

# Weaving Sustainability Into Affordable Housing : Anna Builders

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## Abstract

Anna Builders has been building affordable housing units since 2000. Founded by Mr. Venu, who is taking forward his late father's vision of housing for all, Anna Builders has till now handed over 30,000 sq. m. of built up space aimed at the first time buyer and user. Mr. Venu had recently attended a seminar organized by CII and the Indian Green Building Council (IGBC) to educate small and medium builders regarding the benefits of building with eco-friendly materials which had got him thinking. The case traces his dilemma in striking a balance in the affordable housing sector between the green building norms and the base line profits of the company. Will he be able to do it?

**Keywords :** Affordable housing, builders, cost analysis, ecofriendly materials, IGBC, low cost housing, responsible marketing, sustainability.

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On his way to his cabin, Mr. Venu, M.D. of Anna builders looked around his office and noticed for the first time that most of the wood work was crafted from recycled wood from his ancestral house which had stood in the same spot as the office in T. Nagar, one of the commercial hubs of Chennai. He smiled to himself as he remembered his father who had built the office building in the early 80s and had the foresight to integrate *sustainability* into its structure.

Even though Anna Builders were into typical real estate construction, they had been building affordable housing units since 2000. Initiated by Venu, who is taking forward his late father's vision of housing for all, Anna Builders has till now handed over 30,000 sq. m. of built up space aimed at the first time buyer and user. Venu had recently attended a seminar organized by CII and The Indian Green Building Council (IGBC) to educate small and medium builders regarding the benefits of building with eco-friendly materials which had got him thinking. He had asked his consumer insight team to gather relevant information regarding green buildings and hoped that the meeting would help him make some decisions.

An ever increasing population is the bane and boon of India. In order to accommodate this population, there has been a significant increase in housing infrastructure. It seems that the higher income group of the population has been well catered to, while the majority is left out. The cost of construction for low-income housing has to be looked into to provide for majority of the population. The overall shortage in Economically Weaker Section (EWS) and Low Income Group (LIG) housing in India was estimated to be close to 2.65 crores (26.5 million) dwelling units as per the report on Indian Urban Infrastructure and Services (2011) published by government and is expected to touch 3.8 crores (38 million) by the year 2030. According to Ablett, Baijal, Beinhocker, Bose, Farrell, et al. (2007), it was estimated that

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by 2015, India would have 106 million households (aspirers) with annual income levels between ₹ 1,70,000 to ₹ 3,80,000 (at 2011 prices, index basis CPI for industrial workers). It can be expected that at least a third of these households would be potential customers for new small affordable housing units given the unsatisfactory state of housing for this segment of society. This translates into a market of 35 million housing units. Various measures like Indira Awas Yojana, state-run Housing Schemes, and others have been formulated to tackle this problem.

## **Affordable and Sustainable Housing**

The United Nations (2000) stated, “We must spare no effort to free all of humanity, and above all, our children and grandchildren from the threat of living on a planet irredeemably spoilt by human activities, and whose resources would no longer be sufficient for their needs.” The outcomes of the UN World Summit 2002 (United Nations, 2002) assumes a collective responsibility to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development - economic development, social development, and environmental protection at the local, national, regional, and global levels. This can be looked at from the perspective of housing for all.

Worldwide, the United Nations Environment Programme has sought to promote sustainability in affordable housing as the main theme of Sustainable Social Housing Initiative (SUSHI). As a part of this, pilot projects have been conducted in Bangkok and Sao Paulo, Brazil, which have provided great insights into sustainable housing solutions in the affordable housing scheme, and have also succeeded in bringing out criteria for sustainable housing as applied to affordable housing. In case of India, the green real estate footprint has been growing exponentially from 0.02 million square feet in 2004 to over 23 million square feet of green space, but it is primarily in the retail and high end group of residences (Mayank, Ganesan, & Gupta, 2011).

