment with their neighbours in these informal spaces (Satish and Brennan, 2010).

In contemporary developments, houses are set back from the boundaries, with no clearly defined use for the outdoor ground (Figure 8). The building form no longer encloses and defines the external space that encouraged outdoor activities. Privacy is given priority over community. The large windows of the contemporary housing designs do not overlook and engage with the community, instead each building is self-contained and introspective (see MUDA, 2005). Roads, independent of houses, consist of pedestrian ways and are clearly segregated from the protected private property, and are supported by spatial planning (MUDA, 1996). Although in a purely functional sense, these layouts are well worked out, it is a clear departure from the relative social sophistication in the operation of the courtyard and *jagali* forms.



Figure 7. *Jagali* transition. This transition space was and is used for the most part of the day for different activities. This climate-responsive space would have been in the shade for most of the day



Figure 8. New houses: compound before main door. This image of the new layout clearly shows the barrier between the road and entrance. A further lack of communication between the house and the road is evident

Density and mode of transport also affects the *jagalis*. Increases in the flow of traffic, both vehicular and pedestrian, from outside the neighbourhood has led to increased noise and pollution, making the *jagali* more difficult to use in its traditional way.

One architect stated, ‘...now application of the *Jagali* is restricted to the farmhouse. It was effective when the known people use to overlook the community spaces. Now the fabric has changed, and hence it is obsolete’ (respondent no. 29, interviewed on 10 July 2009). The climatically driven, inviting *jagali*, which acted as a series of bioclimatic transitions from outside to inside the house is now replaced by a clear demarcation between roadway and plot. Almost all the respondents viewed compounds as more of a psychological security, offering protection of the property and defining territory. According to practising architects ‘compounds are also used as a tool to express their client’s prestige symbolically’ (respondent no. 18, interviewed on 30 June 2009). When asked about the need for physical demarcation, one respondent said ‘For privacy and cordial relation, earlier people wanted one other; nowadays people do not need others. We do not want to have the problem during children time (in future), so a compound is built’ (respondent no. 36, interviewed on 14 July 2009). Citing this concern for the shift away from climate-responsive spaces, 70% of the architects interviewed suggested that they follow this trend and do not see themselves playing a role in promoting sustainable attitudes with clients. One architect summed it up as, ‘we cannot complain, we have to go with the trend, it is the question of how well we can adjust to the new situation’ (respondent no. 17, interviewed on 30 June

2009). One respondent strongly expressed the view that ‘the emphasis on compound as a barrier is to ensure their children do not mingle with other children from different social backgrounds’ (respondent no. 20, interviewed on 1 July 2009).

The earlier interactive, participative open spaces have thus now become individual and self-centred, supported by planning regulations that divide land into roads and individual plots (MUDA, 1996). Although the concept of open space has regained importance, it is no longer public. According to a builder ‘importance is given for external spaces. Sometimes it is used as part of the internal space. Mostly it is a private space’ (respondent no. 51, interviewed on 16 July 2009). With the redefined lifestyle, the time spent in these open spaces is subjective. The interview feedback of respondents in terms of their daily routine clearly suggests that individuals and families spend the least amount of time in these open spaces.

Mysore enjoys a mild and pleasant climate, and people are able to spend more than 50% of their time in climate-responsive *jagalis*. A daily routine based around daylight and climate has resulted in low energy use. The consumption of embodied energy to facilitate indoor activities has also increased the operational energy. Furthermore, in newer developments, the effective use of open space has drastically changed to gated private spaces, which reflect the specific concerns and aspirations of emerging householders.

6. House planning

In the past, spatial configuration and construction materials used in domestic buildings were sourced locally and had low energy impacts. There are implications for materials in the shift from multifunctional spaces to specific rooms for discrete activities. The selection of building materials and assemblies is examined in this section. Their use is governed by the projection of the status of the occupier as well as satisfying functional requirements.

Traditional housing in Mysore, before independence, was constructed of thick mud walls and terracotta tile roofs. The houses had small openings towards shaded areas (Figure 9). By 1987, this was completely replaced by the brick wall with cement plaster and reinforced concrete roof (CITB, 1987). Spatially, the relatively large central hall was used as an internal meeting area. Very few spaces inside the house had a fixed purpose (Ikegame, 2007). Most spaces were multifunctional and their use was determined by the occasion; for example, the central hall was used for socialising, working, sleeping and dining (Figure 10).

Housing design changed to a partitioned space with clearly defined functions (CITB, 1987). Influenced by the Western model, importance is given to larger openings and privacy



Figure 9. External space. This view of the *jagali* clearly shows the way the house engages with the surroundings. This part was and is used for most of the day. It also reflects the use of locally available material and culture

while defining spaces. All respondents expressed their concern for good light, ventilation and privacy as crucial aspects along with affordability as a priority during the design process. It is this declared desire for light, ventilation and privacy that encourages householders to move away from cluster development to individually plotted schemes.

While analysing the adoption of these housing typologies in Mysore, most architects and builders believe that the European



Figure 10. Old interior. This view shows the multipurpose area with locally available material. It reflects the maximum use of daylight and the least furniture resulting in very low operational costs

model of building organisation reflects their client's aspirations. More than 60% of the respondents feel their house reflects their social background and character, while 10% of the respondents believe it is their status and wealth that is reflected in their house. Fieldwork clearly indicates that more than 95% of these respondents interviewed reside in houses built according to a European model. This reflects the redefined requirements and expectations of the households.

At the national level, economic liberalisation provided an opportunity for individuals to aspire to wealth across the class structure. The middle classes are the biggest beneficiaries of this phenomenon. According to Satish Deshpande, the middle classes have consolidated their social, economic and political standing through globalisation (Deshpande, 2004). Economic liberalisation not only encouraged upward mobility for the middle classes, it also supported the notion of progress for the lower classes to aspire to economic development (Fernandes, 2000a).

The resultant impact on housing is evident in Mysore. According to one practising architect, the average age of a commissioning client is much younger than the previous generation. This has a greater impact on design, as clients are more open to new ideas, design, materials and technology. Concern for the change in attitude is evident as quoted by a builder 'the concept of the house as a 100-year asset is changing, and people are planning for only 15 to 20 years. Though this is good for industry, it has to be examined from the sustainability point' (respondent no. 54, interviewed on 18 July 2009). In this context, clients' attitudes can be summed up as one architect puts it, 'now people are trapped by the outlook of the building, they do not understand the relation of comfort to design and material usage. Their desire is beyond basic requirements, frequently it is to show off. Some client's expectation of traditional architecture is superficially met' (respondent no. 6, interviewed on 26 July 2009). The significance of the shift in planning is evident, when a builder interviewed says 'over a period of time there has been a clear shift from homes designed for minimal living space to viewing the buildings as a commodity to show one's wealth' (respondent no. 43, interviewed on 14 July 2009).

Economic liberalisation and increases in personal wealth have stimulated middle class segments to import materials and redefine their personal spaces. An aspiration to demonstrate wealth has resulted in the use of environmentally insensitive materials with high embodied energy. Two representative instances of this are the use of marble transported from quarries 2000 km from the city, and large glazed areas with imported timber frames. Furthermore, the house being more compartmentalised and used for demonstration, there is an evident increase in the size of individual houses and more

materials are used for internal walls. This has clearly resulted in increased embodied energy and operational energy. Users see their house having a short useful life compared with the inherent flexibility of older buildings this has a direct bearing on the lifecycle energy consumed by contemporary houses.

7. Finishes and facade

The earning power of the emerging Indian middle class is much greater than that of their parents and often expresses itself in home construction and interiors (Figure 11) (Saavala, 2003). In tracing the use of household items that people use to associate their needs and status, there is a clear increase in the use of energy-intensive items. The survey studied the items considered important by the middle class occupier. There are major increases in most goods such as washing machines, ovens, air conditioning, cars and foreign travel compared with 15 years previously with the exception of television and the telephone (Figure 12). According to a respondent 'aspirations have forced the middle classes to spend more on finishes and burden themselves unnecessarily' (respondent no. 33, interviewed on 11 July 2009). Most of the time, this act is more for demonstration than real need.

More than 70% of the respondents seek to invest additional money on better quality materials. According to the feedback from the practising architects at Mysore, more than 65% of their clients are aiming for the most expensive, imported and best materials, which will reflect their status during the selection process of finishing materials for flooring, elevation, electrical fixtures, plumbing fixtures and woodwork (Figure 13). This contrasts with the traditional Mysore, which encouraged local crafts and promoted locally sourced materials as part of their early development strategy (Vandana, 2008).



