CHAPTER 4:

GREEN BUIDINGS IN PUNE: CURRENT STATUS

4.1 Introduction

Green Building footprint is seen to be at stake for implementation of major square footage that needs to be addressed on priority in the city of Pune. Green buildings have been the key element towards saving of energy along with many intangible benefits throughout the life of the building. The study is an attempt to explore the hindrances that are restricting the stakeholders towards going green in totality and identify opportunities to curtail these hindrances. A attempt to understand constraints and prospects and involve the designer's intervention towards the cost as one of the prime hindrance is made. The study used diverse methods of inquiries which were intended to address diverse aspects required for detailed investigation.

This chapter is aimed to explore a clear, detailed and realistic picture of the opportunities, resources, challenges and barriers regarding the issue of green buildings in the city of Pune. The methodology relied upon the consumer-focused research addressing about the issues in hand with both quantitative and qualitative methods to investigate individual attitudes, reactions, behaviors and preferences of the stakeholders. The data collection methods included the structured surveys and personal interviews developing a communication loop with relevant agencies.

The first part of the investigation is the situational analysis based on the concept of formative research informed from social marketing research where the overall process and analysis of the exploratory study are presented. The second part includes the design of the tools and the methodology in stepwise manner for all the stages of inquiry. The further part refers to the context of the study while the major findings are included in the last part of this chapter that guided the next step of the research.

An argument materialized in the course of pragmatic study where cost emerged as a prime hindrance towards green buildings which was further analyzed with a case study method with in depth cost impact analysis of green certified buildings from the residential sector. The findings from this chapter guided the further study and integrated to formulate the further methodology which is presented in the next chapter.

4.2 Findings from Step I: Communication

The data regarding green residential building is explored from various documentary sources and was supported with structured interview with 5 representatives from green certification authorities one from each namely IGBC, Griha, LEED – EDGE and Eco Housing. The main findings are as follows:

Green certification programs:

The Indian Green Building Council (IGBC) was formed in 2001 as a part of the Confederation of Indian Industry (CII). IGBC initiated the Green Homes rating system and started building the footprint base in Pune region. The trend of project registration has been found stable initially for IGBC rating system while increased registration observed after the notification from the environment clearance committee providing green channel advantage.

In year 2013 the green homes version 1 was replaced with the upgraded version 2. Both the versions show major difference in terms of the parameter and are not comparable. Few projects that were registered under version 1 were shifted to version 2 for final certification. This study includes projects under version 2 as version 1 was not applicable anymore.

Griha rating system initiated in year 2007 by TERI and made a firm hold for green rating particularly for the government projects. Pune's private sector started adopting the Griha rating system anticipating the benefit towards the rebates offered from Pimpri Chinchwad Municipal Corporation (PCMC) to promote the green buildings. Further green channel advantage added in the process for pre certification as per the notification from MOEF

which resulted in an increase in registration for green rating in the PCMC region of Pune with few projects in Pune Municipal Corporation (PMC) region.

Eco Housing Certification Program was a joint initiative taken up by Pune Municipal Corporation and Science and Technology Park, University of Pune with the intend to ensure environmentally sustainable construction in year 2005. Under this Pune Municipal Corporation could secure many projects to undergo the rigorous certification comprising of 100 points with 88 criteria and proposed rebates. There were many projects registered and provisionally certified with Eco Housing but no data is available post 2013. 16 projects were reported to be finally certified till 2014 but the details were not available.

Trend of Rating Systems

With the interest to increase the green building footprint across the country, various certification mechanisms have been developed and recognized by the Government of India. The process involves three major steps out of which two – registration and final certification are mandatory while the third step of pre certification is optional. The first step is the registration of the project which involves payment of registration fees with basic information of the project where tentative date for inception of the project as well as the completion date is to be specified. It is followed by precertification process where the project proponent needs to submit the project's design intends. The pre certification received is generally used to demonstrate the project benefits to the potential buyers by the developers. The final step of project is final certification which is to be obtained after completion of the project.

Currently IGBC and Griha ratings were found operational in the study area as they are preferred by the stakeholders. Both the systems are voluntary in nature which provide various benefits in terms of rebates and additional FAR / FSI. Projects need clearance from the environment committee which is a mandatory compliance. The applicability of the mandatory compliance depends on the scale of the project. It was stated that during the period of 2012 – 13 there was 12 to 15 months waiting time for obtaining clearance. To solve the situation pre-registered projects under IGBC, LEED or Griha were given preference for presenting their cases as per MOEF committee notification. As a result

many projects from medium (area ranging from 2 lakh sq. ft to 5 lakh sq. ft) and large typology (area beyond 5 lakh sq. ft) were got benefit and obtained pre certification from the respective rating systems.