Affordable housing is usually referred to in economic terms. Most of the times, the definition of affordable housing only takes into account the initial costs excluding the maintenance cost required to sustain the life cycle of the building, but a comprehensive definition should take into account sustainability also. It is recognized that one of the major factors of environmental disruption is construction, and therefore, there is a need to reduce its impact in different ways (Field & Field, 2009). Ideally, the design and materials in a building should be such that they reduce the environmental impact as well enhance the factor of affordability.

Any bid for affordable housing should reflect emerging societal expectations which were captured in the Habitat Agenda of the United Nations Conference on Human Settlements, Habitat II, held in Istanbul, Turkey in June 1996. It outlined the determination of national governments to meet global challenges for human settlements via five main strategies for action, such as adequate shelter for all, sustainable human settlements development in an urbanizing world, capacity building, institutional development, international cooperation and coordination, and the implementation and monitoring of the Habitat Agenda.

According to Watermeyer (2004), sustainable and affordable housing should look at all these factors:

- (a) Adequacy in terms of accessibility.
- (b) Affordability throughout the life cycle.
- (c) Health and safety.
- (d) Thermal comfort.
- (e) Vulnerability to natural disasters.
- (f) Employment potential, including potential for poverty relief and employment.
- (g) Energy efficiency in cooking, heating, cooling, hot water consumption, and energy use.
- (h) Biodegradability and non-noxiousness of demolition waste, embodied energy, recyclability, and renewability of construction materials.
- (i) Sanitation options

(j) Water use and savings in terms of appliances and fittings and site, and design interventions such as permaculture, rain water harvesting etc.

Taking into account these factors, it can be seen that a sustainable housing definition should be framed such that it includes the provision for affordable shelter without the harmful effects on the environment. This description should be applied to all the different stages of housing as planning, design, construction, and maintenance of the whole housing unit. It has also been proved that green or sustainable buildings use key resources like energy, water, materials, and land more efficiently than buildings that are just built to code. Green buildings are also seen to contribute to improved employee and student health, comfort, and productivity (Kats, 2003). Sustainable housing or ecofriendly housing also minimizes the energy requirements of building materials as well as further maintenance (Buys, Bailey, & Barnett, 2004).

## **Green Buildings in India**

In India, the Green Rating for Integrated Habitat Assessment developed by The Energy and Resources Institute (TERI) has been taken as the national rating system for green buildings by Government of India in 2007. GRIHA is a tool to facilitate the design, construction, and operation of green buildings in India, which in turn measures the 'greenness' of a building. It was estimated that at the end of 11th Five Year Plan, approximately 7.5 million sq. m. of built up space was registered to be GRIHA compliant. In recent times, TERI has also devised a rating system for built up areas of 2500 sq. m. or less, called SVAGRIHA (Small Versatile Affordable GRIHA). This is a rating system for small stand-alone buildings, such as, residences, commercial offices, and schools. With the SVAGRIHA rating, a project can achieve a maximum of 50 points based on its design performance in 14 criteria, which are further classified into five groups including energy, water, waste, materials, and landscape.

During the past several years, many real estate developers in India have significantly improved their execution capabilities, and have adopted sustainable and environmentally friendly development practices. At the same time, home buyers in India have become more quality conscious, and now prefer residential products built according to global standards. To meet this growing demand for high-quality homes, several developers have incorporated sustainable development capabilities into their operations. Mr. Venu started reading up on the main rating agencies available in India.

**(1) IGBC LEED :** The Indian Green Building Council (IGBC) has adopted LEED (Leadership in Energy and Environmental Design) standards from the U.S. Green Building Council, with several appropriate modifications for India-specific conditions. Residential projects are typically certified according to silver or gold LEED standards, rather than the more intensive platinum level that is typically used in class A office projects to attract multinational and credit tenants.

