A STUDY OF FACTORS AFFECTING BUYING BEHAVIOR OF ECO-FRIENDLY HOUSES (EFHs) IN PUNE AND PCMC

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Undertaking

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Annexure IV

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TABLE OF CONTENTS

SR. NO	TITLE	PAGE NO.
	Declaration	I
	Certificates	II
	Acknowledgment	III
	Table of Contents	IV- VII
	List of Tables & Charts & Diagrams	VIII-XII
	Abstract	i-x
1	**CHAPTER I -INTRODUCTION**	**1-35**
1.0	General Introduction	1
1.1	**PART-I** Introduction to Eco-Friendly Housing	3
1.1.1	Section-(a) Environmental Impact of Housing Industry	3
1.1.2	Section-(b) Green Building – Solution to decrease the environmental impact	6
1.1.3	Section-(c) Rise of Eco-Friendly Housing	8
1.1.4	Section-(d) Features of Eco-Friendly Housing	12
1.1.5	Section-(e) Advantages of Eco-Friendly Housing	15
1.1.6	Section-(f) Current Scenario of Global Housing Industry	17
1.1.7	Section-(g) Current Scenario of Indian Eco-Friendly Housing Industry	18
1.1.8	Section-(h) Future of the Eco-Friendly Housing Industry	20
1.2	**PART-II** Profile of Eco-friendly Houses	22
1.2.1	Section-(i) The Global Scenario	23
1.2.2	Section-(ii) Market Segmentation of Green Building Industry	24
1.2.3	Section-(iii) Regional Analysis of Green Building Markey	25
1.2.4	Section-(iv) Competitive Landscape of the Global Green Building Materials Industry	26
1.2.5	Section-(v) Drivers for the Green Building Industry	27

SR. NO.	TITLE	PAGE NO.
1.2.6	Section-(vi) Agencies for Acquiring Green Building Certification in India	28
1.2.7	Section-(vii) Green Housing Industry of Pune	29
1.3	List of certified eco-friendly projects	30
2	**CHAPTER II – LITERATURE REVIEW**	**36-85**
2.1	**PART-I** Consumer behavior Factors Affecting Purchasing of Eco-Friendly Buildings	37
2.2	**PART-II** Overview of Construction Industry	39
2.2.1	Section-(a) Environmental Impact of Construction Industry	39
	Subsection-(i): Environmental Impact of Construction	39
	Subsection-(ii): Pollution and Construction Industry	42
	Subsection-(iii): Indoor Environment Quality	43
	Subsection-(iv): Need for Adapting Climate Change	44
	Subsection-(v): Inefficient Land use in Housing Industry	45
2.2.2	Section-(b) Energy and Construction Industry	46
	Subsection-(i): Energy Consumption in Construction Industry	46
	Subsection-(ii): Embodied Energy of Construction Materials	46
	Subsection-(iii): Operational Energy of Buildings	49
	Subsection-(iv): Energy Consumption	49
2.2.3	Section-(c) Life Cycle Assessment	50
	Subsection-(i): Types of LCA	51
	Subsection-(ii): Life Cycle Assessment in the Construction Industry	51
2.3	**PART-III** Green Buildings and Eco-Friendly Homes	53
2.3.1	Section-(a) History of the Eco-Friendly Concept	53
	Subsection-(i): Green and Eco-Friendly Buildings in ancient times	54
	Subsection-(ii): Eco-Homes in the 21st Century	55
	Subsection-(iii): Introduction to Green Building	56
	Subsection-(iv): Composition of Green Building	57

SR. NO.	TITLE	PAGE NO.
2.3.2	Section-(b) Indian Scenario of Green Building	58
	Subsection-(i): Indian Green Building Council	58
	Subsection-(ii): Introduction to Leadership in Energy and Environment Design	59
	Subsection-(iii): Green Building Industry in India	60
	Subsection-(iv): Economics of Green Building	62
2.3.3	Section-(c) Advantages of Eco-Friendly Homes	63
	Subsection-(i): Environmental Benefits of Eco-Friendly Housing	64
	Subsection-(ii): Health Benefits of Eco-Friendly Housing	65
	Subsection-(iii): Cost Benefits of Eco-Friendly Housing	66
	Subsection-(iv): Economic Benefits of Eco-Friendly Housing	67
2.3.4	Section-(d) Technical Details of Eco-Friendly Homes	68
	Subsection-(i): Downsizing of Green Building	71
	Subsection-(ii): Heating and Cooling in an Eco-Friendly Home	72
	Subsection-(iii): Geo Thermal Cooling Systems	73
	Subsection-(iv): Air Source Heat Pump Systems	74
	Subsection-(v): Radiant Floor Heating	74
	Subsection-(vi): Air Conditioning (AC) in an Eco-Friendly Home	75
	Subsection-(vii): At-Home Cooling Techniques	76
	Subsection-(viii): Eco Friendly Cooling Systems in Green Building	76
3	**CHAPTER III- RESEARCH METHODOLOGY**	**86-98**
3.1.1	Section-(a) Statement of the research problem	88
3.1.2	Section-(b) Aims and objectives	89
3.1.3	Section-(c) Testing of Hypothesis	90
3.1.4	Section-(d) Database of the study	90
	Subsection-(i) - Primary Data	90
	Subsection-(ii) - Pilot Study	95
	Subsection-(iii) - Secondary Data	96
3.1.5	Section-(f) Rationale and Significance of the study	97
3.1.6	Section-(g) Scope and limitations of the study	97

SR. NO.	TITLE	PAGE NO.
4	**CHAPTER IV – TABULATION,ANALYSIS OF THE DATA AND HYPOTHESIS TESTING**	**99-178**
4.1	PART-I Analysis of the Customer Responses	99
	Section-(i) Analysis General Variables	100
	Section-(ii) Analysis of Cost and Financial Factors	111
	Section-(iii) Analysis of Awareness and Promotional Strategy	120
	Section-(iv) Analysis of Decision Variables	127
	Section-(v) Preference for Facilities and Buying Decision	133
4.2	**PART-II** Analysis of the Sales Executives	148
4.3	**PART- III** Hypothesis Testing and Interpretation	172
4.3.1	Section-(a) Hypothesis-H1 H_0-Larger portion of the society is not significantly aware about the Ecofriendly Houses H_a-Larger portion of the society is significantly aware about the Ecofriendly Houses	174
4.3.2	Section-(b) Hypothesis-H2 H_0-Ecofriendly houses are NOT costlier than the regular houses and naturally buyers attract towards this houses. H_a-Ecofriendly houses are costlier than the regular houses and naturally buyers attract towards the cheaper houses.	177
5	**CHAPTER V - SUGGESTION, FINDINGS & CONCLUSION**	**179-188**
5.1	Section-(i) Introductory Observations	180
5.2	Section-(ii) Summary of the findings	181
	Subsection-(a): Customers' Responses	181
	Subsection-(b): Sales Executives' Responses	185
5.3	Section-(iii) Conclusions	186
5.4	Section-(iv) Suggestions of the Study	188
	REFERANCES	**189-199**
	Annexure-I & II	

LIST OF TABLES, CHARTS & DIAGRAMS

Chart/Figure No.	Title's Name	Page No.
	Chapter 1- Introduction	
Diagram No. 1.1	Main drivers for the growth of the green building industry	27
Table No 1.1	List of Eco Housing Projects in Pune & PCMC	30
	Chapter 2- Literature Review	
Table No. 2.1	Embodied energy for common building materials	48
Diagram No. 2.1	Life Cycle Assessment Frame work	52
	Chapter 3- Research Methodology	
Table No. 3.1	Eco-friendly Construction Sites in Pune	91
Table No. 3.2	Distribution of Sample according to Type of Flat and Budget	93
Table No 3.3	Sample Size for Sales Executives	94
Table No 3.4	Chronbach's Alpha for Questionnaire	96
	Chapter 4- Data Analysis	
Table No. 4.1	Distribution of respondents according to Location and qualification	100
Table No. 4.1a	Distribution of respondents according to Location and qualification (In %)	101
Chart No. 4.1	Distribution of respondents according to Location and qualification	101
Table No. 4.2	Distribution of respondents according to budget and What type of flat/house are you looking for .	102
Table No. 4.2a	Distribution of respondents according to budget and what type of flat/house are you looking for (In %)	102
Chart No. 4.2	Distribution of respondents according to budget and what type of flat/house are you looking for .	103
Table No 4.3	Distribution of respondents according to Location and budget	103
Table No 4.3a	Distribution of respondents according to Location and budget (In %)	104
Chart No 4.3	Distribution of respondents according to Location and budget	104
Table No. 4.4	Distribution of respondents according to Location and Major factors do you consider for your purchase	105
Table No. 4.4a	Distribution of respondents according to Location and Major factors do you consider for your purchase(In %)	105
Chart No. 4.4	Distribution of respondents according to Location and Major factors do you consider for your purchase	106
Table No. 4.5	Distribution of respondents according to Location and purpose of purchase	106

Chart/Figure No.	Title's Name	Page No.
Table No. 4.5a	Distribution of respondents according to Location and purpose of purchase (In %)	107
Chart No. 4.5	Distribution of respondents according to Location and purpose of purchase	107
Table No 4.6	Distribution of respondents according to Location and which floor wills you prefer in a 5 floor building	108
Table No 4.6a	Distribution of respondents according to Location and which floor wills you prefer in a 5 floor building (In %)	108
Chart No 4.6	Distribution of respondents according to Location and which floor wills you prefer in a 5 floor building	108
Table No 4.7	Distribution of respondents according to budget and the building preference	109
Table No 4.7a	Distribution of respondents according to budget and the building preference(In %)	110
Chart No 4.7	Distribution of respondents according to budget and the building preference	110
Table No 4.8	Distribution of respondents according to budget and do you bargain on basic cost	111
Table No 4.8a	Distribution of respondents according to budget and do you bargain on basic cost (In %)	112
Chart No 4.8	Distribution of respondents according to budget and do you bargain on basic cost	112
Table No 4.9	Distribution of respondents according to location and perception regarding current price of flats	113
Table No 4.9a	Distribution of respondents according to location and perception regarding current price of flats (In %)	113
Charts No 4.9	Distribution of respondents according to location and perception regarding current price of flats	114
Table No 4.10	Distribution of respondents according to Location and purchasing decision according to income	114
Table No 4.10a	Distribution of respondents according to Location and purchasing decision according to income (In %)	115
Chart No 4.10	Distribution of respondents according to Location and purchasing decision according to income	115
Table No 4.11	Distribution of respondents according to budget and purchasing the flat/house according to protection and status	116
Table No 4.11a	Distribution of respondents according to budget and purchasing the flat/house according to protection and status (In %)	116
Chart No 4.11	Distribution of respondents according to budget and purchasing the flat/house according to protection and status	117
Table No 4.12	Distribution of respondents according to budget and purchasing the flat/house according to age	117
Table No 4.12a	Distribution of respondents according to budget and purchasing the flat/house according to age (In %)	118

Chart/Figure No.	Title's Name	Page No.
Chart No 4.12	Distribution of respondents according to budget and purchasing the flat/house according to age	118
Table No 4.13	Distribution of respondents according to budget and are you purchasing the flat/house according to your family size	119
Table No 4.13a	Distribution of respondents according to budget and are you purchasing the flat/house according to your family size (In %)	119
Chart No 4.13	Distribution of respondents according to budget and are you purchasing the flat/house according to your family size	119
Table No 4.14	Distribution of respondents according to budget and how do you come to know about this project	120
Table No 4.14a	Distribution of respondents according to budget and how do you come to know about this project(In %)	121
Chart No 4.14	Distribution of respondents according to budget and how do you come to know about this project	121
Table No 4.15	Distribution of respondents according to budget and which digital media you prefer for seeking property	122
Table No 4.15a	Distribution of respondents according to budget and which digital media you prefer for seeking property (In%)	122
Chart No 4.15	Distribution of respondents according to budget and which digital media you prefer for seeking property	123
Table No 4.16	Distribution of respondents according to budget and through whom you have visited the site actually	123
Table No 4.16a	Distribution of respondents according to budget and through whom you have visited the site actually (In %)	124
Chart No 4.16	Distribution of respondents according to budget and through whom you have visited the site actually	124
Table No 4.17	Distribution of respondents according to budget and what promotional activity attracts you more for final purchase	125
Table No 4.17a	Distribution of respondents according to budget and what promotional activity attracts you more for final purchase (In %)	125
Chart No 4.17	Distribution of respondents according to budget and what promotional activity attracts you more for final purchase	126
Table No 4.18	Distribution of respondents according to budget and do you prefer builders arranging financial support for selling	126
Table No 4.18a	Distribution of respondents according to budget and do you prefer builders arranging financial support for selling (In %)	127
Chart No 4.18	Distribution of respondents according to budget and do you prefer builders arranging financial support for selling	127

Chart/Figure No.	Title's Name	Page No.
Table No 4.19	Distribution of respondents according to budget and which factor influence for final purchase of your home	128
Table No 4.19a	Distribution of respondents according to budget and which factor influence for final purchase of your home (In %)	129
Chart No 4.19	Distribution of respondents according to budget and which factor influence for final purchase of your home	129
Table No 4.20	Distribution of respondents according to budget and who influence you for final decision in buying your home	130
Table No 4.20a	Distribution of respondents according to budget and who influence you for final decision in buying your home (In %)	130
Chart no 4.20	Distribution of respondents according to budget and who influence you for final decision in buying your home	131
Table No 4.21	Distribution of respondents according to budget and does female decision is taken into consideration for final purchase	131
Table No 4.21a	Distribution of respondents according to budget and does female decision is taken into consideration for final purchase (In %)	132
Chart No 4.21	Distribution of respondents according to budget and does female decision is taken into consideration for final purchase	132
Table No 4.22	Distribution of respondents according to budget and which factors are generally seen by females/wife while purchasing flat	133
Table No 4.22	Distribution of respondents according to budget and which factors are generally seen by females/wife while purchasing flat (In %)	134
Chart No 4.22	Distribution of respondents according to budget and which factors are generally seen by females/wife while purchasing flat	134
Table No 4.23	Distribution of respondents according to budget and do you prefer an Eco friendly house which is far from city	135
Table No 4.23a	Distribution of respondents according to budget and do you prefer an Eco friendly house which is far from city (In %)	136
Chart No 4.23	Distribution of respondents according to budget and do you prefer an Eco friendly house which is far from city	136
Table No 4.24	Distribution of respondents according to budget and will you specifically choose Eco friendly house for your long them stay	137
Table No 4.24a	Distribution of respondents according to budget and will you specifically choose Eco friendly house for your long them stay(In %)	137

Chart/Figure No.	Title's Name	Page No.
Chart No 4.24	Distribution of respondents according to budget and will you specifically choose Eco friendly house for your long them stay	138
Table No 4.25	Distribution of respondents according to budget and do you prefer building with solar heating facilities	138
Table No 4.25a	Distribution of respondents according to budget and do you prefer building with solar heating facilities (In %)	139
Chart No 4.25	Distribution of respondents according to budget and do you prefer building with solar heating facilities	139
Table No 4.26	Distribution of respondents according to budget and do you prefer building with rain water harvesting	140
Table No 4.26a	Distribution of respondents according to budget and do you prefer building with rain water harvesting (In %)	140
Chart No 4.26	Distribution of respondents according to budget and do you prefer building with rain water harvesting	140
Table No 4.27	Distribution of respondents according to budget and do you prefer building with garbage disposal facility	141
Table No 4.27a	Distribution of respondents according to budget and do you prefer building with garbage disposal facility (In %)	141
Chart No 4.27	Distribution of respondents according to budget and do you prefer building with garbage disposal facility	142
Table No 4.28	Distribution of respondents according to budget and do you prefer building with Bio gas plant	142
Table No 4.28a	Distribution of respondents according to budget and do you prefer building with Bio gas plant (In %)	143
Chart No 4.28	Distribution of respondents according to budget and do you prefer building with Bio gas plant	143
Table No 4.29	Distribution of respondents according to budget and do you prefer building with solid waste management	144
Table No 4.29a	Distribution of respondents according to budget and do you prefer building with solid waste management (In %)	144
Chart No 4.29	Distribution of respondents according to budget and do you prefer building with solid waste management	145
Table No 4.30	Distribution of respondents according to budget and do you prefer solar wind hybrid for lighting	145
Table No 4.30a	Distribution of respondents according to budget and do you prefer solar wind hybrid for lighting (In %)	146
Chart No 4.30	Distribution of respondents according to budget and do you prefer solar wind hybrid for lighting	146
	PART II	
Table No 4.31	Selling flats which factors influence more on the buyers towards purchase decision	147
Table No 4.32	Selling flats which factors influence more on the buyers towards purchase decision (%)	149

Chart/Figure No.	Title's Name	Page No.
Chart No 4.31	Selling flats which factors influence more on the buyers towards purchase decision- Producer Brand image	150
Chart No 4.32	Selling flats which factors influence more on the buyers towards purchase decision- reputation of the builder	151
Chart No 4.33	Selling flats which factors influence more on the buyers towards purchase decision- Construction as per Vastu Shastra	151
Chart No 4.34	Selling flats which factors influence more on the buyers towards purchase decision- Build up/ Carpet area	152
Chart No 4.35	Selling flats which factors influence more on the buyers towards purchase decision- Price	152
Chart No 4.36	Selling flats which factors influence more on the buyers towards purchase decision- Occupation	153
Chart No 4.37	Selling flats which factors influence more on the buyers towards purchase decision- Income	153
Chart No 4.38	Selling flats which factors influence more on the buyers towards purchase decision- Economic Condition	154
Chart No 4.39	Selling flats which factors influence more on the buyers towards purchase decision- Technology	154
Chart No 4.40	Selling flats which factors influence more on the buyers towards purchase decision- Social	155
Chart No 4.41	Selling flats which factors influence more on the buyers towards purchase decision- Culture	155
Chart No 4.42	Selling flats which factors influence more on the buyers towards purchase decision- Launching offer	156
Chart No 4.43	Selling flats which factors influence more on the buyers towards purchase decision- Sample flat	156
Chart No 4.44	Selling flats which factors influence more on the buyers towards purchase decision- Luxurious flat	157
Chart No 4.45	Selling flats which factors influence more on the buyers towards purchase decision- Duplex flat	157
Chart No 4.46	Selling flats which factors influence more on the buyers towards purchase decision- Furnished flat	158
Chart No 4.47	Selling flats which factors influence more on the buyers towards purchase decision- Semi-furnished flat	158
Chart No 4.48	Selling flats which factors influence more on the buyers towards purchase decision- Under Construction	159
Chart No 4.49	Selling flats which factors influence more on the buyers towards purchase decision- No EMI till possession 3	159
Chart No 4.50	Selling flats which factors influence more on the buyers towards purchase decision- Amenities	160
Chart No 4.51	Selling flats which factors influence more on the buyers towards purchase decision- Facilities	160
Chart No 4.52	Selling flats which factors influence more on the buyers towards purchase decision- Common parking	161
Chart No 4.53	Selling flats which factors influence more on the buyers towards purchase decision- Own parking	161