Fee Structure: The applicable fees for both the rating differ in terms of the stages of payment. IGBC includes a process of registration with a fixed amount towards pre certification fees. The final certification fee that is based on the area is to be paid at the occupancy stage of the project. A pre-certification fee for registration and pre certification is much less than the final certification fees.

Griha rating includes payment of 100% fees payable based on the area of the project at the starting stage. If the developers wish to take green channel advantage with MOEF they have to pay a small lump sum amount in addition to the basic fee. There are no fees to be paid on the completion of the project. It was noted that more number of developers were opted for IGBC rating system as compared to Griha as it need less investment while advantages offered were more or less similar.

PMRDA region of Pune realized a major IGBC registered footprint and pre certified availing the advantage of green channel with MOEF. It was further noted that some of the pre certified projects used the logo of IGBC and mention precertification for sales promotion however did not continued the process towards final certification.

The analysis indicated that the city of Pune has the highest registered **residential** green footprint in the country where largest number of rating systems followed which include IGBC Pune Chapter, Griha, Eco Housing and EDGE, 2016.

Under IGBC rating it has footprint of 243,242,589 sq. ft which is second largest after Mumbai as recorded in December 2015 which currently it is over 245 million sq ft. (IGBC Pune Chapter, 2016).

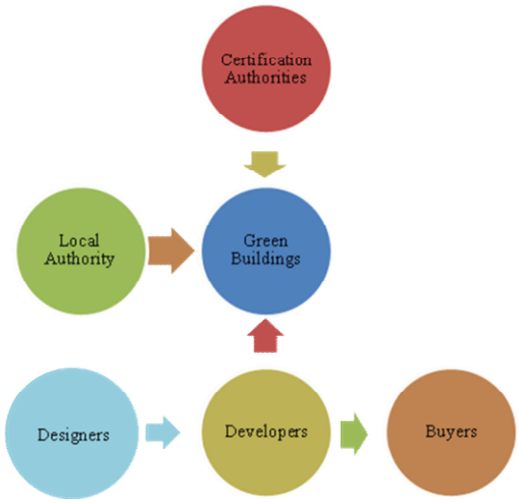
Current Status of projects pursuing green certification:
To find out details about residential projects in process of certification under IGBC and Griha rating system data was collected from October 2012 till June 2016. Data was updated every 6 months with the help of emails, telephone as well as the status for the

green rating scenario was discussed with the authorities from time to time. The information obtained was proved instrumental for conceptualizing the next steps of these research major findings are as follows:

- Numbers of registered projects were365 where 106 were due for final certification as per the anticipated date during registration. **Out of 106, 36 opted for final certifications which are considered for analysis in this research.**
- For many projects the prescribed time limit for obtaining certification was over and there seems to be no assurance about the continuation of the certification process.
- The unprecedented delay makes it difficult for the developers to collate data for submission for final certification.
- Projects that are intending to go with Final certification with aspiration for rebates have faced the decline in the attempted rating or anticipated points. 75% of the cases certified with green ratings have received the lower rating than the pre certified rating or the aspired rating.
- A major issue identified was implementation of green parameters during construction for labour health and sanitation and soil erosion and control measures.
- Another crucial factor was maintenance of the green projects in future to satisfy the parameter that is compliances for operation and maintenance.
- It has been noticed that many projects registered for green rating but eventually opt out of the system due to ambiguity with the rebates and extra unforeseen charges.
- IGBC and Griha rating systems found to be maximum use as compared to other systems. Newly introduced rating systems find their way in the city but at a very slow pace as they face **acceptance issues** anticipating delay for project registrations.
- The registration for two rating systems – IGBC and Griha were found stable since the initiation of the rating system but realized a great leap for project registrations with the **notification** from the EC committee for fast track processing for green

pre certifications which was supposed to help to curtail time required for compliances.

- Analysis revealed that, the **Municipal tax rebates** giving monetary gains to the developer and the advantage to the end user supported the process of registration for green certification. It indicated that the degree of green certification was proportionally linked with the **tax benefits** which help in encouraging the stakeholders go for certification process. Based on discussion and interview data with experts, influence maps for the study were developed to find out the dominant parameter over the subject placing the subject at the center of the map. These influence maps were based on the model referred from J. Gittelsohn's work (2006, 2008, 2010, 2012).



Major heads that have an influence on green certification process were identified in order to determine the focus for further study. The relationship obtained as a result of various discussions is depicted in fig no 4-1 showing the direct and indirect correlation with the subject heads.