**(2) TERI GRIHA :** GRIHA is an acronym for Green Rating for Integrated Habitat Assessment. GRIHA attempts to quantify aspects such as energy consumption, waste generation, renewable energy adoption, etc. so as to manage, control, and reduce the same to the best possible extent. TERI (The Energy and Resources Institute) took the responsibility of popularizing green building by developing a tool for measuring and rating a building's environmental performance in the context of India's varied climate and building practices. This tool has been adopted by the Ministry of New and Renewable Energy (MNRE).

**(3) BEE ECBC :** The Energy Conservation Building Code (ECBC) was launched by Ministry of Power, Government of India in May 2007 as a first step towards promoting energy efficiency in the building sector. It is estimated that the nationwide mandatory enforcement of the code will yield considerable annual energy savings. This, coupled with the fast growing building sector, is likely to result in a big leap towards achieving the nation's energy efficiency roles.

**(4) NBC :** The National Building Code of India (NBC), a comprehensive building code, is a national instrument providing guidelines for regulating building construction activities across the country. The code mainly contains

administrative regulations, development control rules, and general building requirements, fire safety requirements, stipulations regarding materials, structural design, construction (including safety), and building and plumbing services.

## **Insights From the Field**

As Venu entered the room, the consumer insight team headed by Nagappan stood up to share the findings. The team had tried to understand why there was no conscious effort to integrate eco-friendliness into the construction of various units to cater to the low-income housing segment. Data was gathered from five cities of Chennai, Bangalore, Hyderabad, Pune, and Nagpur in India. It had taken more than a month to travel to all cities, contact the architects who had then given references to others who were aware of and had used or started to use eco-friendly materials. Nagappan joked that in the hot summer, they were using a statistical method called 'Snowballing technique' to contact interviewees. The five stake-holders who were identified were:

- (i) Builders
- (ii) LEED AP (Leadership in Energy and Environmental Design Accredited Professional) architects registered with IGBC (Indian Green Buildings Council)
- (iii) Government authorities
- (iv) Rating agencies
- (v) Vendors

## **Eco - Friendly Materials Recommended**

Nagappan said that they had calculated the composite score of availability, affordability, and environment benefits of eco-friendly materials based on mean values of respondents' observations and the percentage of respondents who recommended the material (Appendix A). He highlighted the following as eco-friendly materials usable in low cost construction.

- (1) Fly ash bricks were easily available and very much affordable. The builders were aware of its benefits. They also recognized this as a valuable product while considering the need to re-use fly-ash generated in thermal power plants, instead of dumping them into landfills.
- (2) Recycled wood and steel were easily available and very much affordable. While the builders were aware of the benefits of using recycled materials, they did not use them as customers did not prefer these as they perceived recycled material to be of lower quality.
- (3) Low VOC paints were available and affordable as well. As per the builders, all the major paint manufacturers were concentrating on low VOC paints which were supposed to improve indoor air quality and hence, the occupants' health.
- (4) Water efficient fixtures like low flow fixtures and dual flush cisterns were popular. They were very easily available and highly affordable.
- (5) Sewage Treatment Plant: The upfront costs in implementing was high. The builders were aware of the benefits and savings in maintenance.
- (6) Water meters were available, though these were perceived to add 'extra cost' to the project. The builders were skeptic about recommending water metering for low cost projects.
- (7) Rainwater harvesting was quite prevalent and even mandatory in states like Tamil Nadu and Maharashtra. Builders unanimously recommended rainwater harvesting as it could be implemented at relatively little cost.



(8) Domestic waste segregation was popular among builders. It was observed that this could be implemented at very a little cost by providing multi-color bins for collecting various types of wastes.

Most builders agreed that it was important to reduce construction waste and they were taking measures to achieve it. While most builders agreed that UPVC windows and doors were better than aluminum alternatives in terms of thermal efficiency, there was no converging evidence across cities in terms of affordability. The state governments had been influential in keeping intact the greenery at the construction site. Builders were aware of the need and were following regulations in this regard. For example, the Government of Maharashtra had a mandatory requirement that 80 to 90 trees had to be planted at the site before environment clearance could be given. Most of the builders had taken measures to preserve the top soil and create pavements to prevent soil erosion as the cost involved was not much.