Figure 11. New interior. This modern house interior with quality flooring, large window and furniture reflects the aspirations of middle class people

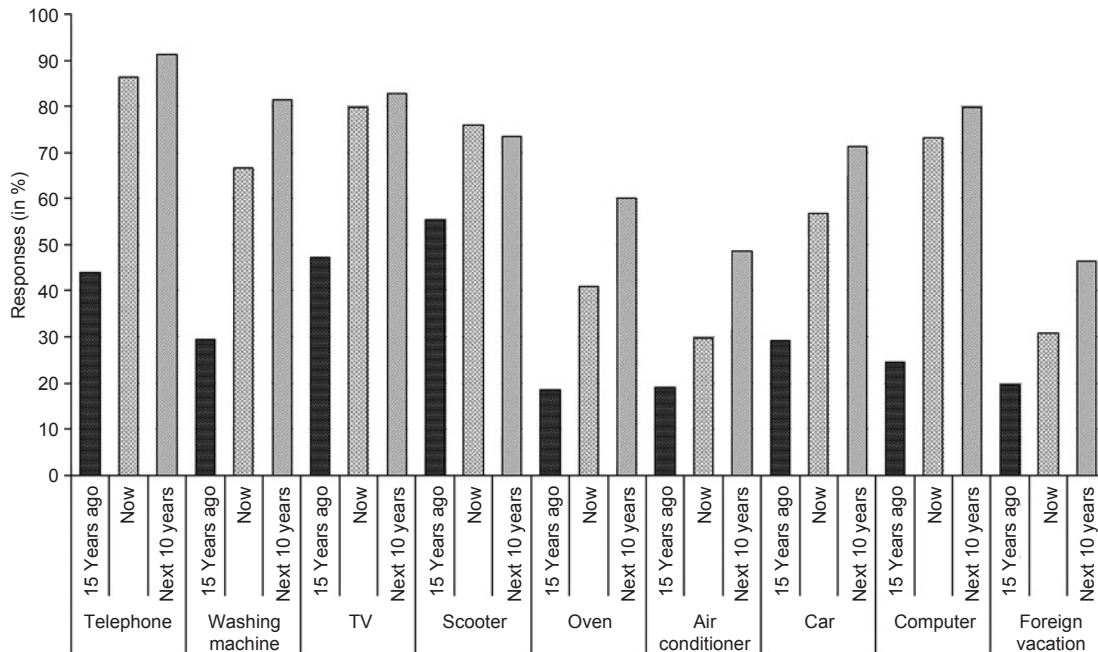


Figure 12. Significance of items and its influence. This feedback from respondents clearly demonstrates the increase in almost all the energy-resourced aspects, which are aspired to by middle class people; further respondents tend to use lots more in the days to come

Although more than 60% of the respondents assert that they want simple, utilitarian housing, they contradict themselves by the care shown in external finish and the quality of materials used in the interiors (Figure 11). For instance, many houses have marble flooring or granite cladding tiles for the front side

of the house, which in both cases do not reflect the utilitarian value of the materials. According to an interviewed scientist from ‘the Energy Research Centre’ (TERI), ‘middle class people, not being satisfied with what they have, they are striving hard to achieve luxury’ (respondent no. 69, interviewed on 11 August 2009).

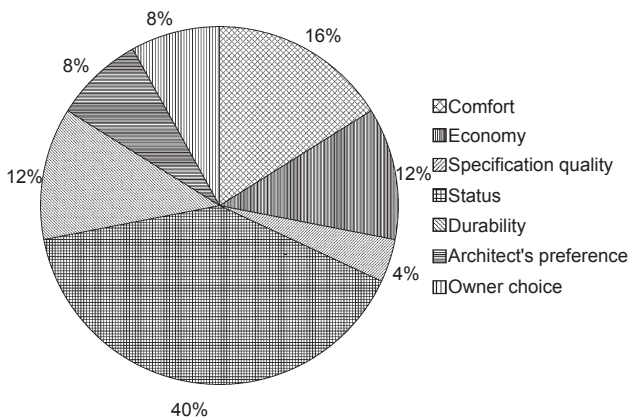


Figure 13. Material selection. Architects in their feedback have identified their clients’ choice of materials would firstly reflect their status and was followed by comfort

Furthermore, there is a clear difference between the traditional ‘Gandhian’ middle class people and recent, more materialist additions. An architect remarks, ‘traditional middle class people would prefer bigger spaces (Figure 14) when compared to the people who have climbed the ladder of economic success. This so-called “newly arrived” middle class prefers high quality finishes announcing their arrival’ (respondent no. 32, interviewed on 11 July 2009). As one respondent sums it up, ‘exhibitionism is the important characteristic of middle class people.... Hypocrisy is evident while they keep Geeta, Gandhi and other great books in the showcase, where none of these were read’ (respondent no. 34, interviewed on 12 July 2009).

The impact of a recent desire to project affluence is evident in the selection process of materials and finishes. Most of the materials and finishes are either imported or processed with



Figure 14. Internal space. A typical interior of the central court, around which most of the activities take place. This image also reflects the local materials used for flooring, columns and roof

high energy, resulting in the consumption of higher embodied energy. For instance, Italian marble for flooring, Australian sal wood for door and window frames use very high energy for transportation; ceramic and vitrified tiles used for cladding use high energy in the manufacturing process, increasing the embodied energy of the materials. Effectively, all these factors demand high energy and due to house design and lifestyle drastically cause once sustainable housing to drift towards an unsustainable built environment.

Traditional built forms did not require mechanical ventilation. Changing the built form necessitates mechanical ventilation; typically, fans consuming approximately 80 W energy for a dwelling area of 108 m², whereas the aspiration to use air-conditioning demands 1000 W of energy for the same area (Lall and Ruchi, 2008). The survey demonstrates middle class people's inclination to use these items more extensively in the future, which may require an excessive need for operational energy. The consequences of increased operational energy is the result of both changing geometry resulting in new building typology and lifestyle changes resulting in the extensive use of internal space.

8. Conclusion

The study in this paper, using a literature review and survey fieldwork, has highlighted the relatively recent shift in attitudes and cultural values related to housing, from an inherently sustainable approach that valued shared spaces, local materials and communal activities to one that reflects a direction pointing more towards a twentieth century Western approach of individual, nuclear family, consumer-driven values.

The particular points are as follows:

- There is a clear move from multipurpose shared spaces and community spaces to individual entities, which has resulted in higher energy required for transportation, embodied energy and operational energy.
- A new housing typology has been implemented without reflecting local climate that has led to the increased consumption of operational energy. Emphasis on privacy has resulted in the use of further resources to protect property.
- Reformed social and cultural needs have resulted in climate-responsive spaces such as *jagalis* becoming redundant, and thus have increased the embodied energy and operational energy required to build and use internal spaces.
- Improved financial resources coupled with changing aspirations have contributed to building bigger houses, again increasing the consumption of embodied energy and operational energy.
- The shift towards expensive, imported and best materials for finishes to reflect their status has resulted in the consumption of high embodied energy. The increased use of electric utilities and air conditioners has resulted in the excessive use of operational energy.

The growing affluence of the Indian middle classes, reflecting the rapidly growing economy, has created a very large and powerful consumer group that is turning its back on traditional sustainable patterns of housing development and lifestyle in favour of the Western model. These changes inevitably result in both a major increase in the embodied energy and the operational energy of housing. Most architects currently see their role as meeting the aspirations of their clients.

The research has shown that there is an urgent need to balance the aspirations of this growing middle class with the broader needs of a sustainable lifestyle and community. There is clearly a revised role and agenda for architects to support and encourage sustainable development.

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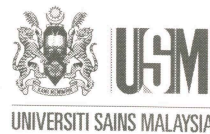
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HARMONISING MIDDLE-CLASS ASPIRATIONS FOR LOW-CARBON HOUSING: CONTEXTUAL STUDY OF MYSORE, INDIA

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ABSTRACT

Economic Globalization is enabling India to reinvent itself as a crucible for development, and provides previously unrealized opportunities for economic transformation catering to a fast growing middle-class. The relationship between affluence and consumption makes it implicit that the Indian middle-classes have a crucial role to play in the process of sustainable development. It is proposed that the Brundtland definition of sustainable development, conflicts with a self-cantered consumerism that often characterizes rapid economic development. The consumption patterns and aspirations of some middleclass sectors are contradictory to many principles of low carbon housing design. This paper explores the challenges and opportunities in the development of low-carbon housing with relation to the growth of the middle-classes in the city of Mysore. Whilst accommodating the inevitable impacts and realities of economic development, this paper intends to trace the interwoven fabric of local, social, cultural, and climatic responsive housing in Mysore, and its contribution to a strategy of appropriate and effective design frameworks for low carbon housing.

Keywords: carbon emission, housing, middle-class, India

HARMONISING MIDDLE-CLASS ASPIRATIONS FOR LOW-CARBON HOUSING: CONTEXTUAL STUDY OF MYSORE, INDIA

“A technological society has two choices. First it can wait until catastrophic failures expose systemic deficiencies, distortion and self-deceptions... Secondly, a culture can provide social checks and balances to correct for systemic distortion prior to catastrophic failures.” Mahatma Gandhi

It is important to understand housing as social and cultural phenomena that can allow insights in the effective formulation of localised and relevant low carbon housing strategies. Although strategies such as converge and contract (Mayer 2004, 189) seek to accommodate developing countries' valid aspirations to achieve higher levels of prosperity, there is still an imperative to reduce carbon emissions within India. Whilst a low carbon society for developed nations can be defined as “inventing low carbon technology and reducing carbon dioxide emission by the middle of 20th century” (Skea 2008); for developing nations, achievement of low carbon communities must go hand in hand with achieving wider development goals. Further, while acknowledging the role of technology, emphasis has to be given to the importance of lifestyle and social change (Skea 2008). The complex and multifaceted society of India is interwoven with caste, religion and regional disparities, where new-found economic status and affluence in middle-class segments has a critical impact in the process of sustainable development. Though the middle class are defined as not in absolute poverty in

the developed world, the Indian National Council for Applied Research has classified India's population in to five demographic groups: the very rich, the consuming class, the climbers, the aspirants, and the destitute. The primary metrics for such a classification being based on income, and spending power, we identify the consuming class and climbers, as constituting the “Indian middle class” (NCAER 2009). Increased resource consumption and carbon emissions that are traditionally associated with higher household incomes runs counter to climate change goals. A key challenge is to research ways in which sustainable housing in an Indian context can both mitigate carbon emissions and at the same time address the material aspirations and desires of a fast growing middle class. The residential sector in the construction industry accounts for 22 percent of global energy consumption (Parker 2003). In case of India, about 17% of emissions originate from construction activities of which 60% can be attributed to the housing sector (Tiwari 2003). Construction in the housing sector amounts to approximately 10% of total carbon emissions. in India with new build reflecting greater income and mobility amongst the population. It would be simplistic to characterise a growing middle class as being exclusively materialistic where social and cultural conditions unique to India have the opportunity to marry prosperity, property and low environmental impact. Commentators such as P. K. Varma assert that Indian society cannot remain cohesive at a basic, functioning level if it is merely measured as an aggregation of personal wants (Varma 2007). It is estimated that middle classes constitute about 25 percent of the total population of India (Saavala 2003). There are more than 27 % of people below the poverty line and about 28% people around it (Sridharan 2004). Recent economic development has enabled the middle classes to assert greater power and influence in political and economic processes (Singh 1993). However, it is important to note that ‘the middle class’ is not a cohesive or singular demographic entity. Traditionally, class has been defined based on the caste or religion of the person (Kulke and Rothermund 1998). This focus shifted slightly towards status gained from land ownership in the last century. With the advent of wider access to education, there is a greater consciousness of wealth inequality and implicit in this, social standing (Misra 1961). Other factors such as religious affiliation also contribute to complex models of social stratification. The more recent growth of an affluent middle income demographic must always be viewed as emerging from a much more complex and fragmented underlying cultural structure.

