

Mainstreaming Sustainable Social Housing in India Project (MaS-SHIP)

Stakeholder Dialogue 3



Venue: Development Alternatives, Conference Hall, New Delhi

Date: 6th November 2017

Introduction

The third stakeholder dialogue under MaS-SHIP was held on 6th November, 2017 at the Development Alternatives Headquarters in New Delhi, India. The stakeholder dialogue brought together the project team, developers, academicians, Government officials, and housing practitioners to share insights and knowledge on the status of affordable housing projects in India and the possibility in the use of alternative (in this case environmentally and socio-economically sustainable) building materials and construction technologies.

The objectives of the stakeholder dialogue-3 were to seek comments and suggestions on:

1. Insights from surveys conducted with home-owners, building material manufacturers and developers.
2. Methodology and mock test for assigning weights to the attributes.

Welcome remarks

The meeting began with welcome remarks by Ms. Zeenat Niazi (Vice President) of Development Alternatives (DA). Given the diverse background of all the participants, Ms. Niazi set the context of the workshop by highlighting the housing challenge that India will face. She spoke of the pressures on natural resources that have been created by the increasing growth in urbanization and as a result will not only lead to scarcity of resources but also severe lack of social-economic well-being of communities in addition to severe environmental degradation.

Elaborating on the table below, she discussed the different parameters of criticality that need to be considered while selecting different natural resources as raw materials of further processing and use.

Parameters → Resource ↓	Scarcity	Cost	Environmental Impact	Embodied Energy	Supply Risk	Lack of Recyclability	Opportunity cost / value / conflict of use
Soil	**	*	***	***	**	***	***
Iron	*	**	***	***	*	*	*
Limestone	*	*	***	***	*	***	**
Sand	***	***	***	***	***	***	***
Stone	**	*	***	**	**	***	***
Marble/Granite	*	*	***	**	*	***	**
Copper	*	**	***	***	*	*	*

Bauxite (Aluminum)	*	**	***	***	*	*	*
Petroleum (PVC)	*	*	***	**	*	*	*
Silica (Glass)	*	**	***	**	*	*	*
Wood	**	**	***	**	**	**	*

For instance some of the resources above such as soil, limestone, sand and stone while may be low on the cost parameter and thus cheaper to source; however the criticality of these resources is high when assessing them against their environmental impacts. In such a case, an informed decision should be made that map out the degrees of criticality against the defined parameters. This would allow for trade-offs to be made based on socio-economic and environmental concerns.

She went on to state the imperatives required in order to mainstream the use of greener materials that create lower environmental impacts and thus smaller ecological footprints. While research and development on new and alternate building materials need to be intensified, an important part of mainstreaming is building the technical as well as the financial capacities of the stakeholders in addition to setting specific standards and codes and the implementation of regulatory norms to ensure the use of these green building materials.

Finally, a short video was shown on the status of affordable housing in India, the issue of natural resource scarcity and the need to identify alternate solutions to the rising resource and housing challenge before India.

Mr. Paul Inman, Pro-Vice Chancellor of Oxford Brookes University then welcomed the participants and gave an introduction of the consortium of partners working on this project and the expectations from the workshop.

Project Progress

In this session Prof. Rajat Gupta from Oxford Brookes University introduced the project in detail and gave an update on the progress made so far. He explained that the project is aiming at producing two major outputs i.e., a Sustainability Index (SI) to evaluate building technologies based on attributes developed and a Decision Support Tool (DST) to enable selection of sustainable building materials and technologies in social housing projects.