Figure 4-1:Influence Map for green buildings

Source: Author.

Channels of Influence related to green buildings are identified for context of Pune region.

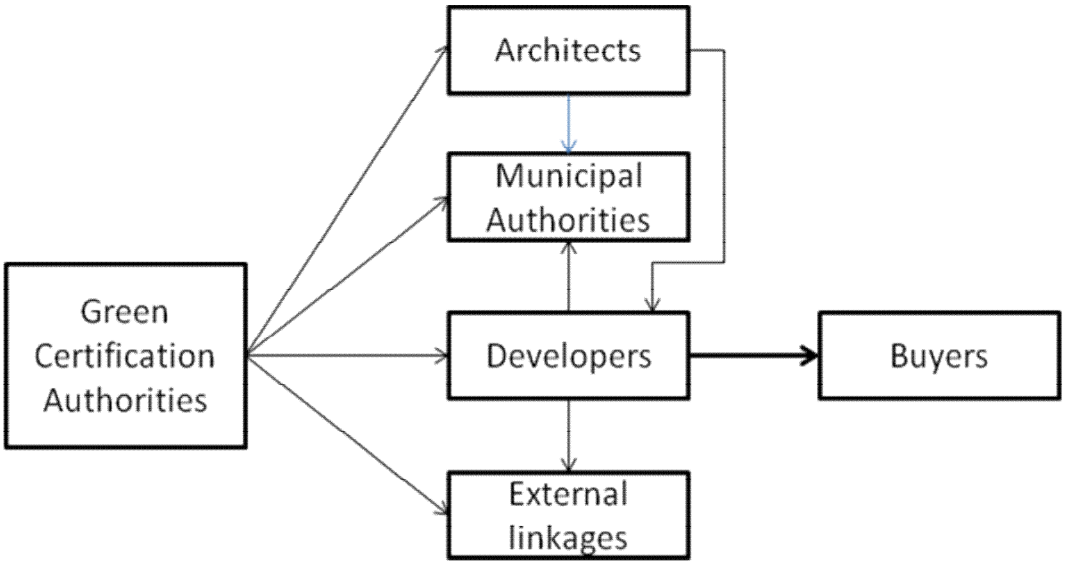


Figure 4-2: Channels of Influence for green movement

Source: Author

The figure 4-2 depicts the channels of influences between various related authorities and stakeholders and describes connect and influence between different agencies that channelize the green building movement in the work stream for Pune region (Amnesty International 2004

As per this green certification authorities are placed at the most influential place with reference to green building movement. At the second level of significance there are developers who are under the influence of architects. The developers are the sole influence for the buyers. The green certification authorities also influence the municipal corporations and other external agencies that are connected to the developer stream.

Power mapping diagrams were derived for the various stakeholders and their inter relation. The diagrams were based on 'The Change Agency Power mapping (2010) that focused on determining the influence of different stakeholders regarding the campaign related issues for the Pune region.

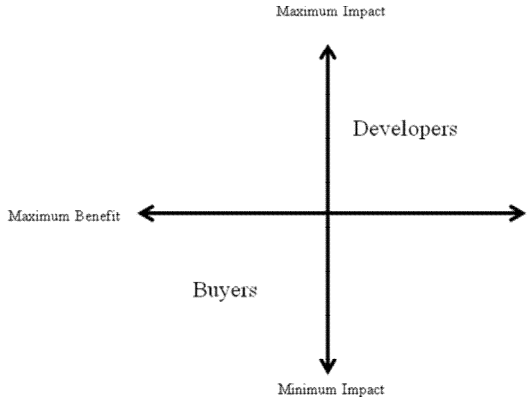


Figure 4-3: Power map determining green building benefits and impacts for stakeholders