Chart/Figure No.	Title's Name	Page No.
Chart No 4.54	Selling flats which factors influence more on the buyers towards purchase decision- Maintenance	162
Chart No 4.55	Selling flats which factors influence more on the buyers towards purchase decision- Solar heating system	162
Chart No 4.56	Selling flats which factors influence more on the buyers towards purchase decision- Rain water harvesting	163
Chart No 4.57	Selling flats which factors influence more on the buyers towards purchase decision- Garbage disposal facility	163
Chart No 4.58	Selling flats which factors influence more on the buyers towards purchase decision- Bio gas plant	164
Chart No 4.59	Selling flats which factors influence more on the buyers towards purchase decision- Solid waste management	164
Chart No 4.60	Selling flats which factors influence more on the buyers towards purchase decision- Solar wind hybrid for lighting	165
Table No 4.33	Non -financial variables are more important for selling the flat (%)	165
Chart No 4.61	Non -financial variables are more important for selling the flat - surrounding area	166
Chart No 4.62	Non -financial variables are more important for selling the flat - safety living	166
Chart No 4.63	Non -financial variables are more important for selling the flat – Maintenance	167
Chart No 4.64	Specifications are more important for selling the flat- Earth Quake Resistant	167
Table No 4.34	Amenities buyers prefer while purchasing as the amenity cost is included into selling price (%)	168
Chart No 4.65	Amenities buyers prefer while purchasing as the amenity cost is included into selling price - Landscape garden	168
Chart No 4.66	Amenities buyers prefer while purchasing as the amenity cost is included into selling price - Rain water harvesting	168
Chart No 4.67	Amenities buyers prefer while purchasing as the amenity cost is included into selling price - Solar system	169
Table No 4.35	Factors are most important for selling the flats to the customers	169
Chart No 4.68	Factors are most important for selling the flats to the customers- sufficient water supply	170
Chart No 4.69	Factors are most important for selling the flats to the customers- Ventilation	170
	PART -III	171
Table No 4.36	Technical hypotheses for H1	172
Table No 4.37	Descriptive Statistics	172
Table No 4.38	One-Sample Test	172

Chart/Figure No.	Title's Name	Page No.
Table No 4.39	Technical hypotheses for H2	174
Table No 4.40	Descriptive Statistics	174
Table No 4.41	One-Sample Test	175

ABSTRACT

Introduction

Present study entitled as the "STUDY OF FACTORS AFFECTING BUYING BEHAVIOUR OF ECO-FRIENDLY HOUSES (EFHS) IN PUNE & PCMC" may be pointed as the descriptive study involving survey method to accommodate deductive reasoning approach. Consumer behavior has been an important research topic for decades. This has been impacted various policy level interventions to be implemented while strategizing the sales activities. A review of existing theoretical efforts indicates a clear shift from rational to psychological and social decision factors. This has included transformation of sales activity from traditional approach to modern approach anticipating psychological and social factors. Specifically speaking construction industry and more of residential construction businesses are now operative from social point of view. In short, it is to be noted that purchasing of the house is not merely a satisfying shelter needs, but it has now become a status quo. Thus, continuous research is expected in this field, however, even the recent models have not been managed to embrace all the knowledge in the field of consumer behavior: subconscious processes, the role of needs, goals and emotions. All these factors are important and essential while studying the consumer behavior. Almost all the industries are putting their efforts on understanding and establishing the relationships between these factors.

Rationale and Significance of the study[1]

In environmentally aware society, demand for the ecofriendly homes need to be on higher side. But considering the supply side of the ecofriendly homes, intentionally reflect that buyer of the construction industry still give the priority to the commercial sides. Though on the long run ecofriendly homes are more affordable but requires larger investments in initial period. Housing comes under the very basic, essential and primary need of any human being and thus it has been prioritized by the customers. This situation reflects the entries of huge and larger industry players reflecting increased competition in the market. Naturally, cost cutting is the major focus in this industry to survive in this competition. Up gradation of the technologies provided significant productivity. Also, application of advanced technology have risen the bad impact on environment.

There is only one solution to this situation and it is constructing the ecofriendly homes specifically built by using local level construction material with negligible loss to the environment. All these things can be worked out once there is a demand for ecofriendly homes. Now, here is the scope for the present study to understand the bottle neck of the buying behavior of ecofriendly homes.

Aims and objective of the study

The primary aim of this research study is to understand factors that affect buying behavior of the customers in ecofriendly houses industry. Though, this aim has been accommodated in below mentioned specific research objectives, such as;

(a) To undertake a survey of the Ecofriendly houses in Pune
(b) To understand an impact of marketing strategies of ecofriendly houses on the buyer's behavior
(c) To study the awareness among the builders and buyers about eco-friendly houses, and
(d) To find out the bottle necks or barriers in the free flow of ecofriendly houses and to suggest the remedies.

All the above objectives are in line with the research questions addressed in the section on statement of the research problem. With the purpose of generalizing the research findings an effort has been made to transform these research objectives into attainable scientific hypotheses.

Hypothesis of the study

Keeping in mind the title of the present study along with extensive literature review carried out for the purpose of this research, directive hypotheses have been worked out and mentioned in below section. The basic intension of these hypotheses are to offer scientifically tested conclusions based on the probabilistic generalizations.

Hypothesis-H1: Larger portion of the society is not much aware about the Ecofriendly Houses.

Hypothesis-H2: Ecofriendly houses are costlier than the regular houses and naturally buyers attract towards the cheaper homes.

Assumption behind this hypothesis is; Ecofriendly houses are not that much worth enough to pay heavy purchase price. It needs to be pointed out here that the quantification, tabulation, testing and interpretation of both of these hypotheses have been made and presented with the help of chapter-4 on data analysis and interpretation.

Scope and limitations of the study

Geographical scope of the present study has been limited to the administrative boundaries of Pune Municipal Corporation and Pimpri Chinchwad Municipal Corporation.

On the aspect of scope, it is to be noted that present study only considers the behavioral aspect of the buying preferences observed during buying of ecofriendly homes. This naturally reflect that present study is not assessing technical specificities of the ecofriendly homes impacting on purchasing decision

On the part of the time span, it to be mentioned here that, this present study has been conducted between F.Y. 2013-14 and F.Y. 2018-19. Thus data collected for primary analysis is having legacy to the extent of only above mentioned time period.

Research methodology and Data base of the study

Present research has been carried out with the empirical method of investigation such as structured and pilot tested questionnaire that has been used to collect primary data. With the help this questionnaire, primary attempt has been made to capture and quantify the data signifying opinions of the customers in ecofriendly homes. Primary data have been collected from the randomly selected customers of the ecofriendly houses. In another way, it may be noted that the entire study has been based on the responses collected from customers observed in construction industry of Pune along with the marketing executives of the construction industry.

Defining the Population

The population is referred to the totality of the entire units under investigation, subject to the mentioned criteria covering, Population Element, Sampling Unit, Extent and time. In case of present study, element of the study has been defined as the customers of the construction industry. Though the sampling units have been defined as the

customers buying eco-friendly houses in Pune. Finally, in regards to the 'extent' of population; Pune City consisting of Pune Municipal Corporation and Pimpri Chinchwad Municipal Corporation has been considered.

Now considering the entire discussion the list of the eco-friendly apartments (schemes) has been obtained and the same has been provided below-

Table No. 3.1

Eco-friendly Construction Sites in Pune

Sr. No.	Area / Location	Number of schemes	Number of flat owners
1	Alandi	1	19
2	Alka Talkies	5	161
3	[a]Aundh	3	44
5	Camp	4	134
6	Deccan	8	153
7	Hadapsar	3	37
8	Khadki	1	5
9	Kothrud	2	87
10	Nagar Road	2	27
11	PCMC	7	158
12	Satara Rd	2	43
13	Sinhgad Rd	3	11
14	Swargate	4	57
	Grand Total	45	936

(Note: [a]Includes: Balewadi, Bavdhan and Baner)
(Source: https://www.ecohousing.in/List%20of%20Eco%20%20Housing%20Projects%20With%20Ratings.php)

In this situation the entire flat owners have been considered as the population of the present study. Also the number of schemes have been considered as the population for the purpose of selecting respondents representing sales executives from the construction industries.

The detailed discussion on the sample size determination has been provided below-

Sample Size for the undertaken research:

1. Population Size: 45 schemes bearing 936 customers[2] is the size of population worked out under this study.

2. Precision Level (Sampling Error tolerated or Margin Of Error or Degree Of Accuracy) : 5 % i.e. 0.05
3. Confidence Level : 95 %
4. Confidence Interval: 7
5. Degree Of Variability: Homogeneous Population Therefore assuming 20%.
6. Response Rate: 70 % of the distributed questionnaires.

Now based on the Base Sample size for above data from table[3]: 162[4].

Though the actual sample size considered in the study is 176 responding customers and 76 sales executives from construction industries.

Data analysis and hypothesis testing

The key observations have been discussed in this abstract.

Analysis of Customers responses

(As per the responses from Questionnaire for Buyers Annexure-I)

It needs to note that buyers of the ecofriendly homes have not considered their income while purchasing the flats. It seems abnormal but the reasons behind this may be attributed to the fact that instead of income buyers may be considering the EMI of the flat to be purchased and the availability of loan facility. (***Chart No. 4.10***)

The budget specified by the responding buyers of ecofriendly houses is playing key decisive factors in buying decision. Though two other factors such as, protection and status also have been investigated in this research to get realistic understanding of the buying behavior. Thus, from the ***Table No. 4.11***, it has been seen that almost 30 per cent of the respondents considers the protection and status while buying ecofriendly houses.

It simply reflects that hassle free buying and no financial burden at least for some time is the right marketing strategy implemented by the industry players. Further details graphical presented in ***Chart No. 4.17***.

In a summary, it has to be noted that policy makers of the builders should prefer social media as marketing tool and focus on pamphlets and banners. The stronger network of agents and mouth publicity shall be given more preference.

Analysis of Sales Executives Responses

(As per responses of questionnaire for sales executives – Annexure -II)

The buyers of the eco-friendly homes are surprisingly observed to be given priority to the technology provided in the flat or apartment. It has been observed that almost 99 per cent of the respondents mentioned this experience while dealing with customers. Further details on this aspect has been provided with the help of ***Chart No. 4.39***.

Social customs or social trends also has played a significant role in buying decision. This aspect has been investigated and presented with the help of ***Chart No. 4.40***. It has been observed that almost 32 per cent of the respondents mentioned that social factors are important in buying decision.

Offers, discounts and special attractions are some of the marketing tactics used in every industry and the construction industry is also not the exception to it. It would be seen from the ***Chart No. 4.42*** below that, almost 83 per cent of the respondents mentioned launching offer is the most important factor impacting on buying decision.

This section has been provided with the detailed interpretation of survey conducted under this study. Though, the generalizations have been made by using appropriate statistical methods. The details on this have been provided with help of hypotheses testing section.

Hypotheses Testing

Hypothesis-H1

In this section an effort has been made to test below mentioned hypothesis.

H_0-Larger portion of the society is not significantly aware about the Ecofriendly Houses

H_a-Larger portion of the society is significantly aware about the Ecofriendly Houses

Results and interpretation:

On scrutinizing the results of calculations mentioned above in ***Table No. 4.37*** the inferences are as follows-

Table No. 4.37
One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Supply of consumer durables increased due to free economy	-1.645	43	0.107	-0.386	-0.8602	-0.874

In case of hypothesis-H1, the value listed as Sig. two tailed is the probability of obtaining an absolute value greater than or equal to the observed 't' statistic, if the difference between the sample mean and the test value is purely random. Since, confidence intervals lie entirely below 0.0; in this case, one can safely say that observed level of agreeableness regarding 'Larger portion of the society is significantly aware about the Ecofriendly Houses' is significantly (positively) not differing from the standard mean of 3. ***Hence, in this case of the hypothesis-H1, hypothesis null may be accepted and result can be interpreted as "larger portion of the society is not aware about the Ecofriendly Houses".***

Hypothesis-H2

H_0-Ecofriendly houses are NOT costlier than the regular houses and naturally buyers attract towards this houses.

H_a-Ecofriendly houses are costlier than the regular houses and naturally buyers attract towards the cheaper houses.

On scrutinizing the results of calculations mentioned above in ***Table No. 4.40*** the inferences are as follows-

Table No. 4.40
One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Hypothesis-H2	-0.643	43	0.524	-0.1363	-0.5643	-0.2915

In case of hypothesis-H2, the significance value obtained show a tendency to be more than 0.05. In such a case, the column labeled 'Sig. (2-tailed)' displays a probability from the 't' distribution with 43 degrees of freedom. The value listed is the probability of obtaining an absolute value greater than or equal to the observed 't' statistic, if the difference between the sample mean and the test value is purely random. Since, confidence intervals lie entirely below 0.0; in this case, one can safely say that observed level of agreeableness regarding 'ecofriendly houses are costlier than the regular houses and naturally buyers attract towards the cheaper houses' is significantly (negatively) not differing from the standard mean of 3. ***Hence, in this case of the hypothesis-H2, hypothesis null may be accepted and result can be interpreted as" ecofriendly houses are NOT costlier than the regular houses and naturally buyers attract towards these houses".***

Conclusions

There are very few schemes operative in Pune that provide and comply with the specifications related to the ecofriendly homes. Total almost 45 schemes have been submitted to the government for approval though majority of the schemes are yet not approved by the competent authority. This conclusion is in relation to the ***first objective*** of the present research. Though detailed discussion on this aspect has been provided in the chapter-1, introduction.

The study of marketing strategies have been studied in the present study to the extent of promotional strategies and loan availability, and discounts offered. Though, it need to be concluded with the due care that none of the marketing strategies have been observed successful in the long run. Such as if the builders were successful in designing

the effective marketing strategies then its impact should be observed on the increasing demand for the ecofriendly houses. This conclusion contribute to the ***second objective*** of the present research.

There is very less awareness has been observed during the present research. Specifically speaking potential buyers are not differentiate based on the features and other benefits that they got from these ecofriendly houses as compare to the normal common housing properties. Also it has been observed that awareness among the potential customers on the aspects of features and benefits of these houses is not significant. This has been in accordance to the ***third objective*** of the present research.

There are three basic barriers identified in the free flow of ecofriendly houses during investigation of the present study. These barriers are; (a) pricing of the ecofriendly houses and its imagination in the mind of customers. In fact the way cost factor considered by the buyers is not realistic, (b) Focus on the social benefits to be given more by the potential customers rather than looking for personal benefits. This paradigm shift will provide active demand for ecofriendly homes. And (c) government is not actively supportive the initiative of the green building or the ecofriendly homes. This conclusion to be noted regards to the ***fourth objective*** of the present study.

Also essentially, it is to be noted that, larger portion of the society is not aware about the Ecofriendly Houses and ecofriendly houses are NOT costlier than the regular houses.

Suggestions

In this section an effort has been made to provide workable suggestions for this entire study based on the above mentioned concluding observations. This suggestions are time specific, meaning the suggestions are applicable to the time specificities in which the study has been carried out. Moreover, these suggestions and place specific. Such as entire study has been carried out based on the observations carried out Pune City only. Finally the suggestions are applicable in construction industry. Though, it also has to be noted that, these suggestions can be implemented in other places, and activities too with certain adjustments.

The suggestions of the study are:

Policy makers in the construction industry should focus more on the spreading awareness among the potential customers with the help of posters and banners. The help from Radio or FM advertisement can be considered for this. The awareness not only required for promoting knowledge on the various schemes and facilities under ecofriendly homes but the sensitivity of the peoples need to be enhanced for ecological balance in the society.

Secondly, policy makers in the government also suggested that, there is a need for solid policy framework for boosting ecofriendly homes. Providing easy loan, lowest interest rate, hassle free loans, significant tax benefits are some of the methods for promoting ecofriendly homes on the part of government policy makers.

Finally, it needs to be mentioned specifically that, this research was under taken with the intension of contributing to the understanding of the ecofriendly house and its awareness among the customers to offer probable solutions in the light of findings. This study has added to the current body of knowledge relating to strategic considerations for promoting ecofriendly homes, also it has provided insight into areas that warrant further exploration.

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Key Words: Eco-Friendly Houses (EFHs), Green Building, Buyers, sales Executives

Chapter-1

INTRODUCTION

1.0 General Introduction

The rise of global warming and climate change has resulted in the need to bring out changes to the functioning of every single aspect of life, business, and economy. The need to change practices and processes of every industry to help cater to the changing environment and to bring out sustainable growth is becoming more foreground. As the consumer knowledge about the side effects of products and services on the environment is increasing, they are looking to find better, eco-friendly alternatives for the existing products and services. This shift in demand can be both an opportunity and a threat to the business. If the business changes their product offering to suit the new demand, they will be able to use the already existing trust and name of the business to gain a market for the new products[1].

Along with consumer products like food, personal care and other items, consumers are also looking for eco-friendly long-lasting investments like automobiles, real estates, etc. In the recent past, there has been a green revolution in the housing industry. As a result of which a new segment of properties has risen. They are eco-friendly homes and housing. The use of practices and technologies which result in construction of houses and properties with low environmental impact and better, yet which promote the sustainable, co-operative growth and flourishing of the environment[2].

Construction activities have a large-scale negative impact on the surrounding environment throughout its development cycle. The impact starts right from the pre-construction on-site work, the construction phase, the operational and maintenance phase, right to the demolition. Although the construction phase of the life cycle of a real estate property is comparatively short in relation to other phases, it is one of the most damaging to the surrounding environment. In today's world, due to pressure from environmentalists and the laws and regulations, it has become necessary to change the process and practices used during the construction of a real estate[3].

Construction and development of infrastructure contributes hugely towards socio-economic development due to the fact that it creates jobs, develops the

geographical area, and increases the value of resources. Development of infrastructure and real estate largely increases the GDP of the country and is thus considered as one of the major sectors for growth and development of the country. All of this comes at a huge price to the environment surrounding the real estate. Despite of the multiple benefits constructions of infrastructure brings to the nation and the people living in it, unsustainable design and use of low quality, harmful resources, and chemicals, has drastic effects on the environment. The contamination and pollution of the surrounding environment ends up harming the population living in the area[4].