Majority of the builders did not follow any green ratings. They did their business under conventional ratings only (Appendix B). Of those who followed green ratings, majority of them followed the IGBC LEED standard. The Ministry of Environment and Forests, Government of India had taken the lead to drive the cause for sustainable buildings. TERI had the SVAGRIHA, a simplified version of GRIHA rating, aimed at evaluating small buildings for minimum green compliance. Ministry of Environment had started to consider a fast-track environment clearance for buildings that received GRIHA pre-certification. SBI provided 0.25% concession on buildings that were GRIHA certified.

## **Factors Influencing Low Cost Housing**

Nagappan was quite enthusiastic about the survey finding that the builders interviewed during the survey had stated that the low cost housing solutions were apt for customers whose monthly income was ₹ 15,000 and above. All the respondents agreed that the biggest expenditure in building a house was the cost of land (Appendix C). Hence, if the location was chosen well, cost could be reduced considerably. Mass construction using locally available materials was recommended. It was observed that reducing the total construction time would help in optimizing construction costs. Further, proper planning and designing could be taken up, which included using low cost techniques that did not require specialized labor, and mechanization of construction processes.

From the interviews it came out that the deciding factors in implementing a low cost housing unit were a combination of location and selection of land, price of the apartment, and total construction time among others as shown in Appendix C. It was seen that the typical low cost house had an area of 350 to 800 sq. ft. In cities, 1BK (one bedroom plus kitchen) or 1BHK (one bedroom plus hall plus kitchen) houses could be built and sold for ₹ 7 Lakhs and above. The builders assured a life-span of 50 to 75 years for the low cost houses they built (Appendices D, E, F, and G).

## **Bringing Sustainability to Site**

As the team completed the presentation, Venu remained pensive. He thought, “in order to completely restructure our operations focusing on sustainability, I need some more clarification.” He asked Nagappan to work with the Heads of Finance and Marketing to further discuss the following:

- (i) What would be the approximate increase in construction costs provided Anna Builders used the materials listed by green building norms?
- (ii) Would a typical low-income customer of Anna Builders (affordable housing segment) able to afford the units which used eco-friendly materials?
- (iii) Could marketing help Anna Builders promote the use, and acceptability of eco-friendly materials
- (iv) What were the other challenges that could surface while making and marketing these units to the end customer?

## Teaching Note

**Case Synopsis :** Anna Builders had been building affordable housing units since 2000. Founded by Mr. Venu, who was taking forward his late father's vision of housing for all, Anna Builders had till now handed over 30,000 sq. m. of built up space aimed at the first time buyer and user. Mr. Venu had recently attended a seminar organized by CII and The Indian Green Building Council (IGBC) to educate small and medium builders regarding the benefits of building with ecofriendly materials which had got him thinking. The case traces his dilemma in striking a balance in the affordable housing sector between the green building norms and the baseline profits of the company. Will he be able to do it?

## Teaching Objectives

This case has the following learning objectives:

- To identify the options associated with integrating sustainability into affordable housing.
- To identify the escalation in cost and affordability of integrating sustainability and affordable housing.
- To familiarize students with eco-friendly materials available for affordable housing.
- To make students aware of the need for responsible marketing.

## Target Audience and use of the Case

The case can be used in postgraduate management courses or executive programs to bring forth the concepts of sustainability in low-cost housing and understanding the economics associated with it. It can be used to illustrate calculation of unit costs as well as to understand consumer behaviour while analysing various factors involved in consumer decision making process. No prior course work regarding both the subjects is necessary to appreciate the key concept discussed in this case. Case questions may be handed out in advance so that the class discussion can be guided through questions, and taken forward through qualitative and quantitative data given in the case.