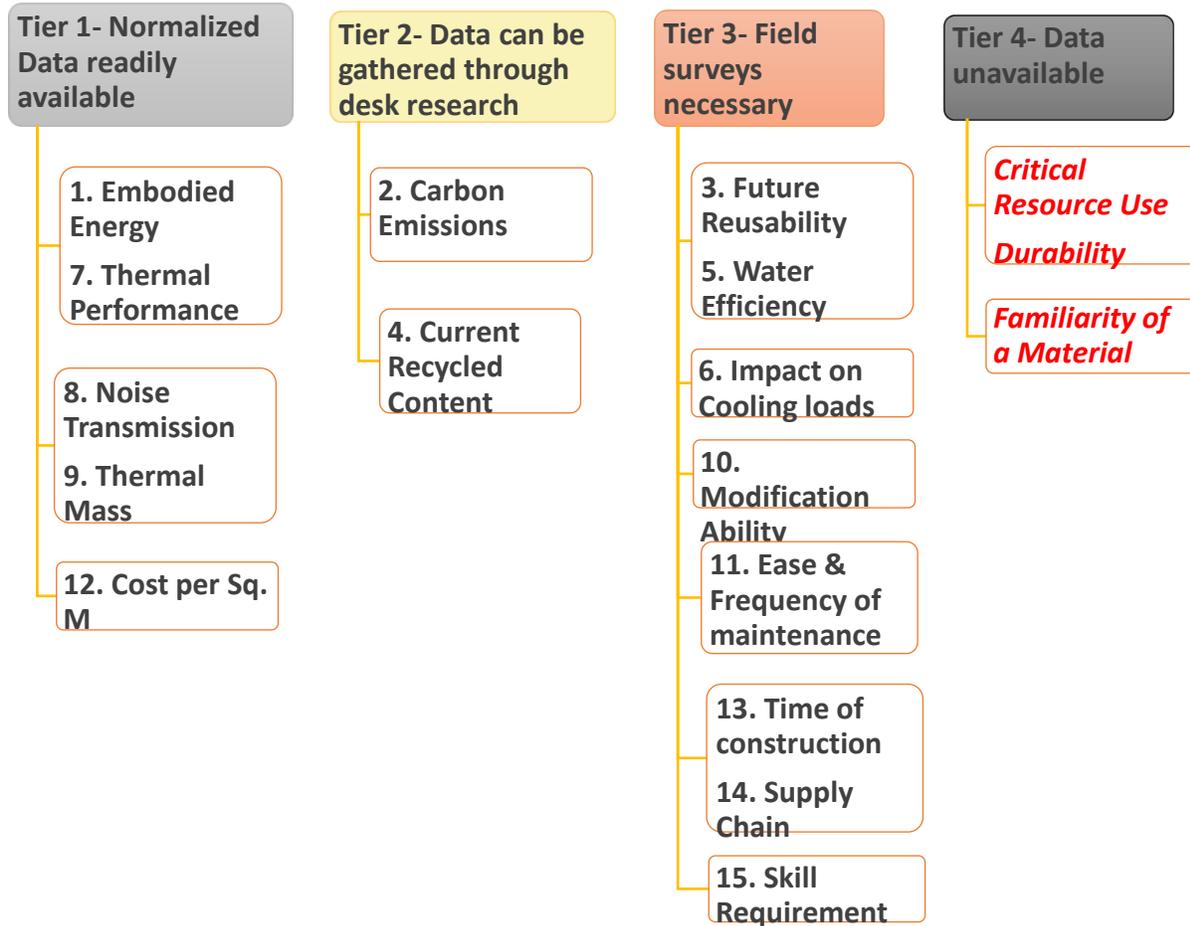
MaS-SHIP Sustainability Index

Ms. PreetikaVerma, Research Associate at TERI took forward the discussion on the premise of the sustainability index that will:

- Be developed built on a **multi-criteria decision support system**

- Provide the targeted beneficiaries with **evidence based performance information**
- **Aid decision making** in choice of building materials and construction technologies

She explained that the sustainability index will be developed based on attributes that address the dimensions of sustainability (social, economic and environmental). These attributes are aimed to help measure and calibrate progress towards achieving sustainable development.



She went on to explain the process of selection of the 15 attributes and methodology for data collection that will be adopted for each attribute.

Data collection

In this session, Ms. Preetika Verma (TERI) and Mr. Pankaj Khanna (Senior Advisor, DA) brought to the attention of participants the different data sources needed for building materials and technologies as against the selected attributes. Data sources were divided into Tier 1- Normalised data that is readily available, Tier 2 – Data collected through desk research and Tier 3- Based on surveys with concerned

stakeholders. While presenting data in reference to Tier 1 and 2 data that also stated concerns about the unavailability of published data related to building materials and construction technologies in addition to statistically invalid number of data points to quantify the available data sets.

Ms. Pratibha Caleb (Deputy Manager, Urban Research, DA) gave a detailed presentation on the survey results from the field, which included household surveys and intensive interviews with developers and manufacturers. She explained the process of selection of affordable housing projects and the selection of local survey partners to support in conducting household surveys a total of 750 households covering 5 housing projects across 5 States in India.