For centuries, the construction industry has been damaging the environment due to the use of unsustainable practices and resources for the process of construction. Inefficient use of resources results in a lot of resources like cement, wood and sand going to waste. Most of the times, this waste is not disposed of properly with care, this in turn pollutes the environment and affects the natural habitats and living creatures in the area. Unsustainable design often results in trees and landscape being cut down to create flat ground for construction which harms the environment. It has been constantly proved that inefficient and unsustainable design has resulted in deforestation, destruction of natural habitats and disturbed the balance of nature[5].

Housing industry or residential real estate is one of the biggest contributors of the degradation of the surrounding environments. The projects created by developers are purely from a commercial point of view which in turn has a negative impact on the environment. To create profit, unfair and unsustainable practices are often used to construct building and other facilities[6].

However, in the recent times of increasing environmental awareness among consumers, the concepts like eco-friendly or green homes have been born. An eco-friendly house is a property which is designed and constructed using sustainable practices and resources. An eco-friendly house is designed to be energy efficient and use little energy and resources as possible even after the construction of the house is completed. This includes sustainable design, use of alternative environment-friendly materials, use of alternative/renewable sources of energy and reducing the carbon footprint of the house[7].

In accommodation of the present research, an effort has been made to present this entire chapter into two parts. Such as, in ***PART-I*** basic discussion regarding eco-

friendly housing has been provided while in ***PART-II*** of this chapter detailed profile of green building industry has been canvassed.

PART-I

1.1 Introduction to Eco-Friendly Housing

This section introduces top the basic dimensions of the eco-friendly housing with the help of eight sections to accommodate environmental considerations, features of eco-friendly housing, advantages of eco-friendly housing, current and future scenario of the eco-friendly housing.

1.1.1 Section-(a)

Environmental Impact of Housing Industry

Construction and maintenance of a building and housing complex consists of a lot of activities like pre-construction inspection, design, construction, and the maintenance after the property if sold. The process of building a housing complex takes up a lot of land area, resources, raw material, and a large span of time. The many ways that housing industry negatively impacts the surrounding ecosystem are as follows:

Inefficient Land Use: Many a times, modern housing complexes waste a lot of land under the name of amenities. This decreases the productivity of the said area and reduces its ecological value[8].

Design Faults: In order to create and build a particular design, mountains are levelled, riverbeds are filled up which has adverse effects on environment. At such times, the architect should take into consideration the natural topographic conditions of the area. Natural features must be used to an advantage without having to remove them.

Wastage of energy: Housing complexes are often decorated with flashy lights and decorations to attract buyers. This results in wastage of energy and increases carbon footprint of the complex.

Pollution: During the construction phase, the amount of pollution caused by construction sites is very high. Particulate pollution caused by the cement & gypsum

is in very high amounts. Often time generators are used to power the machines which result in air pollution. The cement particles enter the workers lungs and cause hazards to their health. Chemicals used can also leak and pollute the water sources and land nearby. Wastewater generated during the construction is also freely let out into nearby water bodies cause contamination and pollution. The construction site also causes high levels of noise pollution due to use of loud machines.

Use of non-eco-friendly resources: Many of the raw materials used in the construction process are harmful if leaked in the environment. Apart from pollution they can alter the health of living beings they come in contact with. Dust and particulate matter released during the process when in contact with humans, settles in their lungs and cause breathing problems. Chemicals used to treat cement and waterproofing when leaked in water can kill the aquatic life.

Development of infrastructure contributes to the growth of a country. As a result, since 1990s, construction activities have seen an explosive growth. The development and construction high rise buildings, landscapes, and commercial spaces, along with public infrastructure like bridges, expressways, have seen massive growth in the past two decades. The increased construction has put pressure on the environment. Forests, agricultural land, mountains have been leveled and used to build roads, tunnels, and bridges this changes the ecological structure of the region. The demand for inputs like timber, water, electricity has also increased which puts pressure on the environment as well as they availability is limited. The use of machinery and vehicles for processing and transport of materials and equipment give rise to air pollution and noise pollution which has shown adverse effects on the ecosystem and living creatures in the surrounding area. The lack of disposal mechanisms for unused, partially used or scrap materials also lead to improper waste disposal which end up polluting the environment even more. Moreover, lack of sustainable design and construction process also results in misuse of resources which have an adverse effect on the environment[9].

The construction industry in general will continue to negatively impact the environment as long as it keeps demanding more and more resources. Therefore, it is important for the developers and contractors to reuse old materials and use practices to use as little material as possible. This will not only help in reducing the depletion

rate but will also increase the efficiency of the materials already in use. Seeing the exploding population growth, the construction industry in the housing segment possesses a major threat to the environment. As a result, developers and construction companies face the pressure of creating projects which cater to the population while also being cautious about the environmental impact of the project and construction activities. Moreover, as the awareness regarding the effects of construction activities on environment is increasing, the pressure from the government and environment activists is also increasing. This adds an additional layer of pressure from the public for the developers to engage in ethical and sustainable practices while constructing properties[10].

As long as the design of the buildings and other infrastructures are not done with an objective of sustainability, the impact that the construction will have on the environment will be negative. Land is levelled to create gardens, clubhouses, decorative monuments, and other structures. These structures are not crucial to the role of the property. They only play the role of an add-on in order to increases the value and price of the property. While doing that, the developers and contractors damage the environment heavily. Building the amenities use a lot of resources, they also decrease the productivity of the land[11].

In today's world, modern town-planning agencies have started to pay importance to the environmental impact of the construction and housing projects. As a result, these agencies have started to conduct an EIA (Environmental Impact Assessment). An EIA is an appraisal ecological-geographical in the proposed area of development in order to review the value of the project in relation to nature and human beings[12].

The objectives of an EIA are as follows:

1. Mitigation of environmental damage.
2. Reduction of construction costs
3. Minimizing detrimental implications for the man's environment.

The key processes in an EIA are as follows:

1. To identify the state of environment.

2. To determine structure and features of likely damage.
3. To find out factors which will eliminate the pollution from effluents and construction waste.
4. To make arrangements to preserve natural environment conservation.
5. To identify whether the project meets the existing requirements of the legislation, environmental standards.

1.1.2 Section-(b)

Green Building – Solution to decrease the environmental impact:

Green building also known as sustainable construction refers to both a structure and process of construction. It is the application of processes and materials which are environmentally friendly and are efficient throughout the building's life cycle; right from the planning stage to the end that is demolition stage. Green building is supposed to complement and expand the classic concerns of economy, utility, durability, and comfort[13].

It is a well-known fact that buildings are responsible for a huge share of energy, electricity, water, and resource consumption. The construction sector is one of the major contributors to greenhouse gas emissions and global warming. Buildings account for around 18% of global emissions today, which is equivalent to approximately 9 billion tons of carbon dioxide annually. In today's climate, it is important for the construction industry to take account for the emissions caused and take necessary actions to reduce energy consumption and increase sustainability of the project. It is due to this need and concern regarding the environment, the concept of green building was born[14].

The concept of sustainable development can be traced back to the energy crisis and environmental pollution concerns of 1960s and 1970s. The first effort to describe sustainable development as related to green building was in "Silent Spring", a book by Rachel Carson which was published in 1962. Modern sustainability initiatives call for an integrated and synergistic design to both new construction and also during the retrofitting and renovation of existing structures. Sustainable design is used by

architects and contractors while building new buildings and also while renovating old structures[15].

One of the main practices of green building is the life cycle assessment (LCA) of the project to be undertaken. Life Cycle Assessment can help avoid a narrow outlook on the environmental social and economic concerns and impact of a building. It is done by assessing the full range of impacts and effects associated with all the stages of building right from planning, design, construction, operation, maintenance, renovation, and demolition. In terms of green building, the last few years have seen a shift away from a very prescriptive approach which is based on theoretical knowledge which assumes that certain practices are better for the environment, to a scientific evaluation of actual performance through LCA[16].

The type of impacts assessed during the LCA process range from the extraction of raw materials through material processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling. Impacts considered include energy requirement, global warming potential, carbon footprint, resources used, air pollution, water pollution, and waste management.

The concept of green building achieves fusion by paying attention and taking into consideration the following components:

- Energy efficiency and renewable energy
- Water efficiency
- Environmentally preferable building materials and specifications
- Waste reduction
- Indoor air quality
- Smart growth and sustainable development
- Toxin reduction

Green building does not only mean using sustainable resources but also to use as less resources as possible throughout the lifecycle of the building, which means reducing the energy consumption after residents and other citizens start living or

working in the property once the property is constructed. This can be done by using systems like geothermal cooling and heating, using recycled water, solar power and other renewable energy sources which will bring the energy consumption of the building to a very minimum. green building does not mean planting gardens and trees in the campus of the building. It encourages the use of sustainable and clean technologies and processes to ensure that the environment is not harmed throughout the lifecycle of the building[17].

1.1.3 Section-(c)

Rise of Eco-Friendly Housing

As the consumer awareness regarding the impact of the housing industry on environment is increasing, the demands and needs are changing. Customers are demanding projects which are built in a sustainable way by promoting the growth of environment. This awareness has led to contractors and developers two build projects which are ecofriendly so that they can attract the attention of this newer segment of customers who values the sustainability and the environmental friendliness of a particular project[18].

As a result, the rise of ecofriendly housing has begun in the past two decades. Projects which are designed in order to suit the landscape they are built in, which use less resources while building as well as which have energy conservation strategies in place are getting more importance from customers.

The main reason for the rise of ecofriendly housing industry is the growing importance and knowledge about global warming and climate change. This has resulted in customers demanding ecofriendly strategies and ecofriendly resources while living in the comfort of their home. Houses which are built in an ecofriendly way also promote energy conservation, better fuel efficiency as well as a proper climate in the area which results in reduction of costs of energy use like electricity and petrol or diesel. This results in savings for the customer which is also one of the main factors which have boosted the ecofriendly housing industry[19].

It is a well-known fact that a typical house is usually made from stone or bricks, it is powered by electricity and has a roof structured to protect from rain and other climate conditions. However in the recent times, due to the change in the

demographic of house buyers, the criteria for the construction of houses has begun to change and the millennial generation is driving the construction of “Wellness-minded” and “environmentally conscious buildings”.

Solar panels on roofs and environmentally friendly energy sources are one of the basic features which are seen in the older ecofriendly houses. Ecofriendly houses are developed to have a limited impact on the environment. They are built to be as self-sufficient as possible by using amply available natural resources like light wind and earth ecofriendly or sustainable homes aim to lower the carbon footprint associated with building a house and reduce the consumption of energy sources like heat and electricity for the homeowners.

One of the basic techniques used in older ecofriendly homes is economic insulation which is done by incorporating earth bags, logs, stones, wood, recycled plastic, bamboo and straw as all of these materials hold heat and don't transfer the cold from outside while also limiting the damage caused to the surrounding environment. As the insulation techniques of these ecofriendly homes are natural and do not contain a lot of electronic components, they have a lower maintenance cost. They also provide a consistent temperature regardless of the power input and output. They provide higher quality of air as the energy required for insulating or heating the home is less and they also produce less waste in the form of carbon dioxide and gases emitted by the generators. It is also apparent that by using economic insulation, consumers reduce their expenses as most of these techniques do not require regular maintenance.

Home construction and demolition are enormous source of waste and the building of housing developments often leads to clearing of trees, land, and important green space at the cost of displacing and harming wildlife. Buildings also use an incredible amount of energy day-to-day to power all of the units in them and this produces a lot of carbon emissions. With the population growing, the demand of housing industry is increasing continuously which if dealt with the way it is dealt today, will have dire consequences on the environment. This creates a need to develop technologies and methods which reduce the environmental impact of housing complexes. As a result, eco-homes are gaining popularity in today's time[20].

Eco homes in the past were mainly cabin type structures which were powered with solar panels. But due to the progress in architectural design and technology, today's green homes are much more modern and accessible to the general population who live a normal lifestyle. This is because the main factor that makes a home “green or ecofriendly” is the reduced carbon footprint which can be achieved without compromising structural design and integrity of the house.

Structural design of the house important to the millennial generation as they live a fast-paced lifestyle and competitive work environment. Even though the knowledge and awareness regarding environmental impact of the housing is concerning to the consumer, the need for a functioning design is higher. This has resulted in the development of eco-housing with a modern structure which provides all the amenities required by the buyer. Now that developers are providing the option of homes with functioning designs along with reduced carbon footprint, the demand is shifting towards ecologically conscious homes.

The existence of sustainable and eco-friendly housing can be traced to ancient times. In ancient Greece, the need for sustainable design transcended all class lines, this can be seen as all homes from palaces to hovels were designed to maximize the use of solar energy, and urban settlements of that time were planned to gain maximum use of solar energy. The use of locally available raw materials was favored in countries like Africa and Asia, which is why many settlements were built used mud bricks and plastered with mud, which was available in “their backyard”. Today’s construction industry focuses on importing and buying materials from the other parts of the world like asphalt, concrete, steel, etc. which results in increased carbon footprint due to the shipping and movement of these goods[21].

It is evident that all animals, share the same desire to increase comfort, and even convenience, but humans have increased this pursuit to the point where we are compromising out environment and livelihood on the earth. One of the main factors of ancient sustainability is regionalism, which means to live in accordance with the environment which means, building homes which will suit the environment around us. For instance, the houses in tropics must be built in a different way than houses in the Mediterranean/Arctic regions. This is due to the major difference in the climatic conditions and features. The humidity and heat that the tropics receive is absent in the

northern belt and as a result the northern homes don't require arrangements which will reduce heat and temperatures. This climate responsive architecture is just an advantageous harmony achieved by changes in design and can be seen in remains of ancient settlements all over the world. But in today's world, almost all over the world, the architectural style is very similar. In order to compensate for change in environment and weather, we use appliances and devices which alter the weather inside the house. This results in even more energy use and thus increases the carbon footprint of the house[22].

The birth of modern green built, eco-friendly housing movement was around the same time as the glass-box style high rise skyscrapers had become popular. At this time as at one side every building was being reconstructed into a high rise skyscraper, on the other side a group of environmentalists, architects and ecologists came together inspired by the growing oil prices and rising environmental concerns, and as a result of that the modern green building movement was born[23].

Research through the late seventies to the nineties, resulted in progress and development of energy efficient processes. This resulted in the development of more efficient solar panels, prefabricated energy efficient wall systems, water recycling, modular construction, use of daylight to decrease day-time energy consumption.

In the current times, green building has taken a front foot in the housing industry, the rising concerns regarding sustainability due to increasing pollution levels and temperatures, global warming, climate change, have made it necessary for developers and contractors think about the environmental impact of housing projects. Restriction form government regarding the pollution levels occurred due to construction activities, the types of materials and chemicals used for the construction process have increased which make it mandatory for all the developers and contractors to comply with these guidelines and follow them. Other than that, the awareness regarding individual carbon footprint is increasing and individuals all over the world are taking efforts to decrease it. This has created a demand for sustainable, low carbon footprint products and services which also include eco-friendly houses and apartments. Until the last decade, most of the green building movement was restricted to individual houses and buildings. But as the face of housing market is rowing and apartment and housing complexes are taking the majority of the housing

industry, the movement has also started to spread in this sector. Rooftop gardens to reduce heating, solar powered water and floor heating, water recycling through the gardens of the complex are some the ways every housing developer is taking steps to reach some amount of green building. This has made green homes accessible to almost every individual, regardless of his budget, living style and thus helps contribute to the development of eco-friendly housing industry.

1.1.4 Section-(d)

Features of Eco-Friendly Housing

Eco friendly house or Eco houses in general have a lot of feature that help them distinguish than traditionally built houses. The methods and layouts used during construction, the materials the practices used are different than the traditionally built housing systems[24].

The main distinguishing features of the eco-friendly housing systems are:

1. Solar gain:

The design of ecofriendly house is fit to maximize the use of daylight and solar energy for lighting the house. For example, in the northern hemisphere, a south facing house is a much better design because of its access to sunlight and protection from the cold winds and vice versa in the southern hemisphere.

By maximizing natural lighting in the house, the energy consumption for the purpose of lighting decreases and cuts cost as well as use of resources. This is done by installing large windows facing the sun, mostly south and west directions[25].

2. Building Materials:

Use of sustainable materials also results in reduction of the carbon footprint of the housing project. Some of the main sustainable materials used are:

- Timber:

Wood is a primary building material used for eco-housing. This is because wood is non-polluting, they grow using energy from the sun and amply existing natural resources, produce oxygen during growth and absorb CO2, they can be

replaced by replanting and they can be sourced locally and thus reduce transportation costs.

- Lime:

Lime is used as a substitute for cement where it can be used. Although lime uses energy and CO2 during production, but it turns into limestone over time while absorbing CO2 from the surrounding environment.

- Reclaimed/Recycled Materials:

Use of materials like bricks, slates and tiles procured from demolishing older structures is also an energy efficient way to construct. This results in reusing of materials which results in reduction of energy used to prepare new materials as well as energy used to demolish and process the waste materials.

3. Health:

One of the main benefits of an eco-friendly house is the healthy living environment. The indoor air pollution levels in an eco-friendly house are significantly lower than a traditionally built house. Use of sustainable materials around the house also decreases exposure to harmful chemicals and wastes which otherwise would be dangerous to the health.

Eco-friendly housing seeks to lower the volatile organic compounds, or VOCs and other impurities like microbial and particulate contaminants. Many of the times buildings have a poorly designed ventilation systems which fail to provide adequate ventilation of cleaner air from outdoors or recirculated filtered. During the design and construction process of buildings, choice of construction materials and interior finished products is very important as they determine the levels of volatile organic compounds which affect the indoor air quality. Many of the cleaning and maintenance materials emit gases and some of them are toxic like carbon monoxide and formaldehyde. These gases can have a huge impact on the occupant’s health, comfort, and productivity. The levels of these gases must be managed in order to increase the building's indoor air quality.

Another aspect of improving the indoor living quality is to control the moisture levels inside the house. This is because moisture can cause bacteria and

mold to grow which is not a healthy living environment. This is done by use of better insulation methods and ventilation systems to remove the moisture. Use of hardwood floors also promote moisture control by absorbing or releasing moisture and thus, improve air quality inside the house.

4. Waste reduction and management:

Green building or eco-friendly building pays attention to not only the sustainable building but also to waste reduction and management. This applies from the construction phase to all the way to demolishing phase.

During the construction attention is paid to efficient use of all the materials used. This in turn reduces the waste created and prevents it from ending in landfills. When the building is operational phase, attention and focus is paid to reduce and effectively manage the waste created by occupants. This includes establishing facilities like compost bins, greywater treatment centers, water recycling systems. Grey water generated from occupant activities like washing clothes, dishes, and then use them for subsurface irrigation and if treated for non-potable purposes like flushing toilets and washing cars.