In post independence India, a quite cohesive consensus dominated middle class mores and values, defining themselves through Gandhian principles of modesty and self restraint that included the avoidance of ostentatious displays of wealth such as the home (Wessel 2004). Nehru in his autobiography wrote “the rising middle classes wanted some cultural roots to cling on to; something that gave them assurance of their own worth, something that would reduce the sense of frustration and humiliation that foreign conquest and rule had produced” (Nehru 1956). In a country subject to intricate levels of social stratification – such

iconic figures such as Nehru consciously sought cohesion and shared values in a newly forged and fragile nation state. The government had some success in forming a consensus amongst middle income earners that placed value on community over the individual that held true in an introverted economy with modest levels of growth.

The provision of housing in India has traditionally been less related to income and wealth. It is proposed to explore this theme through the example of the city of Mysore. It is a useful exemplar in that it has a history that directly influenced environmental response in the built environment. Traditionally as elsewhere in the country, it featured ingrained customs of social classification based on occupation. In case of Mysore, the Royal Palace was almost the exclusive employer and source of patronage, apart from modest levels of agricultural activity. Housing was segregated according to occupation with status being derived from proximity to the Palace. Residential layouts had evolved from the prototype of the Agrahara (small Brahman villages) that were prevalent 150-200 years ago (Issar 1991). New residences were built right at the edge of the road: that were either linear with a shared party wall, or with houses distributed around an open space. There was a very tenuous boundary to differentiate the end of the road from the beginning of the house. Physically, a semi-open raised space (Jagali) acted as a transition from the road to the inner part of the house. These Jagalis, which are always in shade, were and are, a perfect space for socializing and acted as a meeting area for the inhabitants. Jagalis overlooking the street had brought a sense of physical and psychological security to these spaces, which were actively used as interaction areas. People shared their leisure activities and entertainment with their neighbours in these informal spaces. Constructed of thick mud walls (later brick) and terracotta tile roofs, the houses had small openings towards shaded areas. As the Jagali was used as an external meeting space of the house, the relatively large central hall was used as an internal meeting area. Very few spaces inside the house had a fixed purpose (Ikegame 2007). Examples of these are kitchen, bath and store. It was the occasion that decided the use of the house: most spaces were multifunctional, for example the hall was used for sitting, working, sleeping, dining, and socialising.

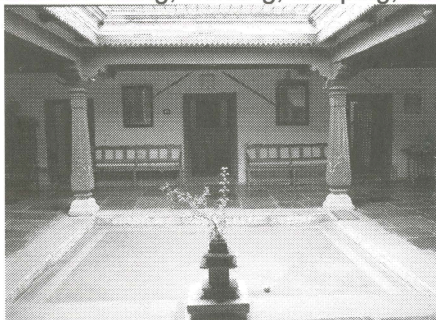


Figure1: View of internal court



Figure2: View of external space of a typical Agrahara Photographs: Satish

Shared facilities (including party walls), the efficient use of semi-open outdoor spaces for much of the day, and the effective use of multi-purpose areas all facilitated a compact building footprint. Using locally available material within a climatically responsive layout and construction would today be regarded as a good example of efficient sustainable development. Plot ratios are dense compared to more diffuse contemporary layouts with less environmental impact because of a more efficient land use. Comparisons in Mysore of typical Agrahara settlements with contemporary middle income settlements indicate an increased dwelling footprint. Cartographic measurements of representative land parcels indicate that for a contemporary dwelling, 50% more plot area is required compared to more traditional Agrahara typologies.

The Jagali neighbourhood network of narrow roads, cluster planning and integration of community areas have successfully provided shared shading to reduce solar gains and improve environment of external spaces. A lower ecological footprint in the housing clusters is achieved by modest material consumption using shared building elements such as party walls and by using locally available, natural and processed, materials. The use of local construction materials, sustainable building practices at micro level, robust planning and clear legislation to promote local material and sustainable practices also resonated with the local agendas of the pre-independence Swadeshi. The term means 'indigenously manufactured' and was one of four key movements established by the Congress Party to campaign for independence. The industrial and commercial strategy, relieved of excessive political pressures was in Mysore implemented expeditiously of the policy by an effective political class and able

technocrats (Baweja, 2008). As a result of this, the benefits of economic progress were optimised to maximise local benefit. At the same time the conservation of parkland and the qualities of the Jagali meant that Mysore was noted for its visual amenity (Parsons 1930).

The innate sustainable qualities of the Jagali housing can be contrasted with contemporary housing typologies. Expansion of new housing has been driven by economic growth in sectors such as IT that have benefitted from economic globalisation and liberalisation. It serves an educated, aspirational and increasingly affluent faction within the middle class who have acquisitive value systems where housing is as much a reflection of individual status and wealth. Such a societal change can be traced from after the death of Prime Minister Shastri in 1966, the political climate changed dramatically, with a population less deferential and motivated to facilitate change. (Varma, 2007). This coincided with reports systemic corruption in the political classes. The electorate therefore became disillusioned with the hypocritical situation of a government promoting the values of Nehru and Gandhi whilst indulging in financial self aggrandisement (Wolpert 1989). In such a context, some many of the middle classes now prioritised success; irrespective of means, and money regardless of source (Varma, 2007). Liberalization in 1991 brought new entrants to the Indian middle class. Economic freedoms not only encouraged upward mobility within a defined middle-class, it also fired aspiration in lower income groups to progress in what were hitherto, rigid class and caste structures (Fernandes, 2000). The IT sector has driven major change in societal structures. Many citizens saw huge progress in a few decades, achieving prosperity and mobility unimaginable to their parental generation (Tim, 2006). Such disorientating wealth finds expression in a variety of ways including building design and interiors (Saavala, 2003). These new additions to the middle class started to define themselves on the basis of consumption and wealth within a perceived meritocracy (Saavala, 2003). It is this consumption pattern that is shaping the culture and identity of middle class (Wessel, 2004).

There is a paradox in that post independence India saw less localism as espoused by the Swadeshi. With priorities to establish an industrial infrastructure planning was centralised with little emphasis on urban planning strategies. Modern Movement planning and design techniques that were based firmly on European practice (MUDA 2008) displaced Jagali typologies and their lighter ecological footprint.

Housing design has fundamentally changed from previously flexible layouts to planning that clearly identifies partitioned space for clearly defined functions (MUDA 2008). Building form no longer encloses and defines external space to encourage outdoor activities. Rather housing sits, set back from a plot line with no clearly defined used for the outdoor ground. A sense of the communal is replaced by a priority to preserve privacy. Although contemporary housing

designs feature large openings, a defined and fenced plot boundary makes each building self contained and introspective (Saraswatipuram layout, MUDA, 2008). Roads, independent of houses, have pedestrian ways and are clearly segregated from the property of private individuals by fencing to compounds and supported by local planning legislation (MUDA 2008). Although in a purely functional sense, these layouts are well worked out, with a hierarchy of roads, amenities and play areas, it is a departure from the values of courtyard and Jagali forms.

It is suggested that the Jagali neighbourhood embodies a sense of the communal that reflects the values of the Nehru consensus middle class. Modern typologies mirror the ascendance of the individual over community where often competing needs for privacy and display produce buildings that are inefficient in their use of land and building materials, with little consideration given to passive methods of environmental mediation.

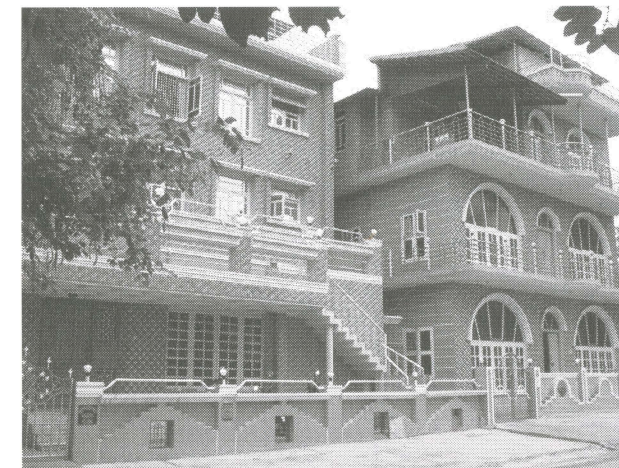


Figure3: View of Contemporary Housing pattern
Photograph: Satish

Consumerism has become an embedded Indian value (Fernandes, 2000). This has changed an image of a once financially cautious and thrifty middle class to one of affordable indulgence (Nijman, 2006). It is in this context that the built environment is at a crossroads, subject to two competing forces. The first is to be an important part of national and international strategies to reduce consumption and carbon emissions. At the same time however is the function of the construction sector to respond to the affluent seeking housing that reflects their status. A key to unlocking such a quandary lies in looking at successful ways in which housing has been procured in the past and finding strategies to harmonise such design principles with contemporary middle class aspirations and needs.

A key question is what virtues of pre-Independence Mysore can be revisited to offer middle income sectors sustainable and desirable housing? Obviously, an effective local government and planning framework is instrumental as was experienced in Mysore. Future research will interrogate whether the Swadeshi values of localism still resonate in the middle class and how the display of such values can confer status in a similar to the current condition of ostentatious consumption. A key challenge of contemporary house building in India lies in the disregard of open space that detracts from the visual and social amenity of the house and street. Here the lessons of the Jagali can be applied in a contemporary way to produce more sustainable housing forms that also meet the aspirations of an increasingly prosperous population.