## Teaching Approach and Strategy

The following questions are suggested for a 90 minute class:

- (1) What would be the approximate increase in construction costs provided the materials listed by the green building norms are used? (30 minutes).
- (2) Would a typical low-income customer of Anna Builders (affordable housing segment) be able to afford the units which used eco-friendly materials? (20 minutes).
- (3) Can marketing help Anna Builders to promote the use of eco-friendly materials? (20 minutes).
- (4) What are the other challenges which might surface while making and marketing these units to the end customer? (20 minutes).

## Analysis

**(1) Sustainable and Responsible Marketing :** Marketing remains an important intermediate function between production and final consumption. Kotler (1984) describes marketing as a social process by which individuals and groups obtain what they need and want through creating and exchanging products and value with others. Definitions for marketing have evolved with the changing products, processes, and market economies. The American Marketing Association (AMA) itself has over the years adopted changes to the definition of marketing. In 1985 marketing was

considered from a 'process' perspective. The revised definition of 2004 brought to focus the importance of marketing as an 'organizational function' which benefits the organizations. In 2007 it was redefined to recognize marketing as a means of 'communication' that had value for all the stakeholders. The debate has grown in recent times to encompass issues of ethics in business communication so as to promote a more sustainable form of living. This brings to focus sustainable marketing, that which promotes environmentally friendly approach.

Through sustainable marketing focus would need to shift towards what happens after the individual or business consumes the product rather than be fixated on the production processes and pre-sales position alone. Hence, it positioning of the product is vital (Murphy, 2005). It becomes critical then that the market mechanisms are used such that environmental costs are integrated into the products' costs and prices. The future of sustainable marketing while being dependent on the technological choices and on engineering practices need to be sustained through ethical choices.

Adoption of societal marketing practices helps organizations to be beneficial to society as a whole but also helps make long-run profits. However, not many organizations would want to take it up as it does not show or yield immediate profits (Abratt & Sacks, 1988). However, as newer technology comes into the market, paving way for better products, it becomes imperative to follow the 'responsibilities framework' in marketing (Hunt, 2007).

**Q1.** What would be the approximate increase in construction costs provided the materials listed by green building norms are used? (30 minutes)

**Q2.** Would a typical low-income customer of Anna Builders (affordable housing segment) be able to afford the units which used eco-friendly materials? (20 minutes)

Questions 1 and 2 are to be taken up together. The answer derived in Q1 helps in deriving the cost of the dwelling in Q2.

The discussion in the class is built on the differences in cost of construction. Here in the case, the costs derived are for a scenario which is sustainable and eco-friendly. To introduce the questions and the subsequent discussion, the class may be asked to collect data from the local market. The grid below helps in comparing the modes of construction. The class is then asked to try to calculate the unit costs for each of the cells.

		Use of Materials	
		Conventional	Eco-friendly
Construction method	Traditional (Not strictly adhering to sustainable practices)	Cost 1	Cost 2
	Sustainable	Cost 3	Cost 4 (derived in Q1 & Q2)

**Answer 1 :** Considering the cost of all the eco-friendly materials that can be used in place of conventional materials which are already being used, Table 1 shows that the difference in cost between use of red bricks and fly ash bricks is ₹ 15,100/-, which is a savings of nearly 53%. Table 2 shows the cost calculations for implementation of sewage water treatment and rain water harvesting which is already given in the case. Table 3 shows the cost (increase/decrease) due to recommended Green Building Materials.

**Answer 2 :** Based on the survey data, the average income of the low income housing (LIH) group is about ₹15, 000 per month. The maximum affordable price is taken as 5.1 times the annual income. The plinth area is taken as 330 sq. m. as per HUDCO standard.