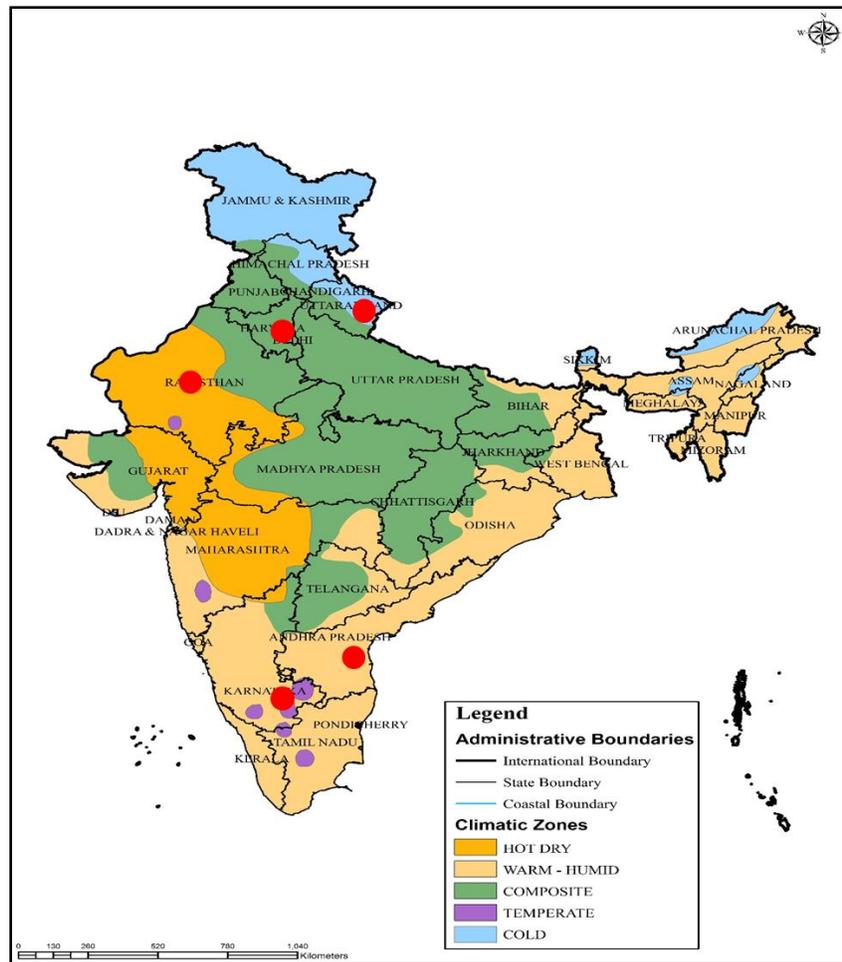


Figure 1: States selected for household surveys

The 5 housing projects and the local partners that were selected are indicated below:

City	Name of housing project	Local Survey partner
Jaipur	Kiron Ki Dhani	Jagannath University, Faculty of Architecture and Planning, Jaipur
Delhi	Bhawana Industrial workers housing	Vastu Kala Academy, College of Architecture, Delhi
Bangalore	Laggere slum rehabilitation	IMPACT School of Architecture, Bangalore
Dehradun	Bhagat Singh Colony	Dehradun Institute of Technology, Dept. of Architecture, Dehradun
Vijayawada	Jakkampudi Housing colony	Vaishnavi School of Architecture & Planning, Vijayawada.

Of these housing projects, a 150 household surveys were conducted at each housing site based on a key questions asked by the architectural students on household opinions on:

- 1) Thermal comfort of the houses (Summer and winter)
- 2) Coping strategies adopted for cooling and heating of homes.
- 3) Acceptance and familiarity with the building material
- 4) Objections against use of any building material/finishes
- 5) Dampness observed on the walls and possible causes of dampness

The surveys revealed interesting results on the thermal comfort of houses and the objections they had against certain building materials. The next phase of the project will now assess the results against different attributes applied to each building material and construction technology that is selected for the purpose of this project.

In the latter part of this session, Ms. Astha Saxena (Research fellow, DA) and Ms. Verma presented the results from the developer and manufacturer surveys.

In the case of developers' survey, questions asked to developers ranged from:

- 1) Choice of building material and technology and for which kind of housing projects
- 2) Reasons for selecting a particular building material or construction technology.
- 3) Quantity of water used in the construction process and the source of water supply
- 4) Resource criticality of raw materials used and the potential for reuse or recycle
- 5) Skill requirement for construction of these housing projects

Due to the small number of developers involved in construction of affordable housing projects and even lesser number of these developers use alternate and more sustainable building materials and technologies, receiving diverse and credible data from the developers' survey has been a challenge.