The design of traditional Agrahara housing clusters have the virtue of enhanced density compared with contemporary layouts, that when combined with carefully designed openings, Jagalis and courtyards can contribute to greater environmental comfort with less environmental impact. However new design typologies that are aimed at the climbing and consuming classes need to reinvent the traditional yet simultaneously respond to a culture of raised expectations.

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*Sustainable Housing Strategies for the Growing Indian Demographics: Contextual Study
of Mysore, India*

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The University of Edinburgh, United Kingdom

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Abstract:

For developing nations the development of sustainable communities has to go hand in hand with the achievement of wider goals, where emphasis has to be given to the importance of lifestyle and social change. This inter-disciplinary research draws understanding from the social, cultural and economic studies to define the values and aspirations of the middle class and its implications on sustainable housing. One of the fastest growing economies in Asia, India, has empowered a large and powerful consumer oriented middle class. Middle class mores are aspirational and aimed at achieving western living standard and moving away from a traditional communitarian social model. This research presents the results of extensive field work in the southern-Indian city of Mysore that defines the values held by the emergent middle-class in respect to the built environment. Common areas and shared spaces have traditionally been very actively used and have played a crucial role in both passive cooling strategies and the maintenance of socially sustainable communities. Field work shows that attitudes to the built environment are polarised between well-maintained and protected housing interiors and poorly organised and maintained external spaces and examines how these transition spaces are used to reflect these values and concerns. The paper reflects on whether earlier traditions in sustainable building design in South Asia (Mysore) have relevance in a contemporary context and the importance of understanding the changing preferences and values of the newly affluent demographic.

Keywords: Sustainable Housing, Indian middle class

Introduction:

Those nations in the developing south inevitably differ in their approaches to sustainable development (Skea, 2008). The imperative to reduce poverty and increase economic activity means that resource use will grow to meet the legitimate aspirations of both government and society and this has to be reconciled with transnational concerns to promote sustainable strategies for the future. As Gay has argued, economic expansion is required before the recognised process of contraction and convergence takes place in concert with the developed world. (Mayer, 2004). Our research engages with sustainable development in its widest sense as formulated through the Bruntland (Brundtland, 1987) definition of interdependence between social, economic and environmental realms.

Our research is based on whether such assumptions still hold true for the design of housing that might appeal to the burgeoning Indian middle class. This has been achieved through two intensive periods of fieldwork to uncover the key drivers to housing development in the middle income demographic. This has been done through mapping activity, structured interviews and questionnaires with key stakeholders. These include architects, builders, developers, planners, householders and potential purchasers. The work was undertaken in Mysore, India (Figure 1). The first published stage of the research clearly reflects a shift away from climate responsive, socially inclusive, community oriented housing to a more individual, exclusive and independent housing typology (Satish et al., 2011). This paper is concerned with the second stage of the fieldwork that market tests with key stakeholders, potential sustainable design strategies that also meet the expectations of the middle income consumer. We describe the methodology for construction of a series of scenario models for market testing as well as using simulation techniques to benchmark the models to a series of quantitative indicators.

The fast growing Indian economy has empowered an emergent middle-class whose new-found economic status and affluence have a critical impact in the process of sustainable development (Fernandes, 2000b, Fernandes, 2000a, Singh, 2009, Wessel, 2004). A former class identity based on simplicity has been transformed by the economic empowerment to one of affordable indulgence (Varma, 1999). Consumerism has become the primary Indian value, fuelled by the influence of the west and a more pervasive media (Fernandes, 2006).

In an Indian context, changes in housing procurement and design are as much a social and cultural phenomenon as a technical one. A recognition of this fact can allow insights into the effective formulation of localised, resilient and relevant sustainable housing strategies that address quantitative issues such as carbon reduction (Skea, 2008). India's economic growth has also increased the spending power of the middle-class (Fernandes, 2006). Changing lifestyles and consumption patterns have clear impacts on housing (Swarup, 2007, Imtiaz and Helmut, 2001). Although increased affluence and consumption benefit the middle-class, it has also increases carbon emissions (Saavala, 2003). 60% of the emissions originating from construction activities are attributed to the housing sector (Tiwari, 2003).

This increase in energy consumption is not limited to ownership of more consumer goods but can also be attributed to changes in housing typologies resulting from changing expectations of home owners. (Satish and Brennan, 2010). Traditional middle income housing as studied by the authors was communally configured with a looser relationship between external and internal realms. Contemporary dwelling templates now reflect a culture of individuality that feature highly defined boundaries forcing dwelling activities into air conditioned interiors with resource and carbon implications (Satish et al., 2011).



Figure 1. India map: Mysore location

In the case of Mysore (Figure 1), a south Indian city, traditional residential layouts were either linear with a shared party wall, or with houses distributed around an open space (Figure 2). Entry to the house was through a semi open raised platform (Jagali) (Issar, 1991). These Jagalis were shaded for most of the day and used extensively for socializing and actively used as interaction areas (Ikegame, 2007). Jagalis worked as an effective climate mediating transition space and there were no other boundaries to define individual territories. Materials used for construction, thick mud walls (later brick) and terracotta tile roofs were locally sourced and with small openings towards shaded areas, they were climate responsive and exhibited sustainable features in their material choice and construction details.

Shared facilities and the efficient use of semi-open outdoor spaces for much of the day also resulted in a compact building footprint. Such climatically responsive layouts and construction using locally available material are good example of efficient sustainable development (Vandana, 2008). These houses were thermally comfortable due to planning techniques which reduced solar gain and due to the use of local materials and construction details which were climate responsive and had low ecological footprints (Satish et al., 2011).

Housing design and residential layout both changed drastically after independence in 1947. It can be argued that a move from communal provision predates contemporary economic expansion and its attendant societal changes, a sense of the communal being replaced by a priority to preserve privacy. Contemporary housing designs feature large openings, a defined and fenced plot boundary (Figure 3) making each building self-contained and introspective (MUDA, 2005). Roads, independent of houses, have pedestrian ways and are clearly segregated from the property of private individuals by fencing into compounds. This is supported by local planning legislation (MUDA, 1996). It is an embedded expectation that buildings no longer enclose and define the open spaces and encourage outdoor activities (Satish et al., 2011, CITB, 1987).



Figure 2. A typical Agrahara, Jagali typology



Figure 3. New houses

Altered social and cultural values have played a crucial critical role in the adoption of new housing typologies. Changed social conditions mean that people have started to associate the strengths of community living with weaknesses. For instance, shared facilities are interpreted as leading to a lack of privacy (Satish et al., 2011).

A new housing typology has been inadvertently implemented that does not reflect local climatic conditions and this has led to increased consumption of operational energy (Figure 3). As an executive engineer responsible for urban housing development recalls, until 1970 people were careful to stay close to the city centre (Fort and Palace) (respondent no.12, interviewed on 23 July 2009). To encourage residents to move away from city centre, the City Improvement Trust Board (CITB) built houses in plots and allotted some sites free of cost for those who bought houses away from the city centre (CITB, 1987). This has had a direct impact on the land footprint (figure 4). Whereas in the earlier Jagali typology, nearly thirteen square meter of land is used per person this has increased to 27 square meters per person (CITB, 1987). Now, middle class people prefer the plot typology and the land footprint have increased up to 43 square meters per person (MUDA, 1996, MUDA, 2005). Emphasis on privacy has resulted in use of further resources to protect property. Improved financial resources coupled with changing aspirations have contributed to building bigger houses and the choice of imported materials to reflect their owners' aspirations. These have clearly increased the embodied energy of houses (figure 4). Changing social and cultural needs have resulted in climate responsive spaces like Jagalis becoming redundant. Social activities have moved indoors coupled with large windows, increasing conductive heat gain and increased comfort expectations have resulted in use of more lighting and spot cooling, all of which has increased operational energy requirements (figure 4).

Unsustainable development can be identified at every level. The first published stage of the research clearly reflected and summed up the unsustainable features of community living, siting, entrances, house planning, finishes and facades. Reflecting on the earlier work, the second stage of the research focuses on a particular sections of the house to investigate the specific rationale for the changes, people's preferences and their implications for sustainable housing.

Housing is thereby identified as a social and cultural phenomena and this research looks at built environment sustainability from a more bottom-up perspective. Earlier research clearly indicated changes at all levels but more so at the entrance point, the transition from street to main door. This area clearly demonstrates people's preferences, aspirations and changed attitudes and their impact on housing form. It is also impacted on by reconfigured layouts, preferences and requirements of home owners.

The research focuses on this boundary condition and the second stage of the field work engages with key stakeholders in examining sustainable design strategies that could also meet the expectations of the middle income consumer.

Boundary condition and its implication on sustainable housing:

It has been argued that the pre-industrial architecture of India served the physical and spiritual needs of the populace well. At a physical level, it demonstrated an understanding of the local climate, available materials and construction techniques. Doshi has argued that “at the spiritual level, the built-form conveyed total harmony with the regional lifestyle in all its daily as well as seasonal rituals, unifying the socio-cultural and religious aspirations of the individual and the community” (Ameen, 1997).

Closer inspection reveals that the key change has been the way the house boundary is defined and the values and changes taking place at this interface. As Correa(1991) has argued, the climatic conditions of most Indian cities allows for the use of open and semi open spaces for interaction, gatherings and other social activities (Correa, 1991). Correa identified specific Indian conditions, which aid sustainability. They use natural light for most part of the day and very minimally construction, which reduces embodied energy. He has identified (Correa, 1991) four major elements as:

1. Internal private spaces
2. Area of inmate contact (the front door step)
3. Neighbourhood meeting places
4. Principal urban area

In a traditional Indian context, these spaces will always have very high usability coefficients due to the nature and way these spaces are used (Correa, 1983). Though the notion of threshold is a theoretical construct used in sociology, anthropology, and architecture, primarily in a western context. It is none the less relevant in interrogating modern urban conditions in India.

The research is thus focussed to these boundary conditions as they may reflect fundamental changes since Correa’s writing about threshold. Although relevant in 1990, such has been the change in society that a virtuous link between building form, bioclimatic response and social structures in the household may be broken. We therefore examine whether contemporary expectations regarding security and privacy have anything to offer sustainable design strategies and if any of the more traditional approaches to threshold and form can be incorporated in the design of new housing.