**Table 1. Cost Comparison for Red Bricks vs Flash Bricks**

Material	Requirement	Size of brick	Price / unit	Cost for 330 sq. ft.
Red bricks	22 per sq. ft.	230 x 110 x 70 mm	₹ 4	₹ 28,600
Fly ash bricks	2.75 per sq. ft.	400 x 200 x 150 mm	₹ 15	₹ 13,500

**Table 2. Cost of Water Treatment and Rain Water Harvesting****(1) Cost of Passive sewage water treatment**

For 1000 people cost is ₹ 50,00,000/- (approx.) (data from WSUP Bangalore NGO)

Total number of people : 1000 households \* 3 persons/household = 3000 persons

Total cost = 1.5 crores

Cost per house = 1,50,00,000/1,000 = ₹ **15,000/-**

**(2) Cost of Rain water harvesting**

For 1000 residents : ₹ 4.5 Lakhs (www. rainwaterharvesting.org)

Cost per residence = ₹ **450/-**

**Table 3. Cost (Increase/Decrease) due to Recommended Green Building Materials**

<b>Material</b>	<b>Cost Increase per Flat</b>
Fly ash Bricks (53% savings)	(-) ₹15,000/-
Recycled materials	On par with conventional material
Low VOC Paints	On par with conventional material
Low flow fixtures	On par with conventional material
Dual flush cisterns	On par with conventional material
Sewage water treatment	₹ 15,000/-
Water metering (assuming 1 meter per flat)	₹ 1,500/-
Rainwater harvesting	₹ 450/-
UPVC windows/doors	On par with conventional material
CFL	On par with conventional material
LED (assuming 10 - 40W bulbs per flat)	₹ 9,000/-
Domestic waste segregation	Negligible difference in comparison to conventional material
Construction waste reduction	None
Bio-diversity	Negligible difference in comparison to conventional material
Soil erosion measures	Negligible difference in comparison to conventional material
Solar water heater (market rate)	₹ 18,000/-
<b>Net cost increase per flat</b>	<b>₹ 28,950/-</b>

The availability and cost of land accounts for the major component of the construction cost. So, here we have considered Oragadam, an area in Chennai's developed industrial belt with over 22 fortune 500 companies (of which six are global car manufacturers). The Sriperumbudur-Oragadam belt has seen tremendous industrial growth in the past few years. It is seen that the need for affordable housing in this area has picked up, and there is land availability also. The land cost here is ₹ 500 per sq. ft.

It is clear from Table 4 that it is possible to provide affordable and sustainable house to the LIH customer. A 330 sq.ft. dwelling will cost ₹ 8, 79, 030. It can be made available at an EMI of ₹ 5, 886 per month. The only constraint seems to be the land cost. This can be overcome by choosing the location wisely (land to cost no more than ₹ 500 per sq.ft.).

**Q3.** Can marketing help Anna Builders promote the use of eco-friendly materials? (20 minutes)

**Answer :** As can be seen in the case discussed, there is clearly a need to pursue sustainable practice. When Anna Builders wishes to reach out to his numerous customers, the emphasis can be on *societal marketing* as given by Kotler. This can be further discussed in the *responsibilities framework* when trying to further disseminate the knowledge about



**Table 4. Summary Unit Cost Calculation for Affordable Home in the LIH Segment**

Details	Value (₹)	Source
LIH annual income	1,80,000	Monthly income @ ₹ 15,000 * 12 (as per survey)
Max. affordable flat price	<b>9,15,000</b>	LIH Annual income * 5.1 (as given by HDFC)
Price affordable per sq. ft. (approx)	2,800	Flat price/plinth area
Average construction cost (conventional)	1,200	www.magicbricks.com
Number of dwellings	1,000	Assumption
Required building space (sq.ft.)	3,30,000	Number of flats * plinth area per flat
Floor Space Index	1.5	CMDA norms
Required land (sq.ft.)	2,20,000	Building space/fish
Total land cost	11,00,00,000	Land cost per sq. ft. (₹ 500 * 220000)
Total construction cost	39,60,00,000	Construction cost per sq. ft. * building space
Total cost	50,60,00,000	Land + construction cost
Overheads @ 20%	10,12,00,000	Assumption (to include lift, lobby)
Total cost	60,72,00,000	
Builder loading @ 40%	24,28,80,000	Assumption
Total selling price of 1000 units	85,00,80,000	
Per unit price	<b>8,50,080</b>	
Net cost increase due to eco-friendly materials	<b>28,950</b>	
Revised per unit price	<b>8,79,030</b>	
Home loan 80% of value	<b>7,03,224</b>	Assumption (max loan allowed 85% of value)
LIH buyer's affordable EMI	<b>6,000</b>	40% of monthly income
Payable EMI	<b>5,886</b>	HDFC EMI calculator - assuming 9.5%, 30 years