Source: Author

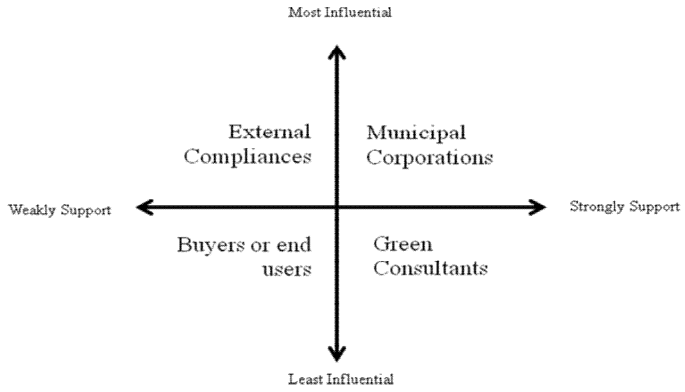


Figure 4-4: Power map determining green building influences for stakeholders

Source: Author

The figure 4-3 depicts the power map for the stakeholder impacts of green buildings on developers and buyers. It can be noted that developers are in the axis for maximum impact and minimum benefit while the buyers are on the axis for minimum impact and maximum benefit. The figure 4-4 depicts the power map for green building influences with all major stakeholders that drive the developers to adopt green practices. It can be noted that the statutory compliances are the most influential ones. The green consultants are not very influential but are strong supporters of best green practices. The least influential and the weakly supported group remain of the buyers. As per this if the buyers change their point of view, they can influence the developers to go green on a large way. The developers and buyers are mutually influential stakeholders and their awareness and pro environment behaviour can change support enhancing the green footprint.

Analysis

The data analysis was done on the basis of the information received from the certification authorities that showed a consistent trend of registration with both IGBC and Griha ratings in the city since 2012. The analysis was stretched a year back and the noting was made since 2011 to understand the pattern of registrations. The data was collected for the period of 3 years and eight months with 7 updates approx from each authority during October 2012 till June 2016.

Pune has been one of the most promising destinations for real investments (which have observed a steady growth in last two decades. The total demand for urban housing in Pune is estimated at 4.2 million units during the period of 2016 to 2020 across top eight cities in India. The city has been showing a steady demand for LIG and MIG housing compared to HIG as 80% of the housing demand is driven by LIG and MIG in Pune where largest share is of MIG housing. Another typology that is 1 Room -Kitchen and 1BHK is also found but less in number mostly located in the outskirts of the city (Cushman & Wakefield 2016).

4.3 Major Observations regarding Pune city as a case:

Green certification: Findings regarding Current status of green certification are presented in the following section

85 to 90% Projects registered projects were completed and occupied but not able to obtain final certified for various reasons.

Probable factors affecting the certification were identified as:

- Time of construction with respect to the generic hindrances
- Changing usage pattern resulted because of changes in bye laws.
- Market recession.
- Availability of Labour and other resources
- Certification and review time required.

- Typologies other than residential show 45 to 50% certified projects against registration. While about 35% anticipates a delay and only 15% of the projects show refutation to the rating.
- Referring to IGBC rating system since October 12 to June 16; city of Mumbai shows an average trend 36 % certified projects for Green Homes (Residential typology of certification) where it was 12.75% in Pune on an average.

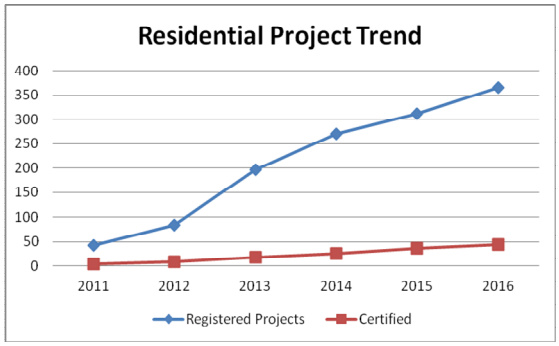


Figure 4-5: Residential project trend

Source : Author

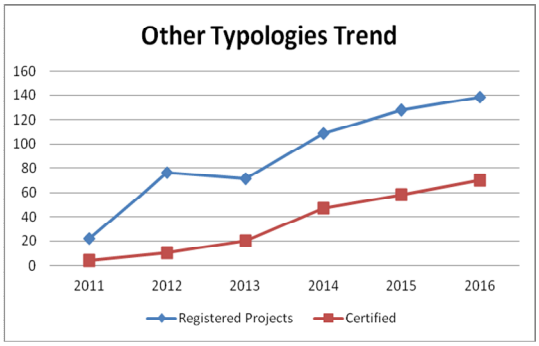


Figure 4-6: Other typologies trend

Source : Author

- For commercial projects higher response was noted towards final certification which generally used as the unique selling proposition (USP) to increase real estate value particularly in multinationals establishments. The trends in registration and certification for residential and other typologies with green certification authorities is presented in figure no. 4-6
- Trend for green certification in residential sector shows a major slow down with final certification and a gap is being realized between the registration and final certification as presented in figure no 4-5

Typology and Rating system choices

The number for project registrations is comparatively higher for the residential projects than other typologies. The number of registered projects was in the ratio of 5: 1 where 5 residential projects were registered against 1 project with all the other typologies. The final certified projects ratio was noted to be 1: 4 where 1 residential project final certified against 4 other typology projects.