Models and simulation analysis:

We aim to use the observations and conclusions of the earlier research and field work to identify the needs and wants of middle class home owners. Structured interviews and surveys clearly indicated the concerns for security and notions of protecting one’s boundary, coupled with the need for privacy, and the use of form and façade to provide visual cues in expressing wealth and aspiration (Satish et al., 2011, Glendinning, 2011).

The understanding of the field work is triangulated with literature studies and the outcomes related to boundary conditions are used to produce different computer models, representing alternatives for major elements, a sustainability agenda and middle class aspirations. Feedback

from architect, builder, and home owner is used to define these models that are then related to sustainable values.

The field work was combined with intensive literature reviews of both contemporary Indian building typologies (MUDA, 2008, Shirley, 2008, Annapurna, 1999, Tiwari, 2001) and research on boundary, threshold and border that help explain contemporary preoccupations with security and defensible space (Blaisse, 2009, Georges, 2005, Georges, 2008, Rashid, 1998, Suzanne and Lennard, 1977). From this a series of four test models were generated for study in respect to both predictive quantitative performance and as a basis for revisiting the fieldwork. The models were organised to test housing market stakeholders' responses to a range of sustainable criteria. At one extent a traditional bioclimatic solution that reflects past models of communal living and at the other extent, a model representative of current private sector middle class housing were constructed. A further two models between these extremes were designed primarily to get a finer understanding of the exact levels of privacy and social interaction that might be embraced by potential stakeholders (Figure 4).

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| | | Model 1 | Model 2 | Model 3 | Model 4 |
|--------------|-----------------------------|--|---|---|--|
| Typologies | | Jagali Typology | Jagali + Plot | Plot + Gate | Plot + High Gate |
| | |  |  |  |  |
| Description | Boundary condition | a traditional bioclimatic solution that reflects past models of communal living | A representative model of combination of traditional and current middle class housing. Demarcation of boundary with very low wall. Combination of Jagali and plot system. | a representative model of current private sector middle class housing | a representative model of aspirations and high end / upper middle class housing |
| | Physical | Sharing party wall either in a row or arranged around the open space. | The plot is defined more as a very low hedge to retain the permeability of the Jagali typology | About four feet high compound Clear definition of one's territory. | Very high compound. Min 6 feet high. Totally cut off from the external world. |
| | Spatial: | Use of semi open space for most part of the time. | Opportunity to use open space for informal activity | Clear demarcation of territory. Presently, the space is not used for much of the activities. | Well defined barrier segregating the inside and outside. Open space and landscape areas for personal consumption. |
| | Visual | Visually connected with each other house and central open space. Kids can play around and people can use the Jagali for informal gathering / activity. | Developed more to suit the prevailing plot typology. Scope for interaction among neighbours. | There is a visual connection if not physical. Owners have the option to interact with the neighbours. | Insulated and visually cut off from the street and neighbours. |
| Qualitative | Communal / Social | Community oriented. Common open space and other than the rear utility area, there is no individual house open space. | Scope to use open space for most part of the day. | Scope for informal interaction with the neighbours and street. Not much importance for the exterior open spaces and community activities. | Totally cut off from the neighbours. Introvert, independent and more importance for privacy. Independent of neighbours and not involved in community activities. |
| | Economics / reflection | More emphasis for culture than Economics (Rangoli). More functional | More functional. | Combination of function and appears. Skin and compound used for demonstration of one's aspiration. | Skin and compound used for demonstration of one's aspiration. |
| | Security | Social Security, compact community and new members are identified by people. | More importance for social security | Compound used as a psychological barrier, main door with steel shutter | Compound itself acts as first level of defence. Totally grill and very high individual security. |
| Quantitative | land foot print | 13 Smt / person | 27 Smt / Person | 27 Smt / Person | 43 Smt / Person |
| | Embodied energy | Use of Least embodied energy and lifecycle energy. | Less embodied energy | Relatively high lifecycle energy. | Use of very high embodied energy and lifecycle energy. |
| | Embodied energy | 0.47 MWh / SQM | 0.57 MWh / SQM | 0.63 MWh / SQM | 0.78 MWh / SQM |
| | carbon emission | 0.24 ± CO2 / SQM | 0.29 ± CO2 / SQM | 0.33 ± CO2 / SQM | 0.40 ± CO2 / SQM |
| | Openings | Very small, just enough light inside. | Narrow openings, Enough light for the interiors. | Wide openings, no relation to direction and requirements. | Very wide openings. Spanning most part of the wall. |
| | Climate responsive features | Climate responsive, roof, wall, construction and materials were reflective of local climate | Jagali area is shaded and could be used for most part of the day. | Design is independent of climate | Highly insensitive to the climatic condition. |
| | source of material | Use of locally sourced materials. | Emphasis on use of locally sourced materials | Combination of local and imported materials. | Use of imported materials. |
| | Security | No/ Least materials used for security other than the regular wooden door. | Steel door as additional security to the main and rear door. | steel grill for the portico area | entire plot or most part is covered by grill. |
| Summary | | Most sustainable typology | Some of the features are sustainable | Some of the features are unsustainable | Least sustainable typology |

Figure 4. Analysis of different model typologies





| | | Model 1 | Model 2 | Model 3 | Model 4 |
|-------------|---|---|--|--|--|
| | Typologies | Jagali Typology | Jagali + Plot | Plot + Gate | Plot + High Gate |
| | General description |  |  |  |  |
| Volume | Different activities and their features are highlighted. Each typologies represent most desired to most prevailing and also vernacular typology. | There is no demarcation of private spaces and public areas. Sharing party wall either in a row or arranged around the open space. | The plot is defined more as a very low hedge to retain the permeability of the Jagali typology. A representative model of combination of traditional and current middle class housing. | This most prevailing model has physical barrier between street and inside plot. The height of the wall is about four feet, where the homeowners can still retain some connection with street and neighbours. Portico defines the main entrance and also acts as informal reception area of guests. | this most aspiring model has clear definition of internal and external part of individuals space. High wall, gate and elaborate portico emphasis the status of the person. |
| Entrance | Main relation of street and Entrance door, different activities between the two are explored. | There is a smooth transition from street to main door through semi open raised area (Jagali). Jagali is used for most part of the day. | Similar to Jagali typology entrance with additional space in the front with hedge to define ones plot area. | Direction of the opening is influenced by many factors and owners tend to locate the main door close to street and additional open space near the main door used for parking two wheel and four wheel vehicles. | Main door is recessed inside the individual property and not visible from the street. There is no relation between street and main door. |
| Opening | Larger openings will increase conduction gain and increase cooling load. Different alternatives are worked out based on the window size and two more models are developed to examine peoples preference of overlooking shared spaces. | Very small, just enough light inside. | Narrow openings, Enough light for the interiors. | Wide openings, no relation to direction and requirements. | Very wide openings. Spanning most part of the wall. |
| Security | Concern of safety and both perceived and real threat are reflected the way the boundary and openings are protected. Different level of security are represented in each model. | Social Security; compact community and new members are identified by people. Least materials used for security other than the regular wooden door. | Emphasis on social security. Steel door as additional security to the main and rear door. | Compound used as a psychological barrier and main door with steel shutter. Most of the cases steel grill for the portico area. | Compound itself acts as first level of defence. Very high individual security. entire plot or most part is covered by steel grill. |
| Interaction | Interaction among neighbours and home owners is the crucial part of the boundary condition. Different typologies represent degree of interaction among community. | Community oriented. Common open space. Visually connected with each other. Kids can play around and people can use the Jagali for various activity. | Scope to use open space for most part of the day. Developed more to suit the prevailing plot typology. Scope for interaction among neighbours. | Scope for interaction with the neighbours and street. There is a clear physical barrier and visual connection. Owners have the option to interact with the neighbours. | Both physically and visually cut off from the neighbours. Importance for privacy. No interaction with neighbours and not involved in community activities. |
| Skin | Skin used for elevation, is either construction material used as masonry or cladding for the entrance and front side of the building. The choice of material is independent of building typology. However, peoples preference of each typology is listed. | Use of locally sourced materials. Use of Mud blocks | Emphasis on use of locally sourced materials. Use of Brick and mud blocks | Combination of local and imported materials. Mostly Plastered with entrance area and street side clad with stone or Tiles | Use of imported materials. Emphasis on aesthetics and cost of the material. Extreme of use of polished granite and imported materials and also cement tiles. |

Figure 5. Description of Elements of different model typologies

The model prepared reflecting the prevailing typology (model 3): has an approximately 4 feet high compound between neighbouring plots. The front and rear of the plot has a minimum set back of 1 meter or as required by the BDA regulations. The aspiring one (model 4): has a very high compound that insulates it from external world and extensive use of imported material and ostentatious finishes and very wide openings. The earlier Agrahara typologies (model 1): is the early typology with a raised platform in the front with small openings and use of locally available material, overlooking the street. Finally based on the feedback from the first field work, a combination of climate responsive and aspirational typology (model 2) was developed (Figure 5).

The models were generated with similar configuration in terms of built up area, number of rooms, size of the plot and provision for minimum light and ventilation. To focus the research more on the boundary conditions, all other components such as constructional systems and spatial planning were kept as constants. Each option was then modelled first in Google Sketch Up then exported into environmental simulation package, Integrated Environmental Systems (IES), to predict energy consumption and carbon emissions. Longitude and latitude were specified for Mysore using hourly climate data from Bangalore, the nearest city to the study area.

Before testing stakeholders' responses to the models for, the models were validated for their predictive quantitative performance by simulating them using environmental design software. An advanced simulation package, Integrated Environmental Solutions (IES), was used in this research. IES uses climatic data and supports a range of analytical tools for lighting, thermal comfort and resultant energy consumption and carbon emission. To predict energy consumption and carbon emissions, longitude and latitude were specified for Mysore using climate data from Bangalore, the nearest city to the study area.