ecofriendly materials among various stakeholders. It can be clearly seen that this becomes imperative where there is technical competence to decide on pricing, promotion, product development, market segmentation, and channels of distribution among others. This part of class discussion makes it very interesting and animated participation was seen among students when they see that there is a need for integrating marketing for land development among others. This has a direct bearing on the economy, and the various market mechanisms.

Under the responsibilities framework, one can also discuss the issue of inclusion among the various kinds of consumers across various income levels to use and accept eco-friendly materials. There is a general sense that rain water harvesting and solid waste disposal practices are only for the higher income groups. The unit cost analysis shows accessibility to all sections of people. It breaks down the exclusivity principle of a product for pricing purposes. The case also highlights the need for clarity and communicability among all the producers themselves. It is seen that developers in all cities are not uniformly aware of all the eco-friendly materials coming into the market. So, knowledge sharing becomes a vital ingredient in the entire process for overall development.

**Q4.** What are the other challenges which might surface while making and marketing these units to the end customer? (20 minutes)

**Answer :** Once the cost components have been discussed, the students would be able to comprehend the extra costs associated with the construction techniques and materials associated with sustainable housing. After the cost analysis, now the discussion can be taken forward to the availability of these materials locally. Once they identify the local sources, they would realise that it is one of the major challenges in sustainable housing construction. Further discussion on this topic will lead to the conclusion that the use of sustainable materials will have to be decided on a case to case basis depending on the economic, climatic, and awareness level of the region, and also the availability of skilled labour

necessary for certain techniques involved.

When we look at the marketing of sustainable housing units using recycled materials, the main problem is that these are perceived to be of higher cost than conventional materials. Another problem which crops up is cultural orientation due to which people believe that recycled materials are not auspicious. Especially, for the lower income group first time buyer, he would not like to spend his hard earned money on a house made of materials which have been used before.

As the class discussion progresses, it can be found that the students themselves would question the durability and thereby, effectively the quality of some of these materials would be questioned. Breaking these two beliefs would be the major stumbling blocks in marketing these units to lower income buyers.

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## Feedback

This case in a managerial economics or entrepreneurship class serves the purpose of understanding unit cost analysis. It also brings to fore the way market mechanisms work and how profits are adjusted by using the principle of exclusivity of a product. When studying consumer behaviour, the importance of culture and beliefs get highlighted. While some beliefs may be generalised, some seem to crop up while discussing a first time purchase of a dwelling unit. Furthermore, regarding the players in the realty market, further information was researched by the student groups to establish the lead players, competitors, followers, and niche players. The existence of cartel behaviour for pricing of 'affordable housing units was much appreciated. Students were able to identify with the social practices that play a great role in the realty sector. This brings to fore the need for a marketing team which is well-prepared to convince funders to help good development projects. A good marketing plan becomes essential to convince consumers as well.

Students were able to identify with the protagonist and help make affordable housing units for the low-income group to enable Anna Builders carve a small niche in the severely competitive construction industry.

## Limitations and Scope for Further Research

The case was built on a limited field survey in a few cities of India. There is need to cover more number of cities and

towns in the country for further understanding of affordable and low cost housing. Also, it is seen that the number of construction projects following green norms is limited. Further studies need be taken up to understand methods which can help customers understand this market better.