In a similar case with the manufacturers' survey, the market for production of more sustainable building materials and construction technologies continues to be small and thus statistically validity of data

collected is an issue. Further while the supply is limited, so is the demand, as a result of lack of awareness and familiarity and acceptance of the materials.

Methodology and Mock exercise

The session focused on the methodology for assigning weights to the attributes of the Sustainability Index for making holistic and informed decisions regarding choice of building materials and construction technologies. Socio-economic systems often face decision making with qualitative and intangible factors. More often than not in such cases it is the values, beliefs and perceptions that are the drivers of such decisions. Thus the key problem is to elicit systematic judgments from unstructured information.

In this session the logical reason for selection of the Analytic Hierarchy Process was demonstrated which was arguable chosen based on the characteristics given below:

- AHP is a **mathematical technique** for multi-criteria decision making.
- Complex problems or issue involving **value or subjective judgements** are suitable applications of the AHP approach.
- Because of its **intuitive appeal and flexibility**, many corporations and governments routinely use AHP for making major policy decisions.
- One of the major advantages of AHP is that it calculates **the inconsistency index** as a ratio of the decision maker's inconsistency and randomly generated index.
- Hence, AHP could be a useful tool in achieving issues involving **subjective judgements**.

The session concluded with a demonstration of the unbiased arrangement of the attributes in alphabetical order and the nominal ratio scale of 1 to 9 being adopted for assigning weightages to pair wise comparisons.

S. No.	Attributes	Scale									Attributes
		9	7	5	3	1	3	5	7	9	
1	Carbon Emissions	○	○	○	○	○	○	○	○	○	Cost per Sq. Metre
2	Cost per Sq. Metre	○	○	○	○	○	○	○	○	○	Current Recycled Content

Figure 2: Snapshot of the scale in the AHP methodology

A mock survey was conducted in this session, where participants were asked to do a pair wise comparison of the attributes, based on their own perception regarding the importance of a certain attribute in comparison to the other. Several questions were raised by the participants on the effectiveness of making such unrelated comparisons between attributes. However, through an assessment of one of the survey responses of one of the participants, the team was able to demonstrate

that this kind of unrelated pairing of attributes, ensured that consistency was maintained against the weightages assigned to each attribute.

Open Discussion

Defining social housing

During the open discussion, Dr. Anjali K. Mohan an urban and regional planner at the International Institute of Information Technology, Bangalore required a clarification on what is meant by 'nailability' as mentioned in the household survey questionnaire. The project indicated that the concept of nailability was often an aspect that is forgotten when developers choose a specific building material. Nailability refers to the ability of households to make interior changes to their homes, by either adding electrical points or hammering nails for hanging photo frames, bookshelves etc. The inability to hammer a nail in the wall, resulting cracks in the wall was a cause for concern by many households and was reflected in the home-owner surveys that were conducted. The human-centric aspect, i.e., taking into consideration end-users needs and their aspirations is often neglected by developers and was visible in our interactions with the households.

Another suggestion from Dr. Mohan was to define what was meant by 'Bearable' and 'Satisfactory' and ultimately how was the project team going to use this data.

Another point of interest to the participants was the mention that a considerably large number of households made bon-fires outside their homes as a coping strategies to survive the winter months. While it was considered a cause of concern that these could lead to fire hazards, it several participants on discussion came to the conclusion that the scope of making a bon-fire ensures that the households had common community spaces that helped build a sense of community values among the residents of the area. Mr. Manoj Misra (Architect) mentioned that with the Government prescribed rules of providing a minimum of 30sq m house for a single household under the EWS category, there is no scope for inclusion of terraces and small open spaces into the floor plans. Thus the idea of community space is slowly diminishing given the scale at which housing units are to be constructed and the land price and shortage issues faced by developers.

Data collection

Given 5 different states were short listed for data collection, Prof. Parul Kiri Roy (School of Planning and Architecture) sought details of the basis on which they were short listed. It was explained that the short listing was done on multiple criteria. States with maximum housing shortage were considered in each of the 5 different climatic zones. Subsequently those cities were visited where green building materials are used in occupied housing projects. Further, those projects were finally chosen that were built for EWS and had been occupied for atleast 2 years, post the handover of the housing units.

Ms. Purnima Verma (DIT Dehradun) pointed that the data collected on thermal comfort and condition of housing units was based on the households' reflections about a particular season in the year which would vary based on the location of the project. In the case of Dehradun, rainfall is a primary concern. Opinions on the building material and construction quality used would primarily be based on resistivity if these materials and techniques on withstanding torrential rains, floods, landslides etc.