The results of the simulation for each of the four models are shown in Figures 6, 7 and 8 in respect of conductive heat gain, cooling load, peak energy demand and carbon emissions for a representative day; May 19, one of the hottest days chosen to analyse the heat gain and energy consumption due to cooling. The focus of this research is to assess the implication of varied boundary condition in terms of change in energy consumption and resultant carbon emission. For the simulation purpose, only these boundary conditions of different typologies are altered while providing input in IES. For instance, the internal parameters like number of rooms, number of occupants, comfort condition expected inside the house, minimum light, and ventilation desired is kept constant across all the models. Details like size of the openings and their location are altered among the models. Similarly, the construction materials and internal partitions are kept constant, whereas the external finish either the cladding or plastering or use of construction material as external fabric, are altered as defined in each typology. Finally, the boundary condition as shared party wall, independent plot system, four feet compound and very high compound with high gate details are constructed and fed to IES.

IES allows altering the input of each typology while retaining some of the features as constant across all typologies. Further, it allows comparison of specific parameter across typologies during output. For instance we can run the models to simulate only the conductive heat gain, where the internal temperature rise is due only to heat gain by conduction. Similarly, the energy consumption due to cooling load, resultant of bringing down the internal temperature to set comfort condition is assessed (Figure 6, 7 and 8).

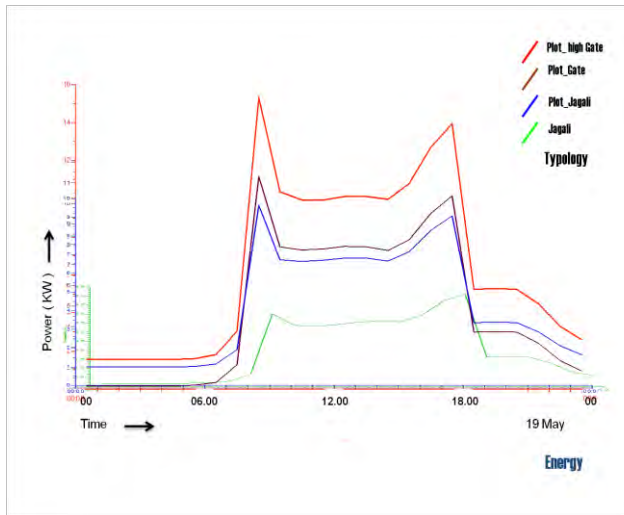


Figure 6. Energy consumption

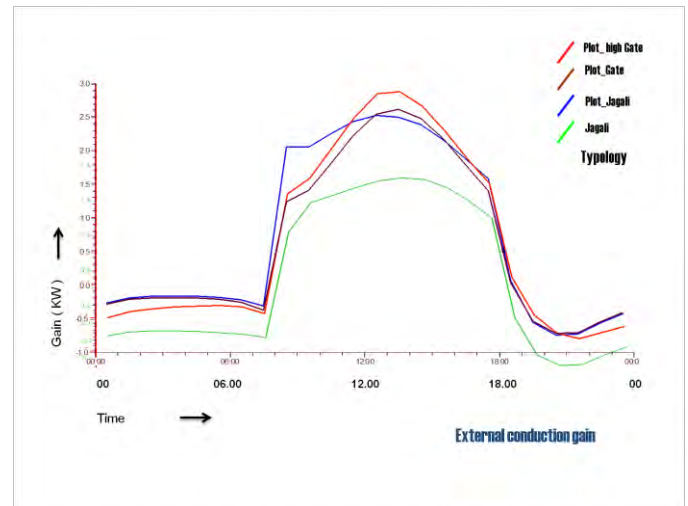


Figure 7. Conduction heat gain

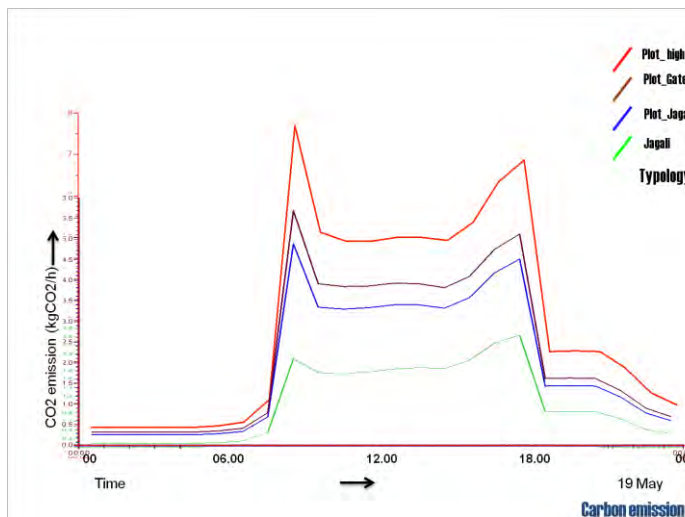


Figure 8. Carbon emission

The outcome clearly indicates higher conduction gain, cooling load, energy consumption and resultant carbon emission in plot and high gate typologies and consistently lowest energy consumption and carbon emission in the Jagali typology.

A key finding is one of increased energy consumption in model 4 representing the aspirational model. It uses nearly 65% more energy than model 1 (the Jagali typology). Similarly, there are differences in the performance of other models; for instance, in the case of energy consumption, the high compound typology (model 4) requires nearly 300% of more cooling load compared to a Jagali house typology (model 1). And even this will increase the conduction gain by nearly 90%. All the results are tabulated and compared in Figure 9.

| IES Simulation Result | | Typologies -> | | | |
|--------------------------|--|--|--|---|--|
| Parameters | General description | Model 1 Jagali Typology | Model 2 Jagali + Plot | Model 3 Plot + Gate | Model 4 Plot + High Gate |
| Energy Consumption / SMT | Energy consumed by electrical appliance are considered. To bring in uniformity, it is converted to SMT and all the models are compared to the base results of Jagali typology as 0 | Bench mark | 20 % of Jagali Typology | 35 % of Jagali Typology | 65 % of Jagali Typology |
| Cooling load | This simulation result accounts for the energy consumed to cool the internal spaces to comfort temperature of 23 degree. | Bench mark | 100 % of Jagali Typology | 200 % of Jagali Typology | 300 % of Jagali Typology |
| conduction gain | Window size is altered in each typology and with other construction materials being constant, the simulation result reflect the conduction heat gain due to size of the opening. | Bench mark | 58 % of Jagali Typology | 65 % of Jagali Typology | 90 % of Jagali Typology |
| Embodied Energy | Source of the material, energy consumed for the processing and transportation are considered to qualify the other simulation results. | Locally resourced material and construction system. Least materials imported from beyond 10 miles. | Most of the materials Locally resourced and few materials imported from beyond 10 miles. | Some of the materials Locally resourced and few materials imported from beyond 100 miles. | least of the materials Locally resourced and most of the materials imported from far distance. |
| Total energy consumption | it includes energy consumed due to electrical appliance, maintenance and cooling load. | Bench mark | 138% of Jagali Typology | 175% of Jagali Typology | 275 % of Jagali Typology |
| Carbon emission / SMT | Total carbon emission due to energy consumed due to maintenance and cooling energy. To bring in uniformity, it is converted to SMT and all the models are compared to the base results of Jagali typology as 0 | Bench mark | 20 % of Jagali Typology | 35 % of Jagali Typology | 65 % of Jagali Typology |
| Summary | | Most sustainable typology | Some of the features are sustainable | Some of the features are unsustainable | Least sustainable typology |

Figure 9. IES simulation output

The simulation output demonstrates that changed boundary conditions have implications for energy consumption and resultant carbon emission. They also validate the hypothesis while developing models that explore different boundary conditions (Figure 4 and 5). It also clearly points to a direct relation between peoples' changed preferences and aspirations and their implications for energy consumption and carbon emission.

Field Work

The main objective of achieving sustainable strategies within the existing middle class paradigm is achieved by contextualising the broad term of sustainability to Mysore condition on one hand and reflecting the acceptability of middle class home owners' preferences and acceptability on the other. The models prepared and simulations carried out reflect the local sustainability agenda and different levels of sustainability with specific reference to boundary condition. Further field work looked the aspirations of the middle class people and their willingness to align towards more sustainable features.

With the series of scenario models complete, a second series of field work was carried out during Feb – April 2011. Here the research is more focused on testing the acceptability and preferences of home owners by drawing on their feedback to these pre-defined models. The models were tested with home owners by semi-structured interview and with key stakeholders in the design and procurement process. To analyse the issues reflected in transition spaces, elements representing middle class aspirations and the sustainability agenda were identified, namely: Volume, Entrance, Opening, Security, Interaction and Skin.

To elicit preferences and log the choices of people, architects and builders, a 'multi sorting task' methodology was followed. As Groat (1982) has argued, it is possible for the participants either to sort representations of buildings they had experienced directly or pictures that functioned as simulations of the real environments. The models are deconstructed to highlight the element of investigation; for instance, while asking people about their priorities about openings / window size and location, views showing different window conditions were derived from the basic models and prepared so that the participants could reflect purely on the concerned issue and not be distracted by other elements in the images.

This technique is very helpful in this type of study as respondents are asked to place the cards from most acceptable to least acceptable. Once noted, they are given a briefing about sustainable issues in housing and how each model and typology reflects different energy and carbon footprints. Stakeholders are asked to place the cards again in the light of their understanding of the sustainable implications of their choices. Their preferences are noted and the implications of any change in the respondents' choices are ascertained.

This multi sorting process was validated through a semi-structured interview. Apart from noting their preferences, the process was recorded and interviewees were informally questioned as to their decisions.

Field work analysis, Discussion

The outcome of this second stage of field work addresses issues including social and cultural values and perception of key stakeholders towards middle income sustainable housing. The study can be broadly addressed at two levels; firstly, it deconstructs how various stakeholders perceive boundary and threshold in housing. The interview and survey assesses the choices and preference of a particular topology based on issues like, security, material, interaction etc. their choice of

most preferred and least preferred are further triangulated with the discussion during the process about the rationale behind their choices and why they think their choice is appropriate.