- The registrations for the residential typology MIG and HIG was found more as compared to LIG.
- It has been found that the registration trend differs slightly for IGBC and Griha certification. The number of projects registered with IGBC is noted

to be higher in the city while Griha projects have shown a concentration in PCMC region (figure no 4-7 and 4-8).

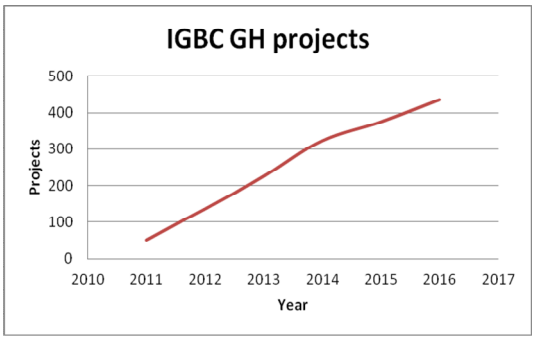


Figure No. 4-7: IGBC GH projects

Source : Author

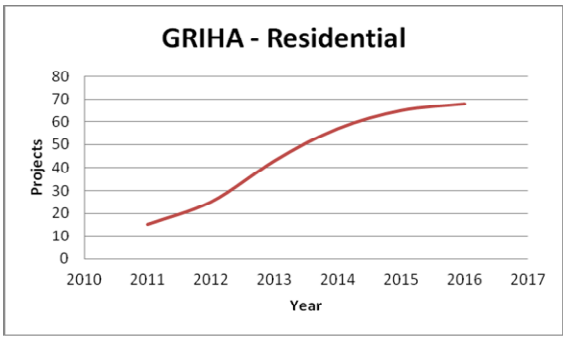


Figure No.4-8: GRIHA residential projects

Source :Author

Rebates and Incentives

The findings obtained from interviews with representatives from the developer associations in the city which included CREDAI, BAI and architects, planners, surveyors from Association of Engineers Surveyors and Architects (AESA), Indian Institute of Architects (IIA) and Pune Municipal Corporation (PMC) are as follows: The Pune Municipal Corporation, city of Pune was one to introduce incentive based Green Building module in the country along with Eco Housing certification program. The large number of registered projects which was found more than 50% under incentive based rating systems indicated inclination of developers for the same as compared to the systems that do not offer any rebates or incentives. In PMRDA region 65% projects were registered under IGBC and 30% under Griha as this system s offers rebates while only 5 % projects were registered under other rating systems where no such incentives are in place. Various rating systems and current available rebates are shown in table no.4-1

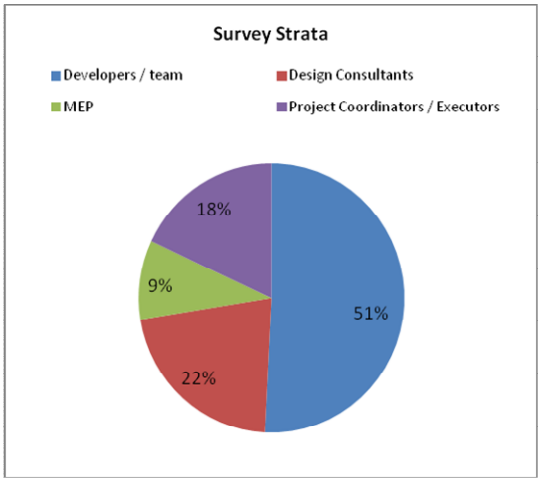
Table 4-1 Rebate Structure in Rating systems

Rating System	Rebate Applicability	Year of Application	Current Status Dec 2016
Eco Housing	PMC	2008 onwards	No rebates as confirmed by PMC.
GRIHA	PCMC & PMC	2012 (PCMC) and 2015 (PMC)	Status quo with rebate proposition. Rebates received by few projects.
IGBC	PMC	2015	Just initiated and rebates awaited
	PCMC	2017	Proposed incentives with FAR (in process)

Source: Author

4.4 Findings from KAP Survey

The survey conducted with a sample of 250, where major responses were received from the developers. The composition of sample is depicted in the figures 4-9 and 4-10.