Mock survey

The mock survey on ranking of attributes was conducted with the participants of the workshop. The outcomes of the mock survey were encouraging and highlighted various concerns of the participants that the project team would need to consider to refine their survey methodology.

Several participants mentioned that the format of ranking was difficult to understand, as the relevance of a certain kind of pairing of the attributes was not well understood. Further certain participants also questioned the rationale behind using the Analytic Hierarchy Process (AHP) for multi-criteria decision making, instead of any other multi-criteria decision making tool/process.

The Project team mentioned about the similar AHP methodology for assigning weights that has also been used by GRIHA in their variants. It was also discussed that the survey methodology used by GRIHA has been so far successful and thus has been a key criteria for adopting this methodology for the MaS-SHIP project.

Survey- Mainstreaming Sustainable Social Housing in India Project										
Name: T. P. SINGH			Date: 6.11.17			Profession: Consultant: Civil.				
			Extremely Important	Very Important	Moderately Important	Equal Importance	Moderately Important	Very Important	Extremely Important	
			←←←					→→→		
			Scale							
S.No.	Attributes	9	7	5	3	1	3	5	7	9
1	Carbon Emissions	○	○	○	○	○	○	○	○	○
2	Cost per Sq. Metre	○	○	○	○	○	○	○	○	○
3	Current Recycled Content	○	○	○	○	○	○	○	○	○
4	Ease & Frequency of Maintenance	○	○	○	○	○	○	○	○	○
5	Embodied Energy	○	○	○	○	○	○	○	○	○
6	Future Reusability	○	○	○	○	○	○	○	○	○
7	Impact on Cooling Loads	○	○	○	○	○	○	○	○	○
8	Modification Ability	○	○	○	○	○	○	○	○	○
9	Noise Transmission	○	○	○	○	○	○	○	○	○
10	Skill Requirement	○	○	○	○	○	○	○	○	○
11	Supply Chain	○	○	○	○	○	○	○	○	○
12	Time of Construction	○	○	○	○	○	○	○	○	○
13	Thermal Mass	○	○	○	○	○	○	○	○	○
14	Thermal Performance	○	○	○	○	○	○	○	○	○
15	Water Efficiency	○	○	○	○	○	○	○	○	○

Cost per Sq. Metre
Current Recycled Content
Ease & Frequency of Maintenance
Embodied Energy
Future Reusability
Impact on Cooling Loads
Modification Ability
Noise Transmission
Skill Requirement
Supply Chain
Time of Construction
Thermal Mass
Thermal Performance
Water Efficiency
Carbon Emissions

Giving Relative ratings is too taxing on the mind.
Possibility of wrong responses is higher.
If I can rate each of the 15 attributes individually on a scale of 10, it ~~is not~~ can be used to see my relative assessment.
But perhaps There's a logic in this too!

Figure 3: Sample of the mock survey filled-out by a participant

Additional parameters

Multiple points related to job opportunities were raised. It was repeatedly pointed out that for a building technique to become a vastly viable practice, it should incorporate creating jobs, as this is a major aspect of the construction industry. It has been able to give employment to the lower strata of the society. It was suggested that it should be added to the list of attributes.

Other comments

Throughout the discussion, the perspectives of various stakeholders were brought forth. Individual stakeholders were found to have deeply conflicting needs and pursuits. The essence remained that the biggest challenge of the industry is to be able to find measures that would enable holistic and sustainable growth for everyone involved.

Key learnings from the workshop

- Terms like 'nailability', 'satisfactory', 'bearable' etc. to be better defined for household surveys.
- Community spaces is an important aspect that has been neglected in the defining 'affordable housing' in the Indian housing sector. Specifications of floor plans do not include spaces for terraces or open community spaces.
- There continues to be a lack of credible data on the market (supply and demand) for green alternate building material and technologies.
- The green building material and construction technologies market is restricted to a small market of suppliers (this is in reference to the scan conducted on the existing manufacturers for the 16 emerging technologies recommended by BMTPC) and consumers (results of the developers survey indicated the use of such material only by those aiming for a green building accreditation).
- The construction sector is one of the largest employers in the country. For a holistic view of sustainable social housing, it is essential that the aspect of 'job creation' be considered as a key attribute to assess the choice of building material and technologies.
- Similarly, 'criticality of material', i.e., factors such as environmental impacts, resource scarcity, supply, price fluctuations, will be crucial in determining the choice of building materials and technologies, given a specific location and context.
- DELPHI exercise could also be used to collection information from developers, on their perceptions on use of green building material and technologies.