At second level, the study analyses how the peoples’ perception changes with awareness. The house owners are asked first to prioritise their preferences. Later after being given information on issues relating to climate change and sustainable housing, they are asked to again place their preferences. Feedback from stakeholders; architects, builders, contractors and home owners are analysed for each element identified namely; Volume, Entrance, Opening, Security, Interaction and Materials. Though there is a clear departure from the sustainable boundary condition, the outcome clearly reflects varied preferences among different elements identified. To summaries the field work results; two representative outcomes, Volume and Opening, are discussed below.

Volume

In the case of different Volume options, stakeholders strongly feel that the prevailing plot typology is most desirable followed by high gate typology preferred by more than 65% of home owners. The most sustainable, Jagali typology is the least preferred option (Figure 10). According to an architect interviewed, “Privacy, dust, vibrations due to vehicle movement, forces people to build house away from road” (respondent no.111, interviewed on 11 March 2011). One builder felt that privacy is a major concern and people would not prefer to build “their house on the street without privacy” (respondent no.109, interviewed on 10 March 2011). When their attention was drawn to well established Jagali typology, they feel there is clear deficit of trust among neighbours which is crucial for social / community living (respondent no.98, interviewed on 19 March 2011). Their strong preferences are evident while analysing their preferences after providing the information regarding sustainable concerns. Home owners’ revised preferences clearly reflect marginal decrease in the high gate typology, which is reflective of many unsustainable features and less than 10 % increase in the preferences for Jagali typology (Figure 10). Similar trend can be observed among other elements like, Entrance, and Security.

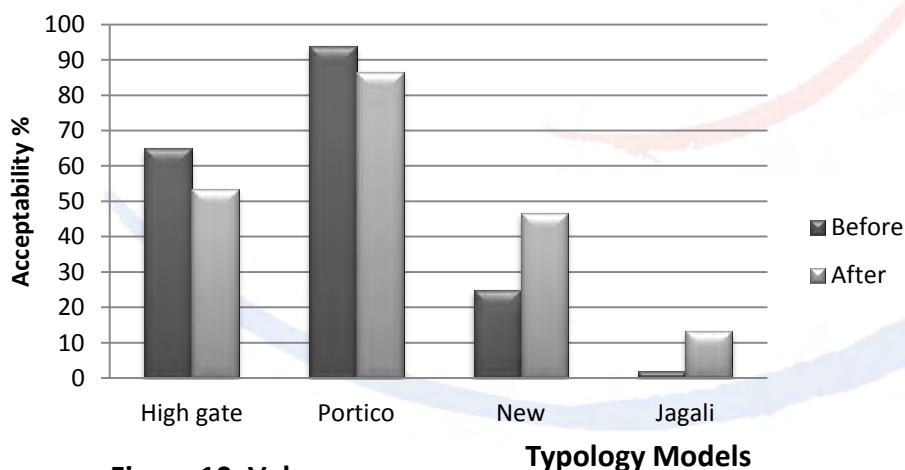


Figure 10. Volume

Opening

In the case of different opening options, stakeholders are divided among the wide, small and inward openings. Less than 10% of home owners prefer opening towards shared areas (Figure 11). According to one architect, changed social network and priorities makes this a least feasible typology (respondent no.76, interviewed on 09 March 2011). One builder posed a more practical

concern of flexible design and spatial organization means these two or four owners will have their own plans and may not match, unless built together and all buy into it (respondent no.115, interviewed on 13 March 2011). The concern and acceptability of the home owners are evident, while their preference for the wide openings are reduced to less than 5 %, their preference for small opening is increased by 20% (Figure 11). Similar trends can be found in case of Material choices as well.

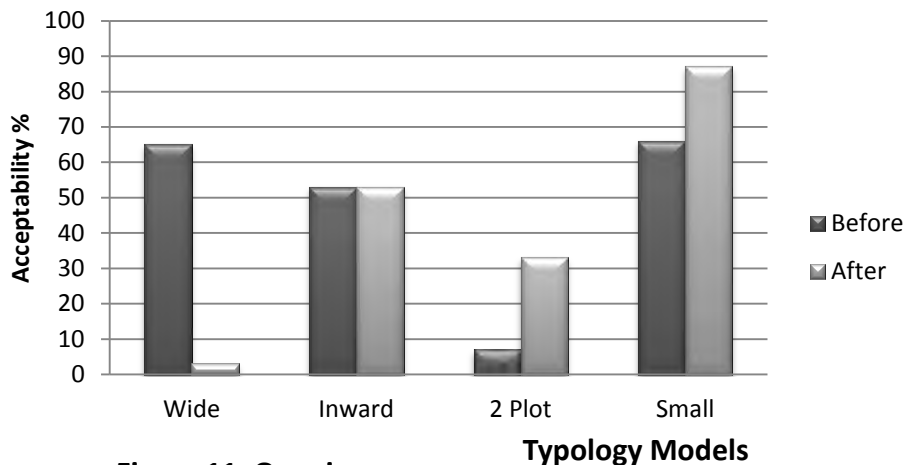


Figure 11. Opening

Analysis of these representative elements reflects the concerns and aspirations of the middle class home owners and also demonstrates variation in their preferences among different elements. The understanding of home owners' perceptions and expectations enables one to produce sustainable strategies which work within an existing middle class paradigm. The outcome of the field work could be summarised based on the level of acceptance of sustainable models and probability of aligning towards Sustainable Housing (Table 1).

| Field Work Reflections | | |
|------------------------|---|---|
| | level of acceptance of sustainable models | probability of aligning towards Sustainable Housing |
| Volume | Least | Negative |
| Entrance | Least | Negative |
| Openings | Most | Positive |
| Interaction | Moderate | Perhaps |
| Security | Least | Negative |
| Skin | Most | Positive |

Table 1. Summary of field work outcome

Choices and preferences clearly represent the area in which we can expect people to support and adapt to sustainable features. The feedback can be classified in to three types. First the elements which people are ready to change their preferences for the cause of sustainability, in this we can easily find the materials, skin and openings as two aspects which people are ready to align towards a sustainable agenda. There are certain elements for which they do not have very strong

preferences and to some extent are ready to align themselves. In this case people might consider some adjustment but are not ready to forthrightly support a sustainability agenda.

However when it comes to issues like security; people are not ready to compromise and would not be interested in sustainability issues and would not compromise on their perception of what is safe and secured for them. This study has been very useful in disentangling one area, the boundary condition and look at each element separately so as to identify people's choices and preferences resulting in the housing typology and hence resultant sustainable concerns rather than broadly summing up the boundary conditions as unsustainable in present context.

This study is also helpful in identifying the areas and elements where it is easier to achieve higher sustainable goals compared to areas where there will be higher resistance to change. Revising the model to suit both peoples' choices and sustainable agenda further tests this. Peoples' choices and preferences, collected by social methods, are fed into the IES simulation model to analyse the difference in the process of sustainable housing. To test this one model is altered to have optimum size windows which people would be ready to align with to achieve more sustainable housing.

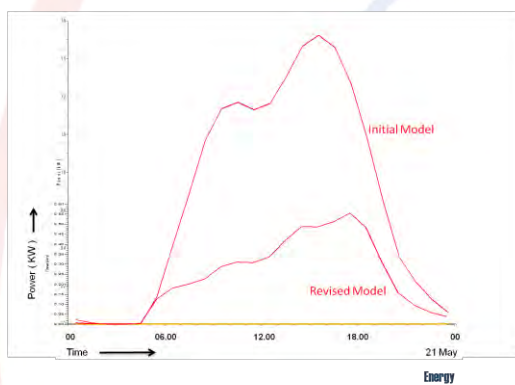


Figure 12. Post-field work: Energy consumption

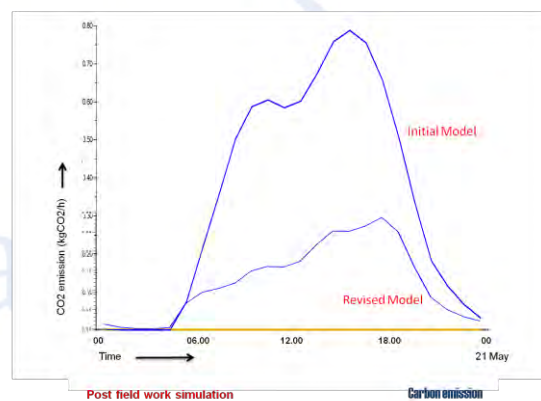


Figure 13. Post-field work: Carbon emission

The new IES simulation chart clearly shows a drop in the energy consumption of 40 % and thus a reduction in carbon emission. The changed window parameter has also reduced the conductive heat gain by 20 %. The results clearly show that, by changing the elements which people are ready to alter, we can reduce carbon emission by a fifth. This is significant because it is useful to know where we can really target and reduce emissions.

Conclusion

The study using survey field work and model simulations has highlighted the relatively recent shift in attitudes and cultural values relating to housing; from an inherently sustainable approach which valued shared spaces, local materials and communal activities, to one which reflects a move towards a twentieth century western approach; of individualism, nuclear families and consumer driven values. The study also clearly demonstrates that there are elements like materials and openings, which people are willing to align themselves with and that there are elements like security, which they would not compromise. Their immediate concerns would be of greater importance than the greater issues of carbon emission and sustainable housing.

The particular points are as follows:

This study has explored the people's attitudes and their implication for housing in India, particularly the people of Mysore. There are however specific factors which are unique to Mysore. For instance, for although aspiration to own a house is an Indian phenomena, middle class home owners in Mysore are particularly desirous of owning a plot and identifying their own territory.

Though there is a clear move away from sustainable living, the values of people can be recognised as being more than 40% ready to change their life style to align themselves towards more sustainable housing.

In the process of achieving more sustainable housing there are factors like security where the perception of the owners plays a crucial role. Though home owners are sympathetic to sustainable concerns, their fear and psychological concerns with regard to security and other issues like unorganised exterior spaces, stray animals and perceived lack of moral values in society has prompted the middle class home owners to define, identify their territory, and protect and insulate their boundaries.