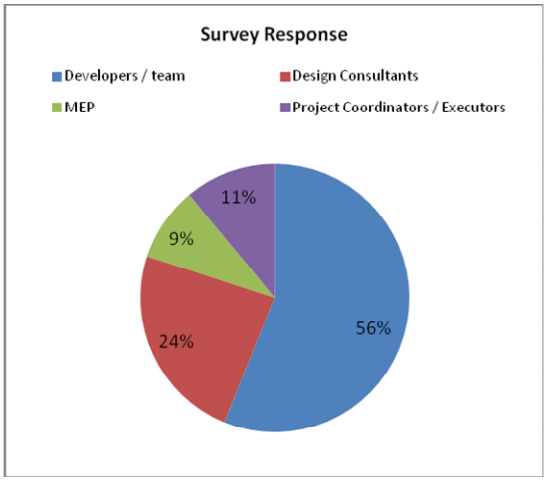


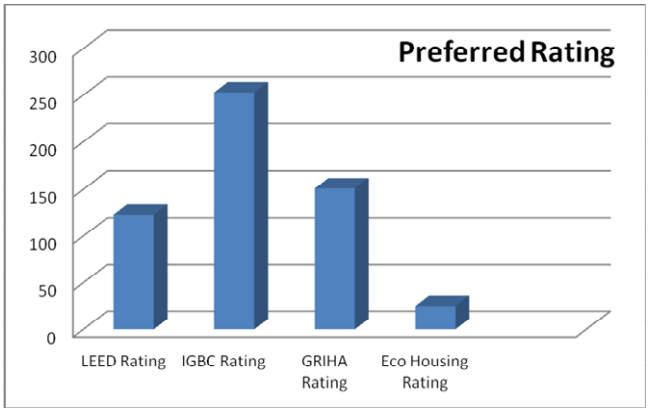
Figure 4-9: Survey Strata
Source: Author

Figure 4-10: Survey Response
Source: Author

The KAP questionnaire addressed knowledge attitude and practice of the respondents with reference to green buildings the findings are presented in the next section.

IGBC rating system was found as the preferred system followed by Griha however the highest response was noted for Eco Housing certification system in last decade which is

currently not in popular use because of various reasons. Other systems like LEED and EDGE are found less preferable which are recently introduced.



Developers strongly believe that green buildings have implications in terms of cost. However it has been realized that there is a less potential of saving in cost at individual level but it is acceptable considering the larger environmental good.

Figure 4-11: Preferred Rating

Source: Author

Lack of knowledge about various aspects of green buildings realized where need for training and awareness programmes was stated important promotion of green building and consequent enhancing the green footprints in residential sector. Presence of ambiguity in rebate structure also noticed as one of the obstacle which has a bearing with the cost.

Lack of awareness is noted with reference to design of green buildings as well as there are many issues related to implementation. Although the notion early design saves cost is known to the developers but without much clarity.

Stakeholders are willing to go for mandatory compliances but are reluctant to adopt green measures as a voluntary activity.

The choice of available green materials are limited in the market which was another factor that discourages developers for green building development.

4.4.1 Analysis

The survey conducted to know the opinion of the respondent group consist of with 24 items questionnaire seeking the response on Likert 5-point scale. A factor analysis with varimax rotation was used with the maximum likelihood method with pair wise deletion.

For 155 complete responses internal consistency was assessed by calculating Cronbach's alpha. High values for Cronbach's alpha obtained during analysis indicated good internal consistency of the items in the scale.

Table 4-2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.675**
Bartlett's Test of Sphericity	Approx. Chi-Square	2798.714
	df	276
	Sig.	.000

Source: Author

Data adequacy was checked with the KMO test, the value of which is 0.675 (Table-4-2). A value is higher than 0.5 which indicated that the data is sufficient for factor analysis. Chi square value 2798.714 at 276 degrees of freedom was found significant (less than 0.0001 level of significance).

The factors were rotated by an orthogonal transformation (varimax) to achieve a simpler structure with greater interpretability. Data were aggregated in three factors with Eigen values greater than 2 and explained about 47.7 % of the variance. Items with Factor loadings > 0.55 were used to define factors (Table-4-3).

Table 4-3 : Factor loading matrix:

Items	**Component**		
	1	2	3
COST is the utmost important factor for a green building.	***.878***	.081	.053
Experience of stakeholders with Green buildings result in COST saving.	***.854***	.024	-.193
Energy efficiency & Water Savings are related to COST savings.	***.829***	-.281	-.120
Studies related to COST of green buildings can help the reservation towards the green approach	***.782***	.010	.013
"Green building "refer to a) Energy & Cost saving b) Social	***.761***	.004	-.089