Setting up a wastewater treatment facility can be expensive and won't be an affordable choice for some developers. At such times, they can use alternatives like setting up a bio-gas plant which converts human and wet waste and using it to create fertilizer and biogas for use centralized heating and cooling system. This helps is creating fertilizer for the plants used in landscape design and create carbon sinks that remove carbon dioxide from the atmosphere and create a healthy air quality.

5. Reduced energy consumption:

Eco-friendly houses are built to reduce the energy consumption by the occupants. This is done by incorporating structural design to maximize the use of existing energy sources like sun and wind. This is done by having windows facing the sun which increases the daylight which reduces the electricity consumption for lights. Similarly, the use of windows and natural cooling and heating systems result in reduced electricity consumption for that purpose.

Installing solar panels on the roof can be useful to heat water for household use as well as power the lights for the house. This results in lower emissions and energy consumption thus lowering the carbon footprint.

1.1.5 Section-(e)

Advantages of Eco-Friendly Housing

One of the main advantages eco-friendly house has is the low maintenance and operation cost. Strategic design and facilities result are less use of electricity and gases which in turn reduces the bills by approximately 30%. Operating and maintenance costs account of around 80% of the lifetime costs of the building for building owners, investing in eco-friendly construction will help in increasing the profits earned by collecting rent from occupants. The cost of using eco-friendly resources maybe expensive upfront but it will be the cheapest option in the long run.

Energy efficiency is also one of the main advantages of eco-friendly housing. Designers of eco-friendly projects try to as much as possible to reduce the dependency on energy produced from non-renewable resources like coal. One of the main alternatives used for this purpose is the installation of solar panels for water heaters as well as electricity. This also reduces the stress on natural resources as the demand for electricity produced through non-renewable resources lowers.

Along with energy and electricity conservation, eco-friendly houses also promote water efficiency. It involves using water resources in a way that conserves water and ensure sustainability. Facilities like rainwater, recycling grey water for plants and other purposes, wastewater treatment reduce the wastage of water. Using efficient plumbing fixtures also reduce the water consumption of the household.

Eco-friendly housing also has some major health benefits for the residents. By use green energy sources and materials, the environment in the eco-friendly home is much clearer. The indoor pollution levels of eco-friendly homes have been proven to be multifold less than that those in a traditionally built home. This is of great importance as it gives the resident a place to be in contact with fresh and pure air which is necessary as the fast-paced urban lifestyle often result in exposure to air and water with high levels of pollution.

The reduced strain on shared local resources is also one of the key advantages of the eco-friendly housing industry. As the house requires low amounts of resources due to a certain level of self-sufficiency, the strain on the shared resources like water and electricity reduces. Along with this, the carbon footprint of the house built using eco-friendly techniques and materials is low which is beneficial of the environment as a whole. The emissions caused during the operation phase of the house are also low when the house is built using eco-friendly techniques.

At global level, the building and construction industry has the highest scope to reduce the greenhouse gas emissions when compared to other sectors. It is said that the energy emissions savings is as much as 84 giga tons of CO2 by 2050 which one of the highest potentials. Green building can not only reduce the damage on environment by in long turn has a positive impact on the environment by promoting energy conservation and efficiency.

The financial or economic benefits of green building or eco-friendly building are numerous which are relevant to a wide range of groups. The cost savings on utility bills for tenants are achieved through energy and water efficiency. The lower construction costs in the long run paired with the increased property value has a potential for developers to make higher profit of eco-friendly projects. as the demand for eco-friendly housing increases, the industry has a massive scope for growth and economic development.

Eco-friendly building results in multiple health and well-being benefits for the general public. Commercial building and offices built using eco-friendly practices promote positive work environment and decreases the negative impact caused due to emissions from such buildings. According to a study conducted by Harvard school of public health, workers in green, well-ventilated offices showed a 101% increase in cognitive scores (brain functions)[26].

The preference to conserve natural landscape while construction, results in prevention of destruction of natural resources. Since the natural landscape is not destroyed to construct building, the eco systems are not severely damaged due to change in terrain and physical features. Activities like clearing of mountains, filling of riverbeds are reduced and thus don’t damage the environment.

1.1.6 Section-(f)

Current Scenario of Global Housing Industry

With importance regarding climate change and global warming increasing, movements have begun to start to reduce the negative impact of activities on the environment including the construction industry. Given the proportion of impact the housing industry has on the environment, it is accepted that the housing industry should move towards an environmentally conscious future. This particularly applies to modern, urban housing system which contribute the most to greenhouse gas emission. These systems like apartment complexes, townhouses, have a higher carbon footprint than traditionally stand-alone houses as they accommodate a higher number of people and have higher energy demands like constant air-conditioning and heating systems[27].

Urban housing systems focus on creating more livable space in a small amount of land. This result in construction of high-rise building and apartment complexes where there is little to no greenery and facilities to help the environment. Moreover, urbanization and high-paced lifestyle has a primarily negative impact on the environment. Use of private transportation facilities, higher electricity consumption has already increased the environmental damage that urban lifestyle has on the environment. These high-rise apartment systems have a massive negative impact throughout the phases of the buildings life cycle. For the construction of the high-rise structure, the foundation has to be built deep in the ground which thus alters the underground eco-system and loosens the soil which can cause problems to the environment. Use of higher electrical power to transport materials and people to higher levels through elevators, pumps result in increased consumption[28].

To increase the livable space in the building, developers often compromise for amenities like gardens and lawns which are the major sources of reducing the carbon footprint of such projects. This lack of greenery also results in an unhealthy air quality in the area which can cause major health problems to the occupants.

As a result, urban or social housing should respond to the urgency generated by climate change as soon as possible. Use of green design and practices during the

construction of new projects while implementing carbon reducing systems and facilities in existing projects to reduce the carbon footprint of these projects.

In the current times, the main focus of social housing projects is to maximize revenue and profits. The main demographic for social housing industry is low-income families and thus to generate profits from such projects, developers often concentrate on creating maximum sellable units which result in overcrowding and non-environmentally friendly design. This cause the design of the building to be highly efficient in reference to its environmentally friendliness. High-rise buildings are often constructed for such projects as they are able to occupy a large number of residents in a comparatively smaller land space than a traditionally constructed building. This design has a lot of impact on the environment as it results in destruction of underground eco-systems and underground water reserves. As a lot of residents occupy a small space the greenhouse gas emissions are highly concentrated from such areas. This is due to a number of reasons, like higher energy requirements and higher emissions from day-to-day activities.

Residential buildings are responsible for approximately 27% of total energy consumption in European cities and they are also responsible for around 21% of total CO2 emissions. It is also proven that 80-90% of energy consumption for residential buildings occur during it operational phase and most of it is used for space and water heating[29].

With initiatives regarding the environmental damage gaining momentum, global agreements have started to focus on environmental impact of human activities. As a result, many governments have started to put regulations and limits on housing projects regarding the emissions. These efforts are driving the movement of green housing to achieve its objectives. The main objectives of the green building movements are to decrease emissions, increase efficiency and decrease dependency on energy from non-renewable sources[30].

1.1.7 Section-(g)

Current Scenario of Indian Eco-Friendly Housing Industry

As far as India is concerned, the growing housing sector is one of main results of rapid urbanization of many towns and cities. The housing sector, particularly urban

housing, is one of the highest contributors to the countries carbon emissions accounting for around 22% of India's total annual carbon emissions. Buildings account for up to 40% of total energy consumption in India. Out of this around 60% of the emissions come from residential buildings and structures. As a result, it has become of utmost importance for the Indian real estate industry to move towards sustainable building and development for residential projects[31].

Importance of energy efficiency in India was seen long before the modern revolution. Traditional buildings were built with energy efficiency in mind because the architecture often depended on the climate and surroundings. Buildings built in desert and hot climates had corridors and passages in the natural direction of wind to cool naturally. In wet regions house were built to drain water from rain as well as keep the house damp free to prevent growth of mold and bacteria. These features can be seen in archaeological sites like the Hawa Mahal where multiple designed windows provide cool breeze in an otherwise deserted area.

The sustainable and green building movement in India is being monitored and led by the Indian Green Building Council (IGBC). The India Green Building Council was formed by the Confederation of Indian Industry (CII) in 2001. The council is based out of the CII Green Business Centre in Hyderabad, which is India first Platinum rated green building. The main objective of the council is to enable a sustainably built environment for all irrespective of their background and position[32].

The IGBC certifies the projects which are designed, constructed, and operated in the guidelines of IGBC ratings. Green projects which are rated by the IGBC fall under the following levels: certified, silver, gold, and platinum. Since its establishment, the IGBC has rated 2049 project (approximately 747 million sq.ft)[33].

Along with the IGBC, the Indian green building movement is also powered by the EDGE program and BEE certification. The EDGE program is a partnership among the IFC, a member of the World bank group and the Confederation of Real Estate Developers' Association of India (CREDAI) which is the apex body of private real estate developers, to promote green buildings throughout the country. A memorandum of understanding for this agreement was signed in the presence of the then Minister for Environment and Forests Prakash Javadekar on 25th November 2014. The Indian Bureau of Energy Efficiency (BEE) launched the Energy

Conservation Building Code (ECBC). The code is set for energy efficiency standards in regard to the design and construction of any building of minimum conditioned area of 1000 m^2 and a connected demand of power of 500KW or 600KVA. Any building which falls under the index set by the BEE is termed as "ECBC Compliant Building".

Along with the IGBC, EDGE program, BEE certification, the GRIHA (Green Rating for Integrated Habitat Assessment) was formulated and conceived by The Energy and Resources Institute (TERI). This assessment was developed with the Ministry of New and Renewable Energy, which is another national rating system for green buildings in India.

Chennai is ranked 4th in the country in terms of the number of sustainably built projects. There are 321 projects registered of which 37% of the projects are residential, 36% of them are commercial and 6% are public places like railway stations. More than 10% of structures in India which are certified as eco-friendly are from Chennai. These ratings have been given by the Indian Green Building Council (IGBC). Chennai has taken multiple strides in making the future more sustainable and eco-friendlier[34].

In Maharashtra, near Mumbai in Thane district, Govardhan Eco Village has been constructed using eco friendly materials like stabilized Earth blocks, Rammed Earth Technique, Cob Houses with traditional roof. These buildings have received a five-star rating from GRIHA, an Indian Nationwide Green Standards for Buildings, a wing of the Famous TERI.

1.1.8 Section-(h)

Future of the Eco-Friendly Housing Industry

The increasing spotlight on issues regarding the negative impact on the environment. The popularity of sustainability is also increasing and thus the size of the eco-friendly housing or popularly known as eco-building market is increasing as well. For instance, the global market for green materials is set to reach a target of $364.6 billion by the year 2022. As the consumers are getting more knowledgeable about the issues regarding the environment, their lifestyle is changing and thus, this has fueled the demand for green buildings[35].

Research has showed that up to 72% of people prefer to buy products from companies which shows respect the environment. With the millennial generation being the new home buying generation, the ideas and values of this generation largely affects the demand. With the millennial generation being very passionate and conscious about the environmental impact of their activities, they seek products and services which have low impact on the environment. This changing purchasing habit has also seeped into their demand and interests in buying houses. It is said that millennial value sustainability and want a healthier environment, lower maintenance, and smart technology and they don't want anything wasteful and harmful to the environment. It is also seen that the millennial generation has different requirements when it comes to real estate and interact with their homes in a different manner. For the older generation, the main expectation from their house was to provide a shelter and protect from the harsh environment, whereas the millennial generation seeks comfort and functionality as well as a place to escape from the fast paced social and professional lifestyle. This difference in expectation from the property has resulted in a totally different set of demands which can't be satisfied by existing/traditionally built homes. As a result, developers have started to change their offerings and construct homes according to the demand of the main demographic of house-buyers[36].

With the materials for construction being available locally and often times for cheap, the cost benefit for eco-friendly housing is also high. As the materials are available locally, the transportation costs for the site of production to the site of operation is also low which thus increases the profit margin for developers. Recycling raw materials like timber, bricks and slate means that the materials are available much quicker and don't have long waiting/shipping periods, so the construction works is able to complete in a shorter amount of time. As for the selling point of view, by getting the required certification and approvals from agencies the developers are able to put on a higher price tag for a verified and accepted green home which can increase their profits. Construction of ethical properties can help increase brand loyalty and awareness which can help in attracting more customers[37].

For savings from the customer point of view, even though the initial cost may be high, the day-to-day operation cost for the house is also low. By using renewable energy sources and smart technology in eco-friendly homes, the energy bills can be cut down 20-30%. As a result, the savings from living in a sustainable home are much

higher in long run. Since eco-friendly houses are built to last for a long time, the maintenance cost and frequency for such homes is also low. Since systems like solar power and wind power are used effectively, dependance on heating radiators or air conditioners is reduced and thus they don't need to be maintained constantly. Moreover, the health benefits of eco-friendly houses like the improved indoor air quality also attract home buyers to help their health issues from being in a highly pollutes outside world.

To promote environment conservation and protection, governments also have started to offer subsidies and incentives on green products including green houses which gives boost for both the developers and buyers to turn towards eco-friendly homes. Developers being able to market their projects better by using the government schemes and policies helps them to attract a larger consumer base and generate revenue.

The green building initiatives also open up doors for new employment opportunities like sustainability specialists, architects and material suppliers, environmentalists, etc. this will result in modernization as well as conservation of the existing natural resources.

With the above being said, there is a lack of research in this field and how the buying habits affects the eco-friendly housing industry. As a result, research must be done in the area from consumer point of view which will help the developers create new projects catered to the consumer demands. The research will also help the government in formulating new policies and requirements which will boost the construction of eco-friendly projects.

PART-II

1.2 PROFILE OF ECOFRIENDLY HOMES INDUSTRY

Present research has been aimed to investigate consumer behavior of the ecofriendly homes. Keeping this in mind, discussion on the eco-friendly industry is seem to be important and necessary, thus an effort has been made to provide detail profile of the eco-friendly homes with the help of six sections accommodating global scenario of eco-friendly homes industry, market segmentation, regional analysis,

competitive landscape, drivers of industry and agencies involved in acquiring green building.

1.2.1 Section-(i)

The Global Scenario

Green buildings or eco-friendly buildings a relatively new introduction to the society. Green buildings incorporate sustainable materials and technologies during the construction with the aim to decrease environmental impact while creating a healthier indoor environment find occupants. These motives are also one of the main reasons at the green building market has started to gain higher momentum. A combination of various factors which includes carbon footprint reduction, enactment of green building laws, growing urbanization will help door market of green building to proliferate in the coming years.

The global green buildings market is likely to expand at a compound annual growth rate CAGR off 10.26% over the period of 2018 to 2023. The global green building and its allied activities market is expected to grow to 187.4 billion dollars by 2027. These figures brought out during the latest study conducted by market research future MRFR. This report incorporates multiple macro as well as microeconomic factors which have the potential of impacting the market over the said forecast period[38].

The global warming has become a reason of concern in today's world and as a result various regulatory bodies like governments and international agencies have started to enact laws which will promote green buildings. These governments are taking concrete steps to increase building which have green components and promote them by providing incentives and subsidies. Green buildings are known to reduce carbon emissions by up to 35% and consume 25% less energy than conventional buildings. This is a major factor why the green building segment in construction is gaining popularity day by day. Moreover, the higher resale value of a building constructed with green components is again the positive point from buyers perspective and provide access to a catalyst to find applied growth, as this increases the favorability for the builders as they can charge a higher premium for green properties[39].

1.2.2 Section-(ii)

Market Segmentation of Green Building Industry

The green building market can be assessed on the basis on the basis of the products as application. On the basis of application, the green building market can be divided into:

1. Commercial and industrial

2. Residential

The commercial segment of green building focuses on reducing the carbon footprint off factories, offices, and other commercial establishments like malls. This is done by incorporating green alternatives during the construction of new buildings and by switching to green assistance during renovation and retrofitting of existing structures. The main driver for this segment of market is the demand made by huge corporations like Amazon Google Microsoft etc. The demands made by these companies when looking for office spaces in the region helps in the growth of a commercial green building industry[40].

The residential sector of the green building industry is mainly divided into two portions consisting of independent houses and community houses or apartments. This sector has seen an enormous growth has the consumer mindset has been shifting due to the increasing awareness about the current environment crisis. The consumers are looking to incorporate more green factors in their life including their home. The independent houses sector of this segment had seen the growth of green building for a longer time then the apartments or community houses sector. This is because for the longest time the technology is required to increase the efficiency of Community Housing we're not developed. As the field is progressing the Community Housing sector had started to see rapid growth[41].

The residential segment of the green building market is dominating the field this segment stood at USD 123,401.5 Mn in 2018 and accounted for almost 60% of the total market share. It is anticipated to reach USD 206,855.7 Mn by the year 2023 at a CAGR of 10.88%. The non-residential project is likely to reach USD 121,270 Mn at a CAGR of 9.25% over the forecast period[42].

On the basis of product, the green building market has been segmented into two types:

1. Exterior products
2. Interior products

The exterior product segment of the green building market has been further segmented into smart lighting, HV AC systems, solar products, building systems, and others. The interior products segment of the green building industry has been segmented into roofing flooding and appliances.

The exterior product segment is dominating the market and has the major share off 79.6% of the global market. The segment is expected to reach market value of USD 268,573.8 Mn by the end of 2023. It has a proposed CAGR of 10.76%.[43]

1.2.3 Section-(iii)

Regional Analysis of Green Building Industry

The green building industry can be segmented into four key regions. They are:

1. North America
2. The Middle East and Africa (MEA)
3. Europe
4. Asia Pacific (APAC)

North America is the leading green building market and holds a 29.41% share of the market. This is due to the existence of developed countries like USA and Canada in this segment. Need to develop countries have a higher scope in building sustainably constructed buildings as they don't have constraints like limited budget and space. In 2018 no value of the North American market was USD 59, 537 Mn hand was expected to reach USD 99, 805.5 Mn at CAGR of 10.89% during the forecast. Another major factor influencing the market growth is the technological superiority that countries in North America have.

Europe is the second largest market or green building, valued at USD 51, 030.1 Mn in 2018. As per MRFR's analysis The European green building market had the potential off the increase in value up to 83, 669.1 Mn at a CAGR of 10.39%.

Stricter government regulations in terms of performance, availability of technical expertise are acting as major driving forces or the market growth in this region.

The emir green building market is also growing at a CAGR of 9.39% over the forecast period. Extreme climatic conditions experienced by this region all year long is one of the main factors which has resulted in the increased need of green building in this area.