Finally the revised IES simulations demonstrates that nearly 40% energy savings and carbon reduction could be achieved without altering peoples' preferences. Further reduction requires intervention at higher level; for instance to change the entrance and setbacks now prevalent. To achieve this regulations and legislation will have to be reworked. On the other hand concerns about security can only be addressed at regional and policy levels.

We have to acknowledge the need for people to express and accommodate their desire for upward mobility against a backdrop of complex class and caste structure on one hand and consumerist driven influences of the media and the west.

India has identified Housing as one of the eight national missions to reduce carbon emission as part of its commitment to reduce the vulnerability of the people to the impacts of climate change (NAPCC, 2008), this bottom-up approach to identify the sustainable strategies acknowledging people's needs and aspirations should be a useful contribution to achieving carbon reduction and sustainable housing.

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Mutating barriers around the sustainable built environment: a study of Mysore, India.

Post-independence architecture of Mysore City is governed by a version of a well-planned European model neighborhood, with highly defined ownership boundaries. This is in sharp contrast to the free flowing community ownership that existed pre-independence. This poster explores the effects of this imposition of boundary on sustainable neighborhoods.

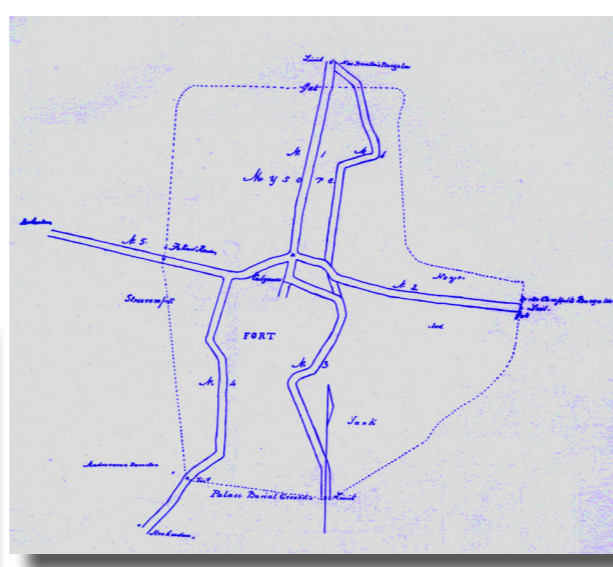
Mysore was a precursor of sustainable practices in the early 1900s. Changes in the political and administrative structures after independence (1947) radically transformed the development practices in India and specifically Mysore. Housing design in pre-independent India was based on vernacular architecture, featuring communal spaces, with inherent sustainable characteristics. The thick walls, small openings and multipurpose areas of these pre-independence buildings clearly demonstrate sustainable design practice. After independence came a move to more formal demarcated layouts, with each house featuring clear, identified spaces for different activities. Priority shifted from the community to the individual, and prevailing common spaces became obsolete. This poster illustrates that such a transition has negative consequences in relation to sustainable development.



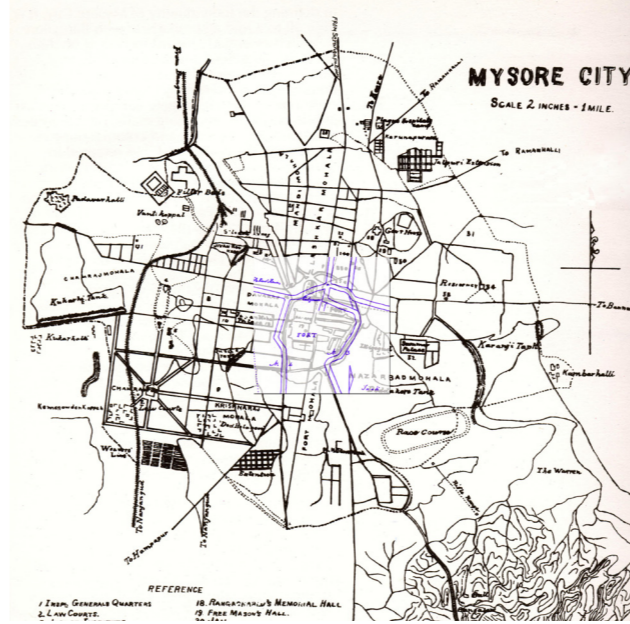
'Agrahara' row-housing, as seen by Mario Miranda.

The built environment of pre- and post-independent India has shown transient boundaries of sustainable practices.

The effects of imposition of boundaries (building regulations, prevailing practices) on sustainable neighborhoods of Mysore city is explored by using Indicators; regulation, design, construction, material and socio-cultural aspects.



Mysore: 1865



1902



1939



2011 (proposed CDP)

pre-independence

building design and construction:



Highly climate responsive Sustainable built environment.

Raised podium (jagali) acted as informal meeting place.

Internally, a central hall was used for multi purpose with court open to sky.

Thick mud wall (later brick), timber truss with terracotta tile roofing.



post-independence

The standard house design is a set of rooms with a clearly identified function for each space.

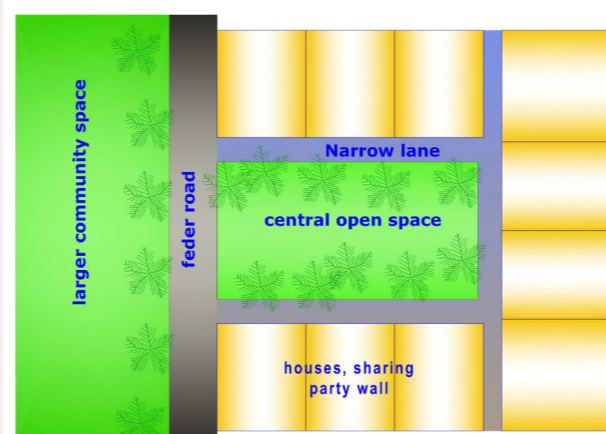
Well-lit and ventilated rooms overlook the open space left as part of the setback on each side of the site or plot.



Houses standing without any relation to each other and have moved away from the road.

Compounds demarcate the property of private individuals and open spaces.

planning and legislation:



There is a very thin line to differentiate the end of the road from the beginning of the house.

Jagalis overlooking the street had brought a sense of physical and psychological security to these spaces.

Agrahara (Typical Layout)

Residential layouts had evolved from the prototype of the Agrahara (small Brahman villages) that were prevalent 150-200 years ago.

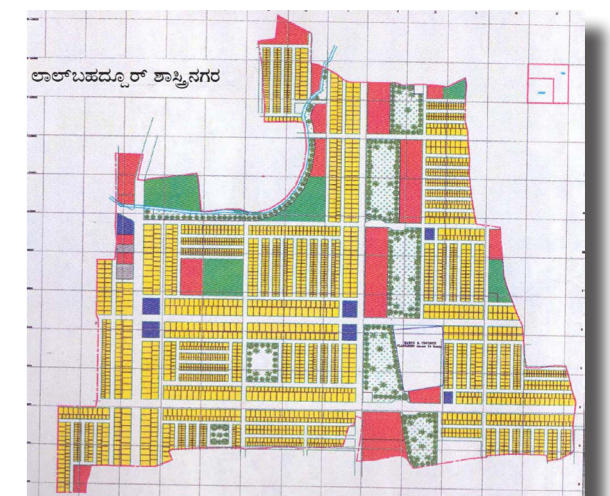
Residences were either linear with a shared party wall, or houses distributed around an open space.



Lalbahadur Shastrinagar (Typical Layout)

Economically driven layouts are developed as plots and in certain layouts model houses are constructed.

Roads, independent of houses, have pedestrian ways.



Layout is well worked out, with a hierarchy of roads, amenities and play areas.

Owners are allowed to build their individual houses based on the Bylaws set by the development authority.

| Type of Plot | Area (sq. ft.) | | Plot Ratio | | Floor Area Ratio (FAR) | | Floor Area Ratio (FAR) | |
|--------------|----------------|------------|------------|-----|------------------------|-----|------------------------|-----|
| | Plot Area | Plot Ratio | FAR | FAR | FAR | FAR | FAR | FAR |
| Plot 1 | 100 | 1:1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Plot 2 | 150 | 1:1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Plot 3 | 200 | 1:2 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Plot 4 | 250 | 1:2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Plot 5 | 300 | 1:3 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Plot 6 | 350 | 1:3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| Plot 7 | 400 | 1:4 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Plot 8 | 450 | 1:4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| Plot 9 | 500 | 1:5 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |

social and cultural:



Open spaces, Roads, and Jagali acted as interaction spaces and made the society interwoven and close-knit.

Jagalis, which are always in shade, were a perfect space for socializing and acted as a meeting area for the inhabitants.

People shared their leisure activities and entertainment with their neighbors in these informal spaces.

Consumer society in the driving seat: radical shift away from traditional values.

A society that is cosmopolitan and diversified has varied options for entertainment.



The movement away from extended families to nuclear families has also had a bearing on the need for social changes.

conclusion:

- Development regulations have become a barrier to creating a sustainable built environment.
- Regulations often come into conflict with ethical boundaries of sustainable practices.
- Earlier sustainable practices with in the built environment have been eroded by globalising imperatives.
- Moral and social responsibilities have to be accounted for while reconfiguring the boundaries of a sustainable built environment.

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Forthcoming Publications:

B K Satish, J Brennan and R Pedreschi (2013_ abstract approved) Significance of Boundary conditions towards sustainable housing strategies: a case study of Mysore, India. Journal of Engineering Sustainability, Proceedings of the Institution of Civil Engineers, London,
Abstract has been approved and writing up the final paper.

B K Satish, J Brennan. (2013) “Sustainable housing strategies for the growing Indian demographics: contextual study of Mysore, India”, Journal of Sustainability, Energy & the Environment. Invited during the ACSEE conference presentation, Osaka, Japan.
Paper accepted with minor correction (17th March 2013). Will submit the final paper soon.



Appendix D: Visual Observation

Mysore Palace



Mysore...

Local concerns



Mysore...



Security



Mysore...

New houses