welfare c) Environment protection			
The implementation of green features is cost intensive.	***.718***	.439	-.067
COST one of the major hindrances that prevent the developers from taking a green approach.	***.705***	.182	.204
Green building materials can influence the cost of the project negatively.	***.658***	.207	-.125
Early initiation of green strategies result in COST benefitting structure	***.645***	.019	.191
Municipal Corporations should incentivize Green buildings	***.610***	.096	.074
Maintenance of Green residential buildings are costly compared to conventional ones.	***.746***	.260	.065
Green buildings help in gaining monetary benefits to the end-users i.e. residents, in the long run.	.115	***.600***	-.080
Green buildings benefits to overall society, a region & improves the quality of life.	.013	***.581***	.436
Green building saves energy & resources at individual level.	.566	***-.686***	-.027
Payback calculation is reliable to a satisfactory extend.	.016	***-.724***	-.152
Services play a very important role in Green buildings and can save on huge resources.	.119	-.248	***.745***
Green building certification programs define a totality green building.	.042	.081	***.655***
Green buildings help for climate impact mitigation in the long term	-.040	.029	***.646***
Green project should be preferred for stay than conventional one.	-.174	.269	.538
Today's residential complexes should be mandatorily "Green".	.541	.248	-.528
Pay back calculation in green building is essential.	.540	.300	.463
Green Building Certification guidelines improve the environment quality of the project.	.295	.492	-.104

Green Growth is related to Economic growth in real estate	-.417	.231	-.232
Overall awareness & green education is the key for the Green project	.553	.044	-.244

Source: Author

Internal consistency of these three sub-scales was found by calculating Cronbach's alpha.High values for Cronbach's alpha obtained during analysis indicated good internal consistency of the items (Table 4-4).

Table 4-4: Cronbach's alpha

Factor no.	Factor Label	alpha
Factor 1	***Cost Conscious***	***0.837***
Factor 2	Environment Conscious	0.673
Factor 3	Social Conscious	0.636

Source: Author

Factor scores:

The regression method with a mean of 0 and a standard deviation of 1.Factor scores are composite variables which provide information about an individual's placement on the factor(s). Higher the scores, higher will be the agreement with the factor. The distribution of the respondents on three factors is given in table.

Table 4-5: Factor scores

No.	Factors	Frequency	Percent
1	***Cost Conscious***	***64***	***42.1***
2	Environment Conscious	49	32.2
3	Social Conscious	42	25.7
	Total	155	100.0

Source: Author

Factor analysis established the choice and decision behavioral pattern for going for green attributes and indicated positive attitude towards the green initiatives. The importance of cost was confirmed which was found as a major hindrance. The social-consciousness and environmental concern also was also found significant aspect. The analysis indicated that that people are willing to contribute for green development provided this phenomenon will not financially overburden them.

4.4.2 Discussions

Structured interviews and the focus group discussion with CREDAI and BAI personnel revealed that the stakeholders believe that incentives are offered in order to bridge the gap of additional investment for green buildings, hence green buildings call for additional investment.

Many of the developers were found conscious about cost increments that they have calculated considering defined parameters under a particular certification system individually where no standard method was followed. This exercise established the notion that green buildings have additional cost which is supposed to be a major hindrance. Many developers found implementation process difficult and they stop taking steps towards certification.

For green certification it is indicated that the applicable criteria in terms of government mandates is based on the scale of development and built up areas. For smaller projects with an area less than 2,00,000 square feet need to follow local byelaws, medium sized development having area between 2,00,000 to 5,00,000 square feet need to satisfy local byelaws as well as environmental clearance while larger projects that have area more than 5,00,000 square feet need EIA in addition to local byelaws and environmental clearance.

Marketing strategies for residential projects:

In the current situation green building mention is used to promote the sale of projects but not aggressively. The current trend in Pune includes marketing with brand ambassadors with their hoardings displaying photographs with the project to create the market for sale.

The establishment of the developers repute is mostly connected with the previous successful projects and hence they are mentioned or displayed. Newspapers, leaflets and CREDAI exhibitions have been the platform to show case or launch the new projects. Existing unsold inventory and extensions are also highlighted here. The location of the project with its proximity to the nearby places and daily needs are prime mention. Work place proximity and transit points are the major mentions. The discounts and the cost benefits of purchase with the developer and the offers are often projected here. The USP lies in the appearance of the buildings and the beauty of the project. Use of newer materials with exceptional looks is appreciated. The purpose is to drive the customer to the site is the motto.

The site is displayed with hoarding to connect with the newspaper or the stalls. The USP lies at the site that displays eye catching and attractive measures. The brochure and the sample flat are the prime marketing tools used by the developers. Rich and exquisite interiors with lights and demonstrative features get the maximum attention. This strategy helps the developers to portray the feel of the space and the arrangement for a comfortable living. Landscape elements like waterfalls, water walls, small ponds with greenery are displayed to give a feel that there is greenery in the surrounding with plenty of water available. The certifications and the accreditations are mentioned a the site but major discussions are with the other parameters including the possession status and the cost per sq. ft. Common facilities with jogging track, swimming pool, safety measures like CCTV surveillance and automated systems add to the scheme.