With almost 24.5% share of the global market the Asia and Pacific green building market has a potential for remarkable growth. Favorable government policies, increasing incentives and subsidies are favoring the growth of market off green buildings in this region which are expected to help the market achieve a compound annual growth rate off 10.09% over the forecast period[44].

1.2.4 Section-(iv)

Competitive Landscape of the Global Green Building Materials Industry

The global industry for green building materials has a higher scope of competition. This is due to the newness of the industry and the huge scope of development of new technologies and products for the industry requirements.

Key players in the green building materials market include:

- Native (USA)
- Bauer Limited (U.K)
- Ginkgo Sustainability (Canada)
- Kingspan Group plc (Ireland)
- Green Build Products (I) Pvt. Ltd. (India)
- Saint Goblin S.A (Germany)
- SGS (Switzerland)
- E. I. du Pont de Nemours and Company (USA)
- Weinberger AG (Austria)
- Green Building Store (U.K)

And many others.

1.2.5 Section-(v)

Drivers for the Green Building Industry

There are multiple drivers for the growth of green building industry. The drivers for "going green" Can be categorized into two parts:

1. economic factors
2. ecological/Social responsibility

The following figure illustrates the main drivers for the growth of the green building industry[45]:

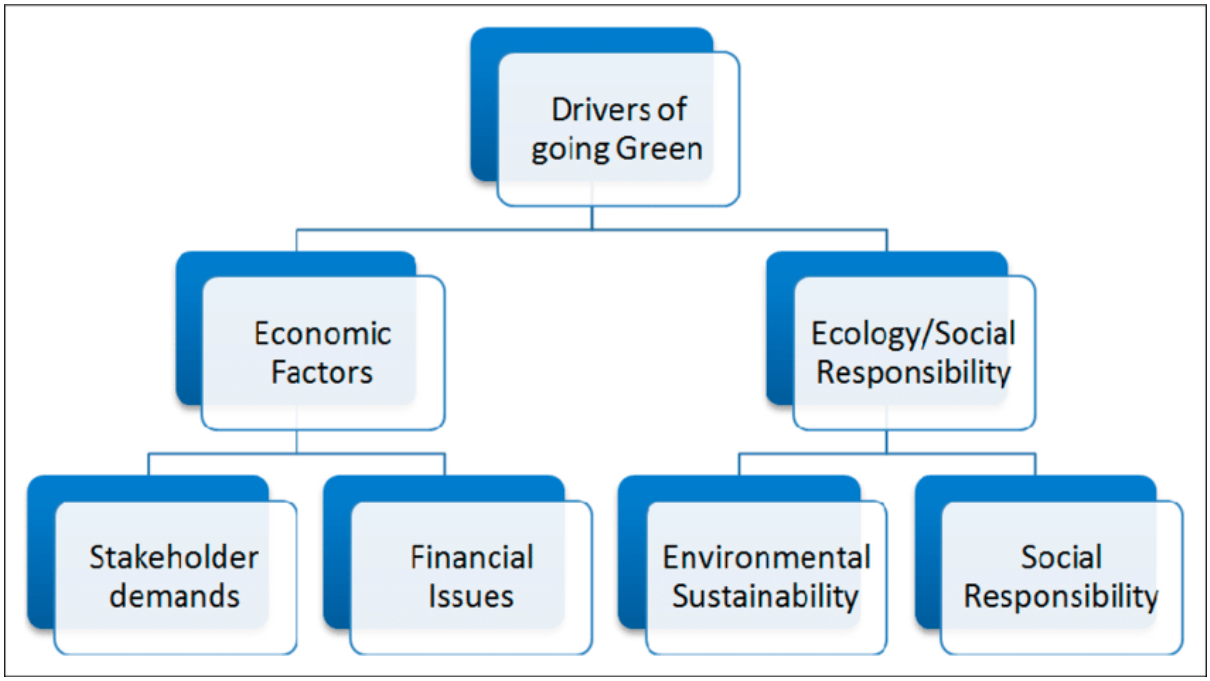

Fig-1*(Source-https://www.researchgate.net/figure/Four-main-drivers-of-green-building_fig1_270645408)*

The economic factors of the growth of green building industry focus on the economic benefits and effects of going green. The economic factors argue that green buildings are constructed due to the drive given by economics which include the need to reduce the cost of construction and operation and to provide an advantage in the market. The increasing demands from the consumers for green features in that houses also give a boost to the construction of new buildings.

The second factor for the growth of green building industry is the increasing sense of ecological and social responsibilities of corporations. The need for

construction of sustainable environment project in relation to the environment has resulted in corporations shifting to green alternatives and eco-friendly options. The increasing social responsibility that companies feel regarding the environment also has driven the growth of eco-friendly construction.

Apart from these another major driver for the growth of green buildings is the legal aspect. In today's day due to the increasing environment and climate crisis governments all around the world have started imposing restrictions and regulations regarding the emissions and impact caused by all industries on the environment including the construction industry. This has resulted in companies needing to follow with revised guidelines had incorporating green features in order to meet them. Along with increasing guidelines and regulations governments are also promoting and ecofriendly industrial environment. Governments are providing incentives, subsidies, and tax benefits for construction of green buildings which also and creative developers and contractors to take up the equal friendly option over the conventional/ non-eco-friendly counterpart[46].

1.2.6 Section-(vi)

Agencies for Acquiring Green Building Certification in India

Having a green building certification is very beneficial for a green structure. Since the design and structure is analyzed in detail there is a 30% increase in the conservation of energy carbon and 97% reduction in wastage as these systems are perfected while getting a certification. There is an additional 8 to 9% reduction in operating costs after green building which is certified by any governing body. The value of structure which is certified by globally accepted certification increases by 7.5%. This is especially useful for the developers has a source to increase the profit margin by marketing the structure as “green” which is known to sell at a higher price. Sustainable buildings have been shown to have up to 6.6% increased ROI, over 3% increase in occupancy rate. Green buildings also fetch a higher rent price with rent premium increasing by 3%. All these economic and financial benefits that certified buildings under any governing body make it very attractive for developers to get a green building certificate.

The main governing bodies and agencies in India to acquire a green building certification are as follows:

1. Green rating for integrated habitat assessment (GRIHA)

Green rating for integrated habitat assessment (GRIHA) is India's very own rating system which is jointly developed by the ministry of new and renewable energy Government of India and Teri. The green buildings designed under this system is evaluated by following process

i. Online submission of documents
ii. The study of feasibility which is conducted by a team of professionals and experts from the greenhouse secretariat
iii. Rating off the building on post construction

Parameters like selection of site, site planning, green systems utilized in the building, innovation, etc. Add the main focus during the process of achieving a GRIHA rating.

2. Indian green building council (IGBC)

The Confederation of Indian industry, CII 's IGBC has launched a total of 9 green building rating systems. These systems are categorized according to the type of construction project. The 9 project types covered under I GBC's green building rating systems are new buildings (NB), existing buildings (EB), Homes, schools, factory buildings, townships, special economic zones (SEZ), landscapes, mass rapid transit system.

3. Bureau of energy efficiency (BEE)

The Bureau of energy efficiency (BEE) has developed an energy performance index (EPI) rich gives a rating between 1 to 5. The higher the rating is the more efficient the building is the unit considered to raid the building is kilowatt hours per square meter per year as the energy performance index targets mainly air conditioned and non-air conditioned office buildings.

1.2.7 Section-(vii)

Green Housing Industry of Pune

Pune is one of the pioneering cities in India With respect to green building. Pune Municipal Corporation PMC) is the first urban governing body in the country to take implementation of ecofriendly programs in the construction / housing industry. when is the first city to implement a plan green building housing program built with the

support of The United States agency for International Development (USAID) and the science and technology park (Scitech park) as its technical partner along with The International Institute of energy conservation (IIEC). the Pune Municipal Corporation has also taken the lead to encourage and make aware the people about the concept of sustainable construction by setting up are dedicated equal housing cell.

The following table show us the number of certified eco-friendly projects long with their name, developer, and the square footage of built area:

Fig 1.1 List of Eco- Friendly Houses In Pune & Pimpri Chinchwad

Sr.No.	Project Name	Developer	Built Up Area (Sq.mt)	Certification Status
1	Vivarea, Byculla , Mumbai	Genext Hardware & Parks Pvt. Ltd	61924	Provisional Certificate - 5 star, Preconstruction phase complete, Construction phase going on
2	Suyog Leher, Kondhwa, Pune	Suyog Group	23810	Provisional Certificate - 5 star, Preconstruction phase complete, construction phase going on.
3	45, Nirvana Hills , Erandwane	Kumar Urban Development Ltd.	8058	Modifications in process , Yet to award provisional certificate
4	Ganga Bhagyoday, Sinhgad Road	Goel Ganga Group	19447	Provisional Certificate - 5 star, Evaluation done, Final certificate to be awarded
5	Gera - Emerald City , Kharadi	Gera Developments	20713	Provisional Certificate - 3 star, Evaluation done. Final certificate to be awarded
6	Kool Homes Solitaire, Kondhwa	Kool Homes Developers	10852	Provisional Certificate - 3 star.Evaluation done. Final certificate to be awarded
7	Cross Over County , Sinhgad Road	Darode Jog Properties	17926	Provisional Certificate - 5 star, Evaluation done, Final certificate to be awarded
8	Park Xpress, Balewadi	Pride Housing and Construction Pvt. Ltd.	36382	Provisional Certificate - 4 star,Evaluation done, final certificate to be awarded
9	Raheja Vistas Phase-I, Mohammadwadi	Cavalcade Properties	4523	Provisional Certificate - 5 star,Evaluation done, final certificate to be awarded
10	Kumar Sublime, Kondhwa	Kumar Urban Development Ltd.	2354.06	Provisional Certificate - 5 star,Evaluation done, final certificate to be awarded
11	KUL UTSAV, Kondhwa	Kumar Urban Development Ltd.	14565	Registration Phase evaluation done , will be awarded Provisional Certificate
12	Deepa Housing Plot 6&7, Pashan - Sus Road	Bhosle Salunke Properties	689	Provisional Certificate - 4 star
13	Kool Homes - Arena, Balewadi	Kool Homes Developers	10864	Provisional Certificate - 3 star
14	Marvel - Zephyr, Kharadi	Marvel Realtors	59507	Provisional Certificate - 4 star
15	Rohan - Mithila, Lohegaon	Rohan Builders (India) Pvt. Ltd.	71679	Provisional Certificate - 5 star
16	Rohan - Leher, Balewadi	Rohan Builders (India) Pvt. Ltd.	24342	Provisional Certificate - 5 star
17	Vascon - Willows, Balewadi	Vascon Engineers Pvt. Ltd.	28381	Provisional Certificate - 4 star
18	Pride Paltinum, Baner	Pride Housing and Construction Pvt. Ltd.	34952	Provisional Certificate - 4 star

19	Orange County-Phase IV, Baner Pashan Link Road	SCN Sukhwani Ventures	2058	Provisional Certificate - 5 star
20	Orange County-Phase III,Baner Pashan Link Road	SCN Sukhwani Ventures	1076	Provisional Certificate - 5 star
21	Amrut Ganga, Sinhgad Road	Goel Ganga Group	19334	Provisional Certificate - 5 star
22	Tejraj - Mallika, ICS Colony	Tejraj Promoters and Builders	3536	Provisional Certificate - 5 star
23	Vascon developer and Clover Builder -Forest County,Kharadi	Vascon Engineers Pvt. Ltd.	96093	Provisional Certificate - 5 star
24	Raheja Vistas Phase II, Mohammadwadi	Cavalcade Properties	7740	Provisional Certificate - 4 star
25	Raheja Vistas Phase III, Mohammadwadi	Cavalcade Properties	10037	Provisional Certificate - 4 star
26	Vascon - Windermere, Koregaon Park	Vascon Engineers Pvt. Ltd.	21600	Provisional Certificate - 5 star
27	Rohan - Parijat Sector 3B,Lohegaon	Rohan Builders (India) Pvt. Ltd.	17105	Provisional Certificate - 5 star
28	Rohan - Parijat Sector 3A,Lohegaon	Rohan Builders (India) Pvt. Ltd.	30821	Provisional Certificate - 5 star
29	Rohan Builders (Mithila - Plot E)	Rohan Builders (India) Pvt. Ltd.	18762	Provisional Certificate - 5 star
30	Kool Homes - Green Valley, Bavdhan	Kool Homes Developers	13110	Provisional Certificate - 3 star
31	Marvel - Aurum, Koregaon Park	Marvel Realtors	6515	Provisional Certificate - 3 star
32	Kool Homes - Rising Landscapes, Mohammadwadi	Kool Homes Developers	18508	Provisional Certificate - 4 star
33	The Latitude, Kondhwa	Ahura Builders	12705	Provisional Certificate - 4 star
34	Margosa Heights, Mohammadwadi	Kolte Patil Developers	82886	Provisional Certificate - 4 star
35	Pethkar - Samrajya, Kothrud	Pethkar Projects	13665	Provisional Certificate - 5 star
36	Rohan - Ishan , Bavdhan	Rohan Builders (India) Pvt. Ltd.	8990	Provisional Certificate - 5 star
37	Ishanya, Pune - Satara Road	Eisha Group	55640	Provisional Certificate - 5 star
38	Amanora Park Town- R9/R10, Hadapsar	City Group	26126	Provisional Certificate - 5 Star
39	Concord Pushpak, Lohegaon	Concord Spaces	5017	Provisional Certificate - 4 Star
40	Project One , Durgapur	Reacon Engineers India Pvt. Ltd.	37161	Provisional Certificate - 5 Star
41	Konark Meadows, Wagholi	Karia Developers	13230	Provisional Certificate - 4 Star
42	Project at Moshi , Survey No.97, Pune	Kumar Properties	33799	Provisional Certificate - 5 Star
43	Tejraj Promoters & Builders (Tejaura), Happy Colony	Tejraj Promoters and Builders	836	Provisional Certificate - 3 Star
44	Tejraj – Thakar Properties (Tejcrest), J.M.Road	Tejraj Promoters and Builders	706	Provisional Certificate - 4 Star
45	Konark Vista, Hadapsar	Karia Developers	8074	Provisional Certificate - 4 Star

(Sourcehttps://www.ecohousing.in/List%20of%20Eco%20%20Housing%20Projects%20With%20Ratings.php)

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Chapter-2

LITERATURE REVIEW

The study of consumer behavior to the extent of buying eco-friendly homes is the core aspect of this present research. With this view of matter literature have been made and presented in this chapter. The basic intension of this chapter on literature review is to provide familiarity to the basic theoretical aspects considered in this study. Initially, need of eco-friendly houses has been addressed in the below section with aim to provide basis for the further discussion.

As the negative impact of consumption habits is coming to a fore front, consumers are looking to reduce their carbon footprint by switching to eco-friendly and green product alternatives. This changing pattern of consumption has reached in the housing industry as well. Consumers who are mostly of the millennial generation who are growing conscious of their carbon footprints are looking to reduce them even while purchasing housing. As they are becoming the main house buying age group, it is necessary for the construction and housing industry to respond to this new demand. Along with the rising demand there are multiple reasons that increase the need to build eco-friendly homes[1].

Along with having a demand, the main factor which should be considered is the lower cost of the eco-friendly house in the long term. An eco-house has significantly lower energy and fuel consumption. Also, since most of the house is built from locally sourced raw materials like sand and timber, the costs associated with transportation and material procurement is considerably low. These cost savings are seen when they are considered in long-term. Eco-friendly houses may still have a higher up-front cost, but they will result in higher saving in long-term. Most of these savings come from reduced energy bills and reduce water consumption[2].

Eco-friendly houses have a lighter impact on the environment. This also has a lot of different health benefits for the occupants living in them. Apart from the sustainably and consciously sourced raw materials, the eco-friendly heating and cooling systems create a comfortable environment for living. The ventilation systems as well as lower carbon emissions rising from the house in result create a healthy indoor air quality which has benefits for the occupants. They are no longer exposed to

hazardous chemical fumes and emissions like formaldehyde and carbon monoxide as well as the levels of greenhouse gases inside the home reduces[3].

India has a vast range of natural landscapes and resources from the peaks in Himalayas and Western Ghats to the plain of north and the Deccan plateau, every geographical has the potential to boost eco-friendly architecture by efficiently utilizing the available natural resources in the area. But due to problems like climate change, industrialization and overpopulation, the resources available are starting to deplete at a fast pace and this has resulted in the need of moving to a greener construction industry.

Considering the key appropriate keywords addressed in the present research, this chapter has been divided into three parts. Such as, detailed conceptual literature review on the aspect of consumer behavior has been provided with the help of ***PART-I***, moreover discussion on the overview of the construction industry has been provided with the help of ***PART-II*** of the present chapter. Finally, extensive discussion has been offered on the concept of Green Building and ecofriendly housing in ***PART-III*** of this chapter.

2.1 PART-I

2.1.1 Consumer behavior

Factors Affecting Purchasing of Eco-Friendly Buildings

The rising awareness and education of the consumer segment on the environmental issues and the impact that they have on the quality of life and human health have started to create expectations for green homes. Several studies have been conducted in the world to determine the factors which influence fires to buy a green residential property over a conventionally built property. These factors are mostly influenced by the advantages and benefits provided by the green building concepts.

1. Efficiency off usage of resources:

Green houses add better than traditionally built house as the technology used during the construction is expected to introduce energy consumption for indoor

cooling and heating, water saving, Green materials and so. Energy efficiency helps to reduce a lot of costs father occupants.

2. Lower operating costs

As the appliances and machines used in our equal house are highly efficient, they are able to provide same results as a traditional appliance with a comparatively low input. These energy savings make the operating cost of a house significantly lower. In today's world where energy costs are rising rapidly it is important to reduce them for the buyer. The upfront expenses maybe higher in case of green buildings but overtime they will save a lot of money as they have a lower operating cost.

3. Safe and healthier environment:

As the ecofriendly homes are built using natural materials, the exposure to toxic chemicals and emissions in the echo house is significantly lower. This increases the indoor air quality and helps increase the comfort after home as well as the health levels in the house.

4. Lower impact on environment:

Knowledge and awareness about sustainability and eco friendliness is growing day by day, investing in an eco-home helps buyers reduce their environmental footprint.

5. Access to green space

In today's modern world, due to urbanization most of the families are surrounded by cement walls on all sides. With an eco-friendly space, these families can gain access to green space and water bodies add enhance that living style.

6. Eco mobility:

Developing of housing scheme is not enough without transportation system to increase the mobility after occupants. If the site of the project is situated far away from the main town, the longer commute to workplaces, shops, hospitals, schools and colleges, and friends and families may bar the consumers from purchasing a particular house. Apart from this, as human is a social animal, the distance from the near and dear once may cause harmful psychological effects like depression, stress etc.