Vote of Thanks

Ms. Zeenat Niazi (DA) extended her gratitude for the valuable insights and feedback provided by all the participants of the workshop. She added that the team would sincerely keep in mind the suggestions and feedback and incorporate them into the project, to increase the relevance and enrich the value of the project further.



Figure 4: Group photo

Annex 1

List of participants

Name	Organisation
Mr. Kondal Rao	Andhra Pradesh Urban Finance & Infrastructure Development Corporation
Dr. Dasari Rayanna	SNPUPR
Ms.C. S.Vedamani	Samarasa
Mr. Promod Adlakha	Adlakha Associates Pvt.Ltd
Dr. Ushalyer-Raniga	RMIT University
Mr. ManojMisra	Manoj Misra& Associates
Mr. Anuj Mehta	Anuj Mehta & Associates
Ms. Anjanli K Mohan	Consulting Urban and Regional Planner, Bangalore
Mr. TanayJaithalia	Aadyaakaar& Ashok B Lall architects
Mr. Anindya Kumar Sarkar	Architect and Urban Planner
Ms. Piyali Bandyopadhyay	CPCB
Mr. Satprem Maïni	Auroville Earth Institute UNESCO Chair Earthen Architecture
Dr. Sandeep Raut	Town and Country Planning Organisation, MoUD
Dr. Ruchita Gupta	School of Planning and Architecture
Ms. Purnima Verma	DIT, Dehradun
Mr. Arnab Gazi	B3B Group
Mr. Frank Amrit	Independent architect, Dehradun
Prof. S. Samuel	IGNOU
Prof. Parul Kiri Roy	School of Planning and Architecture
Mr. T.P. Singh	CRT

Mr. P.K. Duria	TPO
Mr. Hitesh Vaidya	UN-Habitat
Mr. Paul Inman	Oxford Brookes University
Dr. Rajat Gupta	Oxford Brookes University
Ms. Shabnam Bassi	TERI
Ms. Preetika Verma	TERI
Mr. Pankaj Khanna	DA
Ms. Zeenat Niazi	DA
Ms. Gitika Goswami	DA
Ms. Astha Saxena	DA
Ms. Srijani Hazra	DA
Ms. Eesha Bajaj	DA
Ms. Pratibha Caleb	DA

Annex 2

Agenda

09:30-10:00	Registration
10:00-10:15	Welcome Remarks Introduction to ‘Sustainable’ housing and material resource efficiency <i>Ms. Zeenat Niazi, Vice President, Development Alternatives</i> Opening remarks <i>Paul Inman, Pro-VC, Oxford Brookes University</i>
10:15-10:30	MaS-SHIP Project Progress <i>Prof. Rajat Gupta, Director (Oxford Institute for Sustainable Development: Low Carbon Building Group), Oxford Brookes University, UK</i>
10:30-10:40	Introduction to Sustainability Index (SI) <i>Ms. Preetika Verma, Research Associate, Centre for Research on Sustainable Building Science (CRSBS), TERI</i>
10:40-11:00	Secondary data collection & Benchmarking <i>Mr. Pankaj Khanna, Senior Consultant, Habitat Solutions, Development Alternatives</i> <i>Ms. Preetika Verma, Research Associate, Centre for Research on Sustainable Building Science (CRSBS), TERI</i>
11:00 -11:15	Primary data collection – Homeowners, Developers and Manufacturers <i>Ms. Pratibha Caleb, Deputy Manager (Urban Research), Development Alternatives</i>
11:15-11:30	Tea Break and Group Photo
11:30-11:45	Insights from Homeowners survey <i>Ms. Pratibha Caleb, Deputy Manager (Urban Research), Development Alternatives</i>
11:45-12:30	Insights from Developers & Manufacturers survey <i>Ms. Astha Saxena, Research Fellow, Development Alternatives</i> <i>Ms. Preetika Verma, Research Associate, Centre for Research on Sustainable Building Science (CRSBS), TERI</i>

12:30-13:00	Methodology & mock test for assigning of weightages to the attributes <i>Ms. Preetika Verma, Research Associate, Centre for Research on Sustainable Building Science (CRSBS), TERI</i>
13:00-13:15	Open Discussion <i>Moderator-Mr. Hitesh Vaidya ,UN-Habitat Country Manager, India</i>
13:15-13:30	Vote of Thanks <i>Ms. Zeenat Niazi, Vice President, Development Alternatives</i>
13:30 onwards	Lunch