Green marketing has been a major selling point for few of those who go with that concept in totality. These projects are sustainable with all the parameters of green buildings to excessive attempt along with certifications that add to the authenticity. It can be noted that in the current scenario social marketing with green concepts is on the back foot that holds a good potential for sale in future.

It can be concluded that the preference of green buildings over conventional is driven by cost as one of the major factors. Provision of rebates form the municipal authorities have been another driver for the green buildings development. IGBC and Griha are the rating

systems which were largely preferred for green certification. Lack of awareness and knowledge about green buildings, registration and implementation process is noticed which one of the reasons for less participation of in green is building development particularly in residential sector.

The factor analysis established cost as the major parameter that is considered by the respondents. Details regarding incurred cost of various items in green buildings and conventional buildings are not available to facilitate cost optimization. It was observed that cost here included many aspects in terms of investment and returns both.

The heads included under cost primarily relates to the additional cost due to green parameters. This additional cost is the impact of money invested in the parameters and voluntary criteria to go green with certification mechanism. This cost was varying from project to project as it was based on the optional criteria aspect.

The cost head related to return related to the rebates offered by the authorities on prior note. On parallel front the return or savings anticipated with the tangible benefits of green buildings were secondary as they were to benefit the end user and not the prime stakeholder. The perceived value and purchase intentions are thus driven by the expected benefits and the additional costs as depicted in figure 4-12.

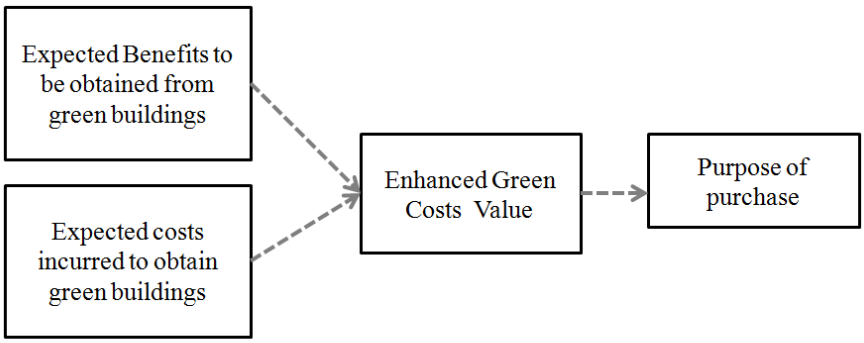


Figure 4-12: Perceived value and purchase intention

Source: Author

The Formative research identified the following indicators which guided the further investigation:

Table 4-6: Identification of problem, severity, people affected, barriers and opportunities

	Parameters	**Approach**
A	The problem, its severity and its causes	Given the alarmingly less green residential buildings the sustainability goals are difficult to achieve.
B	The broad context in which the problem exists.	Pune as one of the upcoming metropolis along with adjoining suburbs under PMC, PCMC AND PMRDA
C	The people affected by the problem	Key Stakeholders – Developers And Buyers
D	Major Factor that have bearing on Developers and Buyers preferences, choices and decision making process with reference to investment in housing sector.	Cost, location, returns on investment, availability of rebates and incentives.
E	Opportunities	Increased awareness about green buildings may help in creating a market for it which in turn will enhance the practice of green construction in India. Pro-environment behaviour may drive people to buy green buildings provided they are perceived as cost effective.

Source: Author

4.5 Summary

This research initiated with Formative research to serve as a baseline of the current status of green buildings development in the area under study. It followed a rigorous assessment

process designed to identify potential and actual influences on the progress and effectiveness of implementation efforts in context of green building development in residential sector. Based on structured interviews and questionnaire survey current status of green certification initiative, process, implementation and outcome was explored. The analysis indicated less number of projects received final certification as compared to registered projects. Knowledge attitude and perception of developers towards green building certification revealed the lack of knowledge and ambiguity regarding registration process particularly about rebates and incentives. IGBC rating system indentified as the most preferred rating system followed by Griha rating system , where preference was attributed to availability of rebates and incentives.

The projects were realized to show a variety for the applicable criteria in terms of government mandates due to their scale of development and built up areas which can be used as criteria for sample selection for further investigation. However cost incurred for green attributes was a analyzed by few developers which cannot be generalized as no standard format was followed. Considering the findings of formative research and situational analysis this inquiry was focused to find cost implications in green buildings with a detailed study of green residential buildings. The results of the investigation are presented in the next chapter.