7. Community design and planning:

A well-planned community is inviting for potential buyers as it increases the safety of the house.

8. Landscape:

Landscape can help increase the beauty of the project and also help in selling the green project. Landscape has a lot of influence on the consumer when purchasing a house. A well-planned and decorated project increases the chances of sale[4].

2.2 PART-II

Overview of Construction Industry

As has been noted earlier, a detailed discussion on construction industry has been offered in this part. To accommodate the entire discussion with regards to the construction industry this part has been divided into three sections. Thus, the severity of the environmental impact due to construction industry has been discussed with the help of ***Section-(a)***. A discussion on energy and its role in highlighting importance in green building has been detailed out in ***Section-(b)*** while ***Section-(c)*** describes the detailed discussion on life cycle assessment observed in the construction industry.

2.2.1 Section-(a)

Environmental Impact of Construction Industry

An atmosphere in Pune is compared to other cities of Maharashtra State is more comfortable. Thus, a detailed discussion has been offered in this section bearing an intension of providing assessment of impact on environment due to recent practices of construction industry.

Subsection-(i): Environmental Impact of Construction

The basic objective of any construction project plan is to improve the quality of life[5]. But this has a lot of positive and negative effects which come along with it. The development projects are often planned in a way which just brings out positive benefits in the name of profits and revenue. Environmental impacts are often neglected which cause a huge damage to the environment surrounding the project[6]. It

is known that construction damages the fragile environment because of the adverse chemicals processes and materials used. This leads to problems like resource depletion, biological diversity loss, landfill problems, lower worker productivity, adverse human health, carbon dioxide and other greenhouse gas emissions, global warming, acid rain, smog etc. The common problems associated with the construction industry are categorized into three parts[7]:

1. Ecosystem impacts

As the number of ongoing construction projects increases, the impact it causes on the ecosystem surrounding has increased manifold. The adverse environmental impacts like waste, noise, dust, solid waste, particulate matter, toxic gases and other type of pollution are hazardous. Emissionsfrom vehicular exhaust during transportation of materials and other goods result in emission of harmful chemicals like carbon dioxide, nitrogen oxide, and sulfur oxide. Thesegases on release in atmosphere, cause damage in the form of acid rain, smog. Andhealth problems like problems in breathing, asthma, etc. The loud construction equipment also releases harmful levels of noise in the environment. Thesenoise levels range from 72 to 120 decibels within the vicinity of construction site. Thesehigh levels of noise are detrimental not only to the humans working there but also to the animals and birds living in the area. Itcan cause health problems to the elderly like loss of hearing and headache as well as it can kill smaller birds which can easily be shocked by the noise levels. Moreover, the wastewater generated is often left to percolate in the surrounding ground or just disposed in the existing water bodies before treating[8]. This results in the contamination of those water bodies and harms aquatic life and the human and animal life which depends on it[9].

2. Natural resource impacts

Construction sector is known for consuming a lot of resources in the form of raw material and energy. the raw materials use for the construction are often procured in higher quantities than that required which result in leftovers which are generally disposed of very inefficiently. The large amounts of steel, lumber, sand, bricks, cement requires a lot of energy to produce and to be transported to the construction site. As a result, construction industry is responsible for consumption of large number of natural resources and generation of high amount of pollution as a result of energy

consumption during the transportation and processing phase. Construction sites are known to contribute around half of the energy consumption in high income, developed countries as well as is responsible for a major chunk of greenhouse emissions in developing nations[10].

3. Public impacts

Almost 60% of construction sites are located in densely populated areas. As a result, the people who live at or close to these sites are exposed to the harmful emissions and raw materials. Moreover, exposure to dust, vibration and noise due activities like excavation and drilling can have harmful effect on the human health. The construction phase of the building has the biggest impact on the human health due to exposure to dust, particulate matter and noise from the construction processes. The air pollution from diesel engines and generators can heavily pollute the air surrounding the construction site which has bad effects like breathing problems and asthma[11].

The study finds out that the health damage due to construction accounts for 27% which is less in comparison to the 65% for environmental damage but more than resources depletion which stands at 8%. This is why it is necessary to analyze the health impact of construction.

4. Impact on climate change

Construction highly affects climate change. The emissions from construction activities account for 25 to 40 per cent of the world's total carbon emissions. Estimates from multiple studies suggest that the emissions from commercial buildings alone can grow up to 1.8 percent by 2030. Mining activities to procure raw materials like sand, rocks and other materials also result in high damage to the environment. Mining results in destruction of the natural landscape, the dust arising cause health problem and harm the surrounding ecosystems, the underground ecosystems are also highly affected during the mining process[12].

One of the biggest environmental damage that construction industry cause is in the form of energy use. Construction activities and processes use a lot of energy in the form of electricity, the global commercial building sector consumes around 36 per cent of the world's energy.

Subsection-(ii): Pollution and Construction Industry

Pollution is one impact that the construction industry is not able to ignore anymore. With growing importance and urgency of global warming and climate change, it is important to identify problem areas and find solutions. The main types of pollution that the construction industry contributes to is air, water, and noise. Site employees, laborers, and worker as well as the local residents living nearby the construction project are the people who get most impacted by the pollution. The damage caused by these pollutants is irreversible to the health with a major link between the pollutants and cancer[13].

Air Pollution:

Air pollution refers to the man-made emissions released into the atmosphere and surroundings. Polluted air results in poor air quality, which is a global health hazard, resulting in 4.2 million premature deaths in the year 2016. Use of machines on the construction site is the highest contributor to the air pollution. Due to the sheer workload, most of the times, machines are working and running for a long time and emitting greenhouse gases through exhaust continuously. Another major contributor is the chemicals used on site. Most of them released toxic vapors which are inhaled by the workers and surrounding population which will ultimately affect their health[14].

Water pollution:

Water pollution happens when toxic chemicals and substances leak and enter into neighboring water bodies like rivers, lakes, and oceans. Water is essential for each species on the earth, to live. And every mankind should remember this. But the pollution made by human being is increasing and causing sever damage. This pollution may be visually significant like deposits on the riverbanks and the riverbed or may be invisible like chemical which dissolve in water. Diesel, oil, cement, glues, paints, and other toxic chemicals have a really high possibility to end up in the water due to runoff and leaking from the construction site. The pollutants can enter the soil through drains, seeping into soil, and direct runoff into rivers and lakes. Water pollution into drinking water sources can really harm human and animal life. It also has severe consequences on the marine and aquatic life both animal and plants[15].

Noise Pollution:

Noise pollution is the pollution which can show effect almost immediately. Noise pollution is the increased levels of noise in the surrounding environment. The most common source for noise pollution is the loud machinery on site. Noise pollution causes increased stress levels, sleep disturbance, hypertension/high blood pressure. It also disturbs the natural cycles of animals and other living creatures nearby the construction sites.[16]

Subsection-(iii): Indoor Environment Quality

Indoor environment quality refers to the internal environment in the building premises and inside the home. There are multiple factors which exist in relation to the indoor environment quality of a building. These factors range from biological, physical, chemical and they determine the indoor environment quality and affect the overall living experience. Indoor air quality (IAQ) and the indoor environment quality (IEQ) are often times used interchangeably but there is a difference between them. The indoor air quality (IAQ) refers to the condition of air present in the house/space whereas the indoor environment quality (IEQ) refers to the overall environment inside the house/space. The indoor environment quality contributes to the comfort of the occupants and affect their health and well-being[17].

Indoor environments are highly complex and occupants may be exposed to a variety of contaminants (in the form of gases and particles) from appliances, machines, cleaning products and décor and furnishings, cigarette smoke, microbial growth (bacterial, fungal, mold), insects and outdoor pollutants. Temperature and humidity also affect the indoor environment as it is important to create comfortable space inside. The temperature and humidity also affect the microbial growth[18].

Traditionally built buildings often have a high energy requirement and thus the use of machines and appliances to cool and heat the space is more. This results in more exhaust and emission of greenhouse gases and some of it leaks in the indoor environment and in the long-term harm the environment. Use of traditional incandescent bulbs also release harmful chemicals in the environment. So the need arises to adopt some new methods.

Subsection-(iv): Need for Adapting Climate Change

In the recent years, the climate urgency has gained a forefront in world. Pressure from citizens to the governments to prevent global warming more than 2˚C above the pre-industrial levels. Some governments like the UK have declared a "climate emergency" and promised to reduce the greenhouse gas emissions to a net zero by the year 2050. The construction/real estate industry accounts for around 40% of the global energy consumption and more than 20% of the global carbon emissions. The real estate global value is estimated to be at $217 trillion which roughly 2.68 times the GDP of the entire world[19].

Seeing that real estate is one of the biggest industries in the worlds, having a high environmental impact is one of the biggest cons of the industry. As a result, it is important for the industry to ensure conscious and sustainable development in the future to minimize the environmental impact. Ignoring climate change exposes the real estate industry to the risk of permanent disruption and not that the impacts of global warming are being widely acknowledged. Increasing affordable clean technology and increasing adaptation of sustainable principles are proving to be the catalysts for the beginning of the clean construction industry. Investors are already starting to demand disclosure of the project impact on the environment[20].

With global crises increasing consistently, the world is facing extreme conditions like drought, floods, and earthquakes regularly. These natural calamities affect the real estate and construction industry largely. These natural calamities affect the environment which result in the compromise of the raw material for the construction industry. The changes in availability of raw materials result in scarcity and thus increase the price and cost of the constructed structures. Also, shortage of raw materials disrupts the construction process and cause the project to be on standby. This damages the business and the industry as a whole[21].

If a particular area is a consistent ground for extreme weather conditions like floods, drought, wildfires, etc., the property in the region loses value regardless whether it is damaged by the natural calamities. It also discourages investment in the real estate industry and people lose the value of their assets.

Subsection-(v): Inefficient Land use in Housing Industry

Along with the problems like overconsumption of energy and resources, inefficient land use is one of the biggest problems in the construction industry. Many a times, a huge chunk of land is not use to its full efficiency. A lot of land is wasted for decorative and promotional purposes like lawns, decorative signs and structures, etc.

In today's time, the housing project developers often create structures and amenities to attract consumers. Many a times, these amenities are in efficient and have a negative impact on the environment. For example, maintaining a lawn causes more emissions than the oxygen it gives out in the environment. This is because lawn grass is a hybrid grass and requires a lot of maintenance, and it requires a lot of water compared to natural and native varieties of grass. This results in consumption of more resources and increases the carbon footprint of the housing projects. Also, structures, elaborate entrance areas and lobby's result in huge land area loss which can be put to better use[22].

Due to urbanization, more and more area under agriculture is being converted into residential or industrial land. This puts stress on the environment because the agriculture output from that area is removed and it results in loss of fertile land which is important as a lot of areas have been turning infertile. This land when used for building and housing projects is not as efficient when it would be used for agricultural process.

Also forested area is also cut down which results in huge damage to the environment, wildlife and thus causes huge damage to the ecosystem. In order to construct elaborate and extensive projects, a lot of times, mountains are levelled, riverbeds are filled up to create a flat area ,or river paths are altered to provide adequate water supply to artificially planned cities, townships etc. also many times, for providing a shorter route or to save travel time or to show the planned society or city is near to the facilities available in the nearing cities, mountains are dig up and tunnels are formed, which also harms the environment. This results in landslides, floods, destruction of the ecosystem and pollution from levelling activities.

2.2.2 Section-(b)

Energy and Construction Industry

In an entire world demand for energy has been observed to be static, necessary and increasing day by day. This fact has been considered as one of the reason to construct energy conservative eco-friendly green houses. The detailed discussion on this aspect has been presented in this section.

Subsection-(i): Energy Consumption in Construction Industry

It is no secret that the construction industry uses a lot of resources and energy in its activities. And the impact these activities have on the environment is also not-so hidden anymore. One of the main impacts of construction industry on the environment is the energy consumption and resource depletion. The extensive resource depletion is due to the high-volume usage of materials. All round the world construction industry generates millions of tons of waste annually.

The construction materials have need high embodies energy resulting in large CO2 (carbon dioxide) emissions. The embodied energy is the energy that is required to procure, process, and manufacture a particular material. The embodied energy of steel is about 32 MJ/Kg and that of cement is 7.8 MJ/Kg. the highest energy consuming raw material that the construction industry requires is cement and most of it is during the manufacturing process. As a result, a large amount of CO2 is produced during the construction process. If the consumption of construction materials continues to remain the same all around the world, the amount of cement production in the world would reach 3.5 billion metric tons by the year 2050. In reality, at the rate of current production, by 2050, the total cement production will reach up to 5 billion metric tons. This will result in approximately 4 billion tons of carbon dioxide emissions[23].

Subsection-(ii): Embodied Energy of Construction Materials

Embodied energy is a term mostly used in the building industry. Embodied energy is the energy consumed by all of the processes associated with the production of a building, from the mining and processing of natural resources to manufacturing, transport, and product delivery. Embodied energy does not include the operational

and maintenance consumption as well as the energy consumed while disposing/demolishing the building. Embodied energy is regarded as the upstream or front-end component of the life cycle impact of a home.

A building's embodied energy is the indicator of the environmental friendliness of the building. A higher embodied energy means a large amount of resources have been used or resources have travelled a long way to reach the final project site. This is not the most eco-friendly way of construction. a low embodied energy is a sign that the building is built using recycled material, or eco-friendly alternatives and techniques. This is because a building's embodies energy is greatly dependent on the use of materials and change in the materials can greatly affect the total embodied energy[24].

It was not proven until the recent years, that the embodied energy of a building was less than the operational energy. As a result, most of the focus was given to reducing the operating energy of the building by improving the energy efficiency of the building. But research findings have shown that this is not true. Embodied energy has been proven to be equal to multiple years of operational energy[25].

Embodied energy assessment of a building is very complex as there is a very lengthy and intensive process to trace back the origin and the processing of every material which is used in the construction process. The boundaries used to assess the embodied energy of the components are as follows (not all are included all the time):

- The energy and fuel required to transport material and workers to the construction site.
- Just the materials used for the construction of the bare bones of the building i.e., the building shell
- Other parts like bathroom fittings, kitchen fittings and fixtures, driveways and outdoor paving and landscape
- Energy used for maintaining the machines used during the construction process

- Embodied energy of use of urban infrastructure like drains, roads, water and electricity.

The embodied energy is split up into two main types: Gross Energy Requirement (GER) and Process Energy Requirement (PER). In general PER accounts for 50-80% of GER. The embodied energy for some of the most commonly used building materials is given below[26]:

Table No. 2.1
Embodied energy for common building materials

Sr. No.	Material	PER embodied energy MJ/kg
1		
2	Kiln dried sawn softwood	3.4
3	Kiln dried sawn hardwood	2.0
4	Air dried sawn hardwood	0.5
5	Hardboard	24.2
6	Particleboard	8.0
7	MDF (medium density fiberboard)	11.3
8	Plywood	10.4
9	Glue-laminated timber	11.0
10	Laminated veneer lumber	11.0
11	Plastics — general	90.0
12	PVC (polyvinyl chloride)	80.0
13	Synthetic rubber	110.0
14	Acrylic paint	61.5
15	Stabilized earth	0.7
16	Imported dimensioned granite	13.9
17	Local dimensioned granite	5.9
18	Gypsum plaster	2.9
19	Plasterboard	4.4
20	Fiber cement	4.8*
21	Cement	5.6
22	In situ concrete	1.9
23	Precast steam-cured concrete	2.0
24	Precast tilt-up concrete	1.9
25	Clay bricks	2.5
26	Concrete blocks	1.5
27	Autoclaved aerated concrete (AAC)	3.6
28	Glass	12.7

Table No. 2.1 Embodied energy for common building materials		
Sr. No.	**Material**	**PER embodied energy MJ/kg**
29	Aluminum	170.0
30	Copper	100.0
31	Galvanized steel	38.0

*(Source – Lawson 1996| * Fiber cement figure updated from earlier version and endorsed by Dr. Lawson.)*

Subsection-(iii): Operational Energy of Buildings

Operational energy is the energy that is used during the occupancy stage of the building. This energy is mainly used for space and water heating, space cooling, lighting, running the equipment and appliances, etc. According to the US Energy Information Administration, Operational energy in the United States account for about 39% of primary energy consumption and 40% of CO2 emissions annually[27].

The primary purpose of buildings is to create a visually and thermally comfortable indoor environment and also to have a better indoor air quality. The thermal comfort is created by the aid of natural (sun, wind) and mechanical means. The visual comfort is about the sufficiency and quality of the lighting and is achieved by the controlled use of natural and artificial light sources like windows and bulbs and LED's.

The operational energy consumption of a building varies highly. This is because of multiple factors like climatic, occupant behavior, socio economic status of the occupant, design and system-related requirements, etc. This is a highly researched topic. A study conducted on the impact of behavior, physical, and socioeconomic factors on household energy consumption found out that these factors directly or indirectly affect the energy use for cooling and heating. Along with the user behavior, climate also affect the use of energy for cooling and heating[28].

Subsection-(iv): Energy Consumption

Domestic energy consumption is regarded as the energy used in the house for household work, and other functions of the house. The amount of energy consumed varies from house to house and is dependent on standard of living, the country,

climate and the age and type of house. Usually, countries having a higher standard of living like the USA and UK have a higher domestic energy consumption whereas developing countries and underdeveloped countries have a typically low energy consumption.

Domestic energy includes both electricity and the fuel used. Electricity is used in almost of the appliances and facilities like heating, cooling, lighting, and ventilation. Whereas fuel is used in the form of gas for kitchen appliances and water heaters.

The domestic energy consumption is India has tripled since the year 2000. The percentage of household which have access to electricity in homes increased from 55% in 2001 to a staggering 80% in 2017. It was noted in 2014, the average Indian household with access to electricity consumed 90 units (kWh) of electricity every month on an average. This amount of energy is enough to run 4 tube0lights, 4 ceiling fans, a television set, a refrigerator, and typical use hours of most common kitchen appliances. When compared to the global use of electricity, it is three-fourth of China, a tenth of the USA, and a third of the global average[29].

2.2.3 Section-(c)

Life Cycle Assessment

In order to measure the impact of construction projects on the environment, all of its stages must be evaluated. This gives a clear understanding the impact and effect each stage causes on the environment and helps in deciding the environment friendliness of a particular process. This process of evaluating the impact of a project on the environment is called Life Cycle Assessment.