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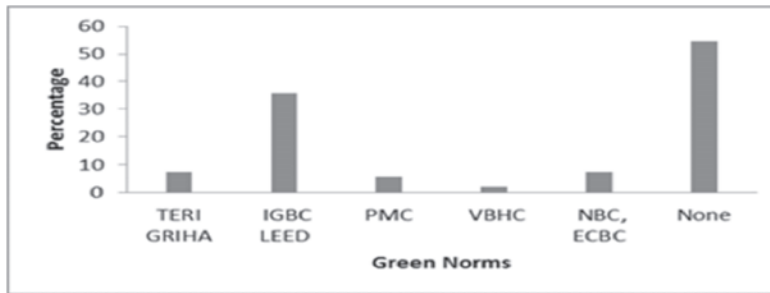
## Appendix

### Appendix A. Eco-friendly Materials For Low Cost Housing Solutions

Eco-friendly Techniques	Solutions in Use as per Survey
Materials, products, and technologies	Fly ash bricks, materials with recycled content
Water efficiency	Rainwater harvesting, water efficient fixtures
Energy efficiency	CFL/LED lamps
Waste management	Domestic waste segregation, construction waste reduction
Site conservation	Soil erosion prevention, bio-diversity conservation

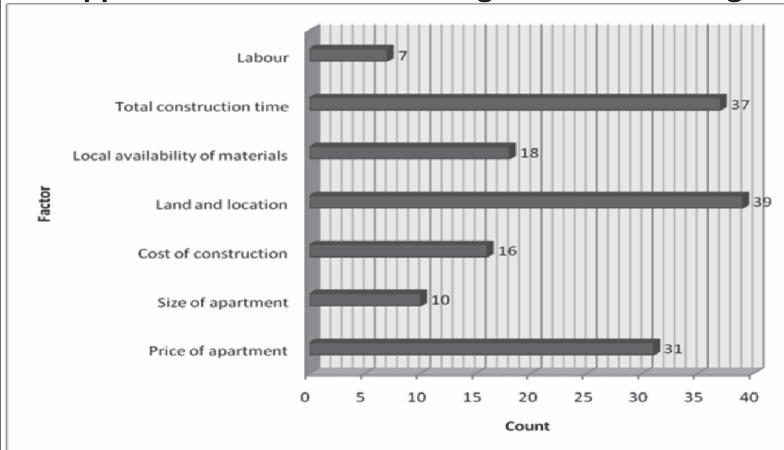
Source : Tholath and Indira (2013)

### Appendix B. Percentage of Green Norms Followed



Source : Tholath and Indira (2013)

### Appendix C. Factors Influencing Low Cost Housing



Source : Primary data

### Appendix D. Assumptions Regarding Recommended Green Building Materials

Material	Comments
Fly ash bricks	53% savings
Water metering	Assuming 1 meter per flat
LED	Assuming 10 numbers of 40W bulbs per flat
Solar water heater	Market rate

Source: Primary Data



#### Appendix E. Cost Comparison For Red Bricks Vs Fly Ash Bricks

Material	Requirement	Size	Price	Cost for 330 sq. ft.(₹)
Red bricks	22 per sq. ft.	230 x 110 x 70 mm	₹ 4	28,600
Fly ash bricks	2.75 per sq. ft.	400 x 200 x 150 mm	₹ 15	13,500
				<b>Savings of ₹ 15,100/- (53%)</b>

Source : Primary Data

#### Appendix F. Passive Sewage Water Treatment Using Decentralized Wastewater Treatment Systems (DEWATS) : Cost

₹ 50,00,000/- (approximately) according to WSUP Bangalore NGO for 1000 people

Total number of people = 1000 households \* 3 persons/household = 3000

Total cost = 1.5 crores

Cost per house = 1,50,00,000/1000 = ₹ 15,000

Source : Primary Data

#### Appendix G. Rain Water Harvesting - Cost

₹ 4.5 Lakhs for 1000 residents according to rainwaterharvesting.org

Cost per residence = 450

Source: Primary Data

### About the Authors

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