Life cycle is performed not only on construction projects but on almost any product, service, or process launched in the market. Most of the times, the life cycle assessment project starts from the acquisition of raw material to the disposal of the used product. This method of life cycle assessment is called the cradle-to-grave assessment. The LCA process calculates the energy and resources required for the value chain process of the product and then calculates the emissions resulting in the combined process. The main aim of the LCA is to document, analyze and improve the overall impact of a project/product on the environment[30].

Subsection-(i): Types of LCA

Attributional LCAs aim to find about the impact a particular project in regard to the production and use at a point in time which is usually in the recent past. Consequential LCAs seek to identify impact in the future in case of changes to the current systems and process. Consequential LCAs have to consider the market and economic implication that the changes will have in the future.

Along with these, a third LCA is also in development called "social LCA". The main purpose of this is to identify the social impact and implications. It is a useful tool for developers to assess the social impact of the product/process/service on the various stakeholders like workers, local communities, and consumers.

The widely recognized procedure for conducting a Life Cycle Assessment (LCA) are included in the ISO 14000 series of environmental management standards, ISO 14040, and ISO 14044 in particular. Other standards and procedures are also used[31].

Subsection-(ii): Life Cycle Assessment in the Construction Industry

A Life Cycle Assessment (LCA) is an internationally used and accepted tool to measure the impact of products on the environment including construction projects. LCA is one of the most promising way to design an ecologically friendly product. According to the UNEP (United Nations Environment Program) three planets will be required in order to sustain and fulfill the world consumption and the current way of life. This is going to be the case if the current consumption and production is continued without taking into consideration the environmental impact and isn't altered to suit and encourage sustainability.

The increasing focus on sustainability is due to the rate of growth of population and the increasing environmental problems caused due to various sectors. The construction sector consumes around 25% of the global wood harvest and approximately 40% of the raw materials entering the world economy. Every year, the construction industry uses nearly three billion units of raw materials. These facts show that the construction industry has a largely negative impact on the environment. As a result, it is necessary for the construction industry to urgently increase the focus

on sustainability in its operations and decrease the negative impact it has on the environment[32].

In order to decrease the impact on environment, it is necessary to identify and measure the impact that the construction projects cause on the environment. This is done by multiple methods, one of which is the Life Cycle Assessment (LCA). LCA is a system used to identify and calculate the impact of projects on the environment throughout the entire life cycle of the project/product: starting from the extraction and production of raw materials to the waste processing after disposal. LCA in the construction industry is highly important and it can systematically and objectively calculate and analyze each ecological impact. This makes LCA the most promising technique for ensuring an ecological design of the product/project[33].

Despite being extensively researched and developed, LCA still has a number of drawbacks. The general standards in reference to the LCA, ISO 14040:2006 and ISO 14044:2006[34], describe and specify the basic guidelines and framework as well the requirements for LCA. these guidelines are divided in 4 stages as shown in the table below:

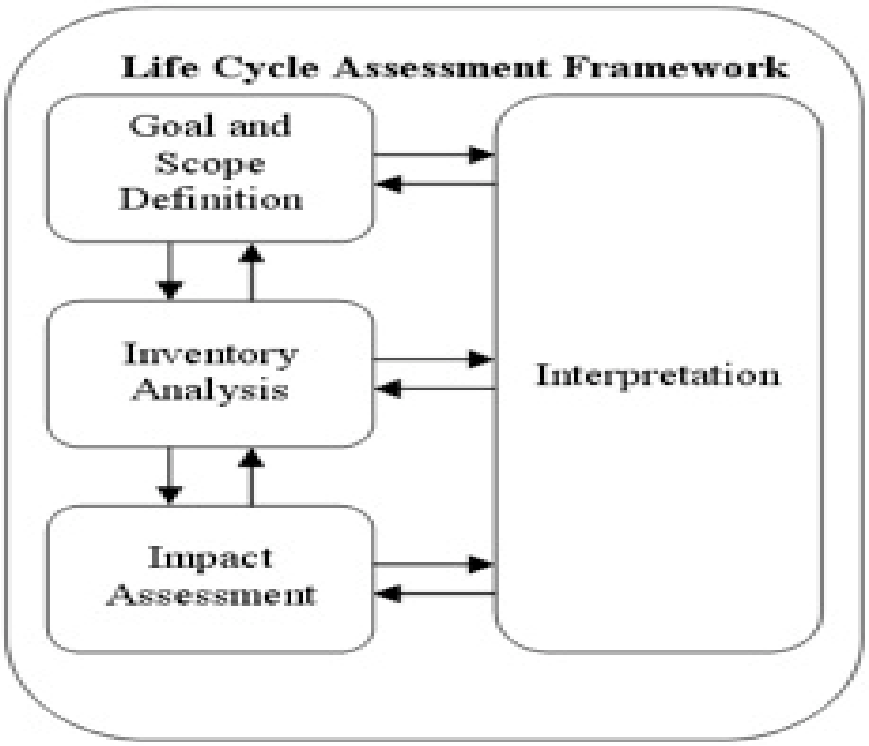

Fig-2.1 Life Cycle Assessment (Source – Life Cycle Initiative www.lifecycleinitiaive.org)

One of the major drawbacks of the LCA guidelines and system is the loose regulations and guidelines. This leaves room for developers to misguide and label products in a certain category even if it isn't appropriate. As a result, it is necessary to use strict guidelines and requirements for product/project classification.

2.3 PART-III

Green Buildings and Eco-Friendly Homes

In this part an effort has been made to detail out research paper review on the aspects of Green Building and Eco-friendly Homes. The technical aspects also have been discussed in this part with an intension to understand the core of the green concept and Eco-Friendly houses.

2.3.1 Section-(a)

History of the Eco-Friendly Concept

The modern green building movement has gained momentum in the last decade, but its origin can be seen and traced to the nineteenth century. In 1970s, where the world was seeing an increasing amount of "glass box" high rise skyscrapers, a forward-thinking group of environmentalists, architects, ecologists came together inspired by the growing environmental movement and increasing fuel consumption. This resulted in the foundation of the modern green building environment.

The early green building movement did not yield adequate success, throughout the 70s to 90s, research was continued in the green building field. This resulted in the development of more efficient solar panels, prefabricated wall systems, water cycling systems, and use of sunlight. The "Greening of the White House" in 1992 resulted in the green building to e put in the fore front of the American society. The greening of White House program was designed to improve the energy efficiency, environmental performance of the White House by identifying the opportunities to reduce waste, lower energy usage and switch to renewable and environmentally friendly energy sources and also improving the indoor living environment and IAQ (Indoor Air Quality)[35].

The savings resulted due to this program resulted in increased focus and momentum of the green building movement. All major offices of the United States Government got a "green makeover" like "The Pentagon" and "The Presidio". As a result, today, green building is one of the fastest growing building and design trend. New developments and findings are being made every day in this field. Architects, designers are starting to shift by incorporating green building principles in their process and designs. The cost benefits in green building, along with the health benefits have increased the attraction of the consumers to this industry and as a result the demand for green houses and apartments is increasing consistently.

Subsection-(i): Green and Eco Friendly Buildings in Ancient Time

The idea of sustainable living and architecture has been around since ancient times. When the world was deprived of petrochemicals and electricity, people managed to keep themselves warm and comfortable without the use of fancy gadgets and systems. Use of natural sunlight, heat retaining materials like wood and wool were some of the methods used by the people in ancient and medieval times.

In ancient Greece, the need to keep warm and comfortable during the winter transcended across all the social classes and this can be seen the architecture. All homes ranging from the high-class palaces to the low- and middle-class urban settlements show the use of strategic design to maximize the use of solar energy to warm up the house while minimizing the heat loss due to ventilation. This was one of the only factors which was similar in the living patterns of the different social classes[36].

In African tribal settlements, use of locally sourced and available materials can be seen in the architecture and housing design. Use of wood, stone and mud from surrounding area was favored as it was readily available and in ample quantity. As a result, the houses in the settlements were built from mud bricks and stones and plastered with mud which came from their "backyard".

Along with these techniques, design of houses in the ancient and medieval varied according to the climate and geographical landscape of the area. Houses in the Middle East and Africa were built to resist the harsh temperatures and desert storms, the houses in South American settlements were built to withstand the constant rains

and moisture from the amazon rainforest. The houses in Himalayas were design to be safe and strong on slopes and be able to withstand the cold and snow[37].

This climate dependent architecture not only saved fuel but also increased the life span and quality of these houses which are still in good shape today even after centuries of being built. The remains of ancient settlements can be proof that architecture based on the climate and geography withstand the test of time. The regional difference can be seen the monument found in different regions all over the world. For example, the Hawa Mahal in Jaipur has corridors and windows in the general wind direction in order to increase the airflow and naturally cool the premises even though it is located in a hot desert like climate. On the contrary, the houses found in wet and rainy areas were built to drain the rainwater easily and remain dry to prevent the growth of mold and bacteria and keep the house damp free.

Subsection-(ii): Eco-Homes in the 21st Century

For the longest time, eco-homes were considered as an alternative style on living. As a result, most eco-homes of the past were cabin-type structures in an off-grid environment. They were powered by solar panels, heated using wood and fire. Most of them were majorly treated as a holiday home or second living space.

But as the demand and the intent of eco-homes is increasing day by day, the development of modern style eco-homes and apartments has come to birth. This progress in architecture and design has made eco-homes much more accessible and livable in the fast-changing urban lifestyle. The main reason for this development is the fact that the main factor which makes the home "green" or "eco-friendly" is the reduced carbon footprint and this can be done without sacrificing structural integrity and design of the home[38].

Another major factor influencing the eco-home industry in the 21st century is the changing demographic of the house-buying population. As the millennial generation is growing to become the main population buying houses and apartments, the type of houses built are changing to suit the changing needs of this generation. The millennial generation if the main force driving the construction of "Wellness-minded" and "environmentally conscious buildings". Structural design of the houses is also very important to the millennial generation as they live a very fast-paced

lifestyle and competitive work environment. They treat their household space as place to unwind and relieve their stress which will help them to achieve higher functionality in complement to their hectic work life[39].

This has developed in new designs and technology which offers both functionality and high environmental friendliness. This new area of development has made new style of projects available for the developers which have ultimately shifted the demand to ecologically conscious homes.

In today's world, green building has taken the front foot in the construction industry. The rising concern regarding sustainability due to increasing pollution levels and temperatures, global warming, climate change, have made it necessary for developers and contractors to think about the impact of their projects on the environment.

Subsection-(iii): Introduction to Green Building

Sustainable construction also known as green building is both a structure and the system used in the construction industry. It is the application of processes and techniques which have a lower impact on the environment and are efficient throughout the buildings life cycle; right from the planning and design stage to its end (demolition). The main intent of green building movement is to complement and expand the classic concerns of economy, utility, durability and comfort while decreasing the carbon footprint associated with the construction industry and decreasing the negative impact on the environment[40].

It is a pretty known fact that the construction industry is responsible for a major chunk of resource consumption and energy use. It also responsible for around 20% of global carbon emissions today and this is equivalent to 9 billion tons of carbon dioxide annually.as the climate crisis continues to grow consistently at an increasing rate, and hence it is of utmost urgency for the construction industry to take account for its emissions and start taking measures for reducing its footprint. This increasing need of change was the result the green building movement was born. The concept of sustainability can be traced back to the energy crisis and environmental pollution crisis of the 1960s and 1970s. The first documented effort to describe and develop the concept of sustainable was in "Silent Spring", a book by Rachel Carson which was published in 1962c[41].

Modern sustainability calls for an integrated effort from designing new sustainable structures and increasing the sustainability of existing structures during their retrofitting and renovation. As time is passing more architects and designers are incorporating sustainable features while designing new as well as renovating structures. One of the major techniques used during green design of a structure is the LCA (Life Cycle Assessment) of the project undertaken. The impact types assessed during the LCA range from the extraction of raw materials, manufacture, distribution, use, repair and maintenance, and disposal or recycling. Impacts considered include energy requirement, global warming potential, carbon footprint, resources used, air pollution, water pollution and waste management[42].

Subsection-(iv): Composition of Green Building

The concept of green building achieves fruition by taking into consideration the following main components[43]:

- Energy Efficiency and reusable energy:

This factor tackles the problem of efficiency of the energy used and the sources which provide the energy to the structure. Appliances and machines must be changed and upgraded to highly efficient models in order reduce energy loss.

- Water efficiency:

This component takes in account the water use and loos and aims to increase efficiency by reducing the wastage and increase the use of available resources. By use highly efficient plumbing fittings which reduce the use of water, this can be easily achieved.

- Environmentally friendly building materials:

Use of materials like bamboo and wood is preferred as they can be replenished and since they are natural, they don’t have as negative of an impact on the environment. Also, they required minimal energy to process in buildable form thus they also don’t require as much processing as their artificial counterparts.

- Waste management:

Waste management involves the proper disposal of waste and reducing the impact of the waste in landfills. This is done by increasing the recycling percentage and also reducing the disposal of wet waste by setting up a composting or a biogas facility. The composting/bio-gas facility further results in reduction of energy consumption as the biogas can be used to supply cooking gas to the occupants of the structure. Disposal of toxic waste in appropriate manner is also beneficial as it helps in preventing leaching of toxic chemicals in the environment.

- Indoor Air Quality (IAQ):

One of the main components of green buildings is to increase the indoor air quality. Use of non-renewable energy sources, emissions from indoor appliances results in the pollution of indoor air quality which can be harmful for the occupants health the measures taken by the green building techniques result in decreasing the indoor pollution levels and boosting the indoor air quality.

- Sustainable growth:

Along with reducing the negative impact on the environment, the green building movement also focuses on creating and improving the positive impact on the environment. This is done with the aim to restore the environment so that it thrives for years to come.

2.3.2 Section-(b)

Indian Scenario of Green Building

Subsection-(i): Indian Green Building Council

The Indian Green Building Council (IGBC) is one of the major bodies for certification of green buildings and allied services. The IGBC was formed by the Confederation of India Industry (CII) in 2001. The council is headquartered in CII-Sohrab Green Business Centre, Hyderabad which is India's first Platinum rated green building.

Ever since it was established in 2001, the IGBC has achieved numerous milestones like:

- 5400 projects have been registered with the IGBC from various regions of India as well as abroad. This is equivalent to a combined footprint of 7.61 billion sq. ft.
- Over 20 IGBC green building ratings that cover all varieties of projects like residential, commercial, healthcare, industrial, etc.
- More than 1800 IGBC Member Organizations including developers, corporates, consultants, architects, institutes, and governments.
- 4487+ IGBC trained stakeholders.

The green projects certified by IGBC are graded in the same categories that of LEED: Certified, Silver, Gold, and Platinum[44].

Subsection-(ii): Introduction to Leadership in Energy and Environment Design

LEED (Leadership in Energy and Environmental Design) is a set of rating systems and rules, which are used for the design, construction, operation, and maintenance of the green buildings. This system was developed by the U.S. Green Building Council, which is the governing and regulation body of green building in the United States of America. The main goal of LEED is to help and guide homeowners and operators be more responsible and environmentally responsible[45].

The development of LEED started in 1993. Throughout 1994 to 2015, LEED grew from being a standard for new constructions to comprehensive system of interrelated standards covering aspects from the design and construction and maintenance of buildings. LEED has also grown from being a 6-volunteer committee to an organization with over 119,924 staff members comprising of volunteers and professionals. LEED standards and systems have applied to approximately over 80,000 registered and certified projects worldwide, which have a combined area of over 13 billion square feet.

LEED 2009 is a rating system which comprises of 10 rating systems for the design, construction and maintenance of buildings, homes and neighborhoods. They are as follows:

- LEED for New Construction

- LEED for Core & Shell
- LEED for Schools
- LEED for retail: New Construction and Major Renovations
- LEED for Healthcare
- LEED for Commercial Interiors
- LEED for Retail: Commercial Interiors
- LEED for Existing Buildings: Operations and Maintenance
- LEED for Neighborhood Development
- LEED for Homes

When categorizing buildings under LEED 2009, there are 100 possible base points which are distributed across six credit categories: “Sustainable Sites”, “Water Efficiency”, “Energy and Atmosphere", "Materials and Resources", "Indoor Environmental Quality", and "Innovation in Design". Up to 10 additional points can be earned for Regional Priority Credits and Innovation in Design. The certification levels are[46]:

Certified: 40-49 points

Silver: 50-59 points

Gold: 60-79 points

Platinum: 80 points and above

Subsection-(iii): Green Building Industry in India

India is one of the pioneering countries when it comes to sustainable development. This is the reason the eco-friendly or green building industry in India is a major and rising segment of the real estate industry.

Almost 14 like houses in India have chosen to switch to a green building which when combined comes to collective square footage of 6.33 billion. But it is

equal to a mere 5% of total residential properties in the country. The Indian government had set up an ambitious target off having 10 billion square foot green building footprint by the year 2022. This will result in increase and the green footprint by approximately 10%. Out of the total, approximately 155 crores square feet off clean buildings are certified by IGBC. As per the statement given by V Suresh, the chairman of Green Building Council of India also known as IGBC, "The current green building area is approximately 6.33 billion square feet and India is going to successfully achieve its target off having 10 billion square feet of green building by the year 2022.[47]"

India is ranked third in the world after China and Canada but more than 750 LEED certified projects.

India has one of the most polluted cities in the world. As a result, it is essential for The Indian government to provide and boost the ecofriendly construction industry. This can be seen coming into fruition as new residential product projects have started incorporating environment friendly components during the construction phase of the building itself. These features include the use of renewable sources like solar and wind power, water conservation through the water harvesting and many other features. Most of these features can also be used in already existing structures. For instance, solar panels on rooftops can be installed on old buildings and rainwater harvesting facilities can be also established even if the building is occupied.

According to estimates provided by IGBC, the market potential for green building products and technology is grow up to 300 billion USD by 2025. There is growing acceptance as well as demand for green homes. Large companies like Amazon, Google, or websites like 99Acres, Prop Tigers, Property.com, Property Dekho.com, and many others demand green features when leasing or outright purchasing properties for commercial offices and residential complexes. Awareness and education about the environment have also made home buyers be on the lookout for green technologies before buying new homes. This growing demand has proven to be a catalyst to the growth of green building industry in India. The Government of India is also providing several incentives on central and state level in the form of additional Floor Area Ratio (FAR) in the range of5 to 15% for IGBC rated silver, gold, and platinum projects.

Subsection-(iv): Economics of Green Building

The decision "to build or not to build", as with all businesses depends on a cost benefit analysis. This means a particular project is constructed or executed if it is expected to generate monetary value which exceeds the costs of the building. On the other hand, if the costs incurred in constructions of building are expected to be higher than the expected revenue the project is shelved[48].

This same basic rule also applies to the green building industry. However, there are some key important considerations that influence the green building costs versus benefit analysis specifically the price of going green and the value it will add to the project as well as the environment. It is also a growing recognition that "green or eco-friendly" should not be considered as a discrete add-on feature which will be grafted to a traditionally built project but be evaluated and considered independently as to its financial burdens as well as benefits. It is also becoming ever clearer that sustainable building requires a paradigm shift and when embraced and applied to the entire construction process, can make the building an even more attractive option without being an expensive one[49].

The traditional lens of the society views green building features as a complementary or an add-on benefit to otherwise normal project. As a result, green building is considered to be costly and a less sustainable alternative by the business. This is because green building requires premium materials, high efficiency equipment, and additional techniques and layers of processes which add up. Although Nowadays, it is becoming a mindset that paying extra is an unavoidable element of building an eco-friendly project and as a result, this has given way to the creation of more holistic designs.

Green building is known to help the owner avoid expenses at the outset. For instance, if a green building design minimizes waste heat by using efficient lighting equipment and including an energy efficient building envelope, the building may require less cooling capacity.This decreases the need for additional chillers and will result in a significantly reduced project cost[50].

One of the main benefits of green or eco-friendly building is its use as a public relations vehicle. In today's day the public expectsa certain level of green in the

organizations and structures which to interact with. This includes structures like offices, malls and even their homes. A green building serves as the symbol of a commitment made by the organization for environmental accountability and focus on sustainable development.

The energy savings benefit brought in by green building is usually reaped by the occupants of the building and not the original designer and project owner. As a result, to balance out the expenses, studies have attempted to quantify the value which green buildings bring to the owner. Some of the findings in these studies are as follows:

- Green buildings sell at a higher price. McGraw Hill measured the price premium for the sale of Energy Star labeled buildings to be over 10%. It is also estimated that the cost of LEED certified buildings is 31% more than their non-certified counterparts

- Green buildings have a higher rent premium. According to researchers at Maastricht University, efficient buildings in terms of energy and design fetched up to 3.5% higher rent

- The same study also found that the green building has a 6% higher occupancy rate which makes green buildings more attractive to tenants and home buyers alike[51].

2.3.3 Section-(c)

Advantages of Eco-Friendly Homes

Eco friendly housing is a practice of using environmentally friendly and positive activities and systems while constructing a particular structure. This is process which is intended to reduce the environmental impact of construction industry on the environment. The construction industry is known to have a high environmental impact as it consumes 40% of the total energy produced in the world and around 20% of total resources. With the climate change and global warming rates growing at an alarming rate it is necessary for the construction industry to switch its processes to environmentally friendly ones.

Eco friendly construction or housing has multiple benefits on the environment public health and economy. They not only help the environment but also increase the development of the area and the nation as a whole. The benefits of ecofriendly housing can be categorized into three main parts:

1. Environmental Benefits
2. Health Benefits
3. Cost Benefits
4. Economic Benefits[52]

Subsection-(i): Environmental Benefits of Eco-Friendly Housing

Ecofriendly housing intends to reduce the carbon footprint and negative impact associated with the housing project. This is done by multiple ways including reusing and recycling of construction materials, use of highly efficient machines and appliances during the process use of sustainable and local resources and reduction of toxic materials.[53]

These practices not only reduce the negative impact on the environment but also prevent the destruction of surrounding ecosystems. Use of efficient machines and appliances during construction results in decreased emissions and thus, reduced air pollution. Proper waste management and use of nontoxic chemicals also helps in preventing water pollution which is mainly caused due to leaching of waste from scrap materials and chemicals. Also use of efficient, low-noise machines reduce the noise levels in the construction site and result in lower noise pollution levels which also have a positive impact on the environment[54].

The environmental benefits half ecofriendly housing gobeyond the reduction of pollution levels. Use of recycled materials as much as possible results in lower resource consumption which reduces the strain on availability. This is important as due to factors like overpopulation and growing demand, the availability of resources it's reducing day by day. Reuse of older materials like bricks, timber, and steel rods reduce the need to produce newer goods which are ultimately procured by destroying the environment. Eco friendly designs make it possible for the construction project to achieve fruition without destroying the original landscape. Mountains are not leveled,

forests are not cut down, and riverbeds are not filled for an ecofriendly project to complete. The design of an ecofriendly project considers the existing landscape of the area and modifies the project designto complement these landscape features. This helps in preserving natural wildlife and other resources like forest area and waterbodies which helps in conservation of these ecosystems.

Subsection-(ii): Health Benefits of Eco-Friendly Housing

Ecofriendly housing not only reduces the environmental impact of the housing project but also improves the living conditions for the occupants of the project. The reduced pollution levels in the construction site offered a wide variety of health benefits for the occupants/residents. As the occupants get access to clean and fresh air, they don't face the harmful effects of air pollution like asthma and respiratory diseases. The clean air also promotes the growth of vegetation in the area which helps in absorbing the carbon dioxide and helps in increasing the quality of air by releasing more oxygen. Since the water pollution levelsare low, the residents don't face waterborne diseases like typhoid jaundice and poisoning due to leaching of toxic chemicals in the water.

Lower noise levels in the site promote better sleep quality and reduced stress levels for both the residents of the project as well as in the surrounding area. These lower noise levels also don't harm the wildlife in the surrounding area by disturbing their natural cycles. This is especially true for small animals and birds as higher noise levels can shock them and they can die instantly[55].

Better indoor air quality also results in a much more comfortable environment to live in than that of a traditionally built housing project. Use of efficient appliances inside the house also reduces the exposure to emission of harmful chemicals like carbon monoxide, formaldehyde, and other greenhouse gases like methane and carbon dioxide.

Eco friendly housing seeks to lower the volatile organic compounds (VOCs) found in the indoor living space and other impurities like microbial and particulate contaminants. Due to poorly designed ventilation systems, most houses don't get adequate ventilation of clean air from the outside. In an eco-friendly home, a suitable ventilation system is used to reduce the levels of volatile organic compounds and

other impurities which promote in creating better indoor air quality.During the design and construction process of building, choice of construction materials and interior finishes is important as they contribute to the levels of VOC's in the house. Many of the cleaning and maintenance materials like multi-purpose cleaners, bleach, emit gases and some of them are toxic like carbon monoxide and formaldehyde. Industrially produced furniture also emits formaldehyde in large amounts. When inhaled in large quantity, these gases can have a higher negative impact on the occupant's health comfort and productivity.[56]

Healthy indoor environment also requires the control of moisture level inside the house. This is important as moisture levels affect the growth of bacteria and fungi. Higher levels of fungal and bacterial growth can be detrimental to the occupant's health. These growth levels are managed by using better insulation methods and efficient ventilation systems which result in removal of excess moisture. Use of hardwood floors also promotes moisture control as they absorb or release moisture according to the levels inside and thus improve the indoor environment quality.

Subsection-(iii): Cost Benefits of Eco-Friendly Housing

One of the major advantages of eco-friendly housing is the lower cost it has in the long term. Eco friendly houses typically have much less resource consumption then their traditionally built counterparts. A survey conducted showed that ecofriendly techniques used in building houses resulted in reduction of energy consumption by over 30%. This is because of the fact that most of the ecofriendly houses require less energy for operation. Eco friendly houses don't have a high energy expenditure on activities like heating and cooling which usually make up for most of the energy consumption.[57]

Moreover, the appliancesand gadgets used in such eco-friendly houses have a lower energy loss and overall use less electricity than others. Use of natural sunlight with the help of large windows, reduce the need for artificial lighting and thus further reduce the electricity consumption. This savings in electricity bills is one of the major cost advantages that eco-friendly houses have. Use of solar power to heat water and use of biogas or renewal sources of energy reduce the fuel consumption of the house. Efficient plumbing systems and modern fittings in bathrooms and sinks result in decreased water consumption which ultimately reduce the water bill associated.

Another way developer can achieve cost benefit and ecofriendly homes is with the self-generation of electricity and fuel. This is done by installing a wind/hydro power facility and bio-gas plant in the project premises. It is very expensive for the developers to install a power generation facility, but it takes the project a step closer to complete self-sufficiency.

Use of highly efficient electrical and plumbing fittings as well as technologically advanced gadgets and appliances result in lower maintenance and operation costs which also further increase the cost benefit of the project. This is beneficial as after a certain period of time the appliances or fittings of poor-quality face frequent breakdowns and consequently require more expenditure on maintenance and hard replacement. Even though the use of highly efficient electrical and plumbing fittings and advanced appliances may seem expensive in the present, it is much cheaper to use them in the long run.

In the short run, many of these activities and secondary methods result in more expenses rather than cost savings, but in the long run, the reduction in energy bills and water bills proves to be a great source of cost reduction of the project. As a result, it is very important for developers and consumers alike to consider the long-term advantage rather than the increased investment in the present. It is only then the cost advantage of eco-friendly building can be realized. Incentives and subsidies provided by the government to undertake eco-friendly construction also proves to be a great source of cost reduction for the developer and make the project more profitable.

Moreover, the label of “green building” is also agreataddition to the marketing strategy of the project as the contractors and developers are able to fetch a higher price for the eco friendliness of their product in comparison to a traditionally built house of same square footage. This will help the developers to maximize their profit while creating a lower negative impact on the environment.

Subsection-(iv): Economic Benefits of Eco-Friendly Housing

Apart from being very environmentally friendly and having lesser impact on the health of occupants, eco-friendly housing is also very beneficial for the economy of the country and also off the world. Ask eco-friendly housing requires less resources it is able to create a higher output without consuming a large number of limited

resources which are available in the country it also increases the sustainability levels of the nation and decreases its carbon footprint levels. Developing and underdeveloped countries have a higher demand of living space due to increasing populations. With resources being scarce, eco-friendly housing rose to be a very affordable and valuable solution to meet the problem of overpopulation and homelessness in such countries. Raw materials required to build eco-friendly housing are usually sourced locally which reduces the strain on imports of the country and improve the balance of payments situation off that country. Eco friendly housing also proves to be a major solution to balance out the emissions resulting from developmental activities like industrial expansion and construction of public infrastructure. Ecofriendly housing when made available forthe lower income class of the country it promotes healthy living situations and better economic stability[58].

Overall lower cost of home ownership results in more citizens buying homes which in turn increases the economic growth of the country. As housing becomes more affordable, it increases the GDP of the nation. With eco-friendly housing gaining more momentum in today's day, the value of the land where it is constructed increases by manifold. This boosts the overall real estate market of the nation and increases the developmental activities and investment opportunities from outside the country[59].

Building a green building according to standards set by organizations like LEED, IGBC and other governing bodies requires a staff of highly skilled individuals who are able to understand those guidelines and then design a project which meets them. This has created multiple job openings as developers require skilled professionals to ensure that the structure is truly eco-friendly and receives the applicable certifications[60].

2.3.4 Section-(d)

Technical Details of Eco-Friendly Homes

It is no secret that the construction of green or eco-friendly buildings is a very lengthy and complex process. It involves taking into consideration a lot of different aspects relating do the buildings life. It requires highly skilled and knowledgeable professionals all throughout its life cycle for the planning construction operation and

maintenance and demolition. The main goal off an ecofriendly building is always to reduce its carbon footprint and the environmental impact. This primary goal is active throughout the entire lifecycle from planning to demolition.

Have the construction off eco-friendly buildings is a very lengthy process and it has a lot of components and steps to complete. Some of these methods are more complicated and time intensive then the others. Some require highly skilled planners and designers while others require specific materials and machines. The process of green building consists of 9 main stages all strategies. All these strategies work together in harmony to reach the primary goal of eco building which is to reduce the environmental impact[61].

1. Program planning and site selection:

This stage of ecofriendly construction start before the land is even acquired. This process has five main components which need to be acquired. In order of completion from start to finish, they are setting preliminary environmental performance targets, research off funding opportunities, reuse of existing buildings and structures, starting early to source salvage materials, select appropriate land.

The purpose of this stage is to set primary goals of the project and select an appropriate piece of land for the project.

2. Selection of design team:

After the primary goals of the project are outlined and ascertained the owner ordeveloper must form our team which has enough experience and interest in the green technology field. Appropriate professionals must be selected to expandthe design team. The owner and the design team collectively must set performance targets in relation to environment.

3. Site design:

This stage focuses on protecting or enhancing the site's ecological integrity and biodiversity. It has main focus off reducing or eliminating disturbance to the water system in the area and to reduce the use of potable water for irrigation and construction activities. Along with water pollution the site design also focuses on

reducing urban heat islands and to accommodate design infrastructure to support alternative transportation facilities.

4. Building operation and configuration:

This process consists of five main steps. They are:

a. Use site resources to reduce building loads while increasing indoor environmental quality

b. Develop a project specific building form

c. Configure internal layout reduce loads

d. Select the best concept design to achieve all primary goals

e. And finalize all non-energy performance targets

5. Building systems design:

This is the most important stage in the construction of a green building. It focuses on designing all the systems which are essential for the functioning of the building. The 7 main types of building systems are: energy, structure, envelope, ventilation, water systems, lighting, mechanical. Along with the design of these systems this stage in the construction of green buildings also involved creating systems in order to achieve the primary goals. Systems are designed and finalized in this stage of construction and environmental performance targets of the building are updated accordingly.

6. Interior finishes and appliances:

After the functioning systems of the building are designed and finalized, the interior finishes and appliances off the building are finalized. The main goals in this stage are to reduce the internal load, reduce disposal of waste materials to landfills, ensure the indoor air is free of pollution. This stage also focuses on creating a comfortable environment both thermally and visually so that the occupants are attracted to the building.

7. Specification / construction drawings

In this stage all of the components of the buildings are specified and made sure to meet the targets. The components are:

- Overall intent of the project
- Environmental site design features
- Energy efficient systems and products
- Acceptable indoor air quality
- Water efficient fixtures and systems
- Green products and materials
- Construction waste reduction
- Commissioning process

8. Construction and commissioning:

This process is the actual construction work off the green building. The main goals of this stage are to prevent erosion during construction, ensure protection of site ecosystem, minimize disposal of construction waste, protect, and conserve the topsoil layer, indoor air quality assurance, and commissioning of all the major systems

9.Operations and maintenance:

This is the last working stage in the life cycle of a green building. In this stagethe building is operated with the intended guidelines and all the systems are made sure to be working at highest efficiency. Any breakdowns are serviced in order to prevent further mishaps[62].

Subsection-(i): Downsizing of Green Building

Like virtually anything in the world, there are downsides to everything, including green building. Even though the advantages of green building are well known and important, it also comes with a number of cons. most of these cons arise in the earlier stage of the project. Possible disadvantages of green building include[63]:

- No initial building cost of any green structure is high. This can be multiple times more expensive than traditional or conventional buildings.
- Funding for green projects is difficult to obtain as banks do not believe in the developer as the technology and methods used for green building are relatively new with no vast experience.
- Green construction materials are not always available near the construction site and thus may require transportation from different parts of the world which adds to the transportation expense.
- Finding artisans and service providers who specialize in this field can be more challenging as it is a relatively new field and there are lesson number of specialized individuals in the field.
- Green building can be more complex which adds up the expense and the time required to complete the project.
- Green building is on the locality or the area it is being built in. The designs and techniques used for green building are not universally acceptable they are highly dependent on the area.
- Repair and maintenance of green buildings is much more complex, and the professionals required to do it are not readily available. This causes problems in the maintenance process and may be detrimental to the developer's reputation.

Subsection-(ii): Heating and Cooling in an Eco-Friendly Home

Heating and cooling of a home is one of the main factors which makes it all comfortable or an uncomfortable situation to live. The indoor temperature and climate highly affect the livable factor of a home. The temperature of a home also affects the comfortableness and the health of the environment inside the house. If a home is too cold, it makes the air dry and thus affects breathing. If the air is too hot, it may turn the house into a breeding ground for bacteria and fungi.

Heating and cooling of the house is one of the major activities which require a high amount of energy and fuel. Typically, furnaces and heaters put heat into the air

and make your home warmer, and air conditioners remove the heat from your house to make it cooler. All heating and cooling systems in a traditional house require electricity or fuel in the form of gas or petrol. If used in large amounts, these systems can consume a lot of electricity and fuel which increases the environmental impact and carbon footprint of the home.

One of the main focuses of eco-friendly building and design is to reduce the consumption of fuel and electricity for heating and cooling purposes. For this, multiple different strategies and systems are used to reduce the fuel consumption and increase the comfort off the home. Increasing the efficiency of currently installed heating and cooling systems is one of the most basic ways to reduce the electricity and gas consumptions of the house. Although, in order to make the home or eco-friendly home it is necessary to switch to an eco-friendly or green source of heating and cooling system. Some of these are:[64]

Subsection-(iii): Geo Thermal Cooling Systems

Geothermal cooling system consists of loop pipes which are installed below the ground. These pipes carry a solution made up of chemicals mixed in water which absorb the heat from the earth and then transfer it and release at a desired place in the house. During cold winter months, the absorbed heat is circulated throughout the house to provide heated air to increase warmth in the house. In summer and warmer months, this process is reversed, that is the cool air is circulated to provide cooling effect. The unwanted heat from your house collected by these pipes and taken underground to be released into the earth and creating a cooler, comfortable living space during the summer[65].

It is known that gas furnaces can have up to a 94% efficiency rating, but a geothermal system has approximately 400% efficiency rating. As a result, use of this system will result in a high decrease in the monthly utility bills, which gives it attractive feature like economical or money saver. Moreover, has the heat comes from the earth itself it does not require combustion off synthetic materials which emit our large amount of greenhouse gases. According to the environmental protection agency (EPA)the geothermal systems hard the most energy efficient environmentally clean and cost-effective space conditioning systems available in today's day[66].

Subsection-(iv): Air Source Heat Pump Systems

The air source heat pump (ASHP) system is one of the most efficient and eco-friendly systems out in the market. Contrary to the name, the ASHP System can heat as well as cool this house.ASHP system takes existing heat from one place and transfer it to another place. In the winter, an ASHP heating system absorbs and condenses the heat from outside air and releases it at a desired place inside the house and during the summer the process is reversed, where the heat from your house is condensed and taken outside which decreases the heat inside the house, making it satisfyingly and sufficiently cool.

The air source heat pumps are very simple and space efficient systems. They comprise of two main components: an outdoor heat exchanger coil and an indoor heat exchanger coil. The outdoor heat exchanger collects and intensifies the heat from outside and once it is done the heat is transported through the indoor heat exchanger coil inside the house and vice versa.

The eco-friendly aspect of ASHP system is that since it uses existing heat within the air, it does not require combustion and burning of synthetic materials which is harmful to the environment and it also does not large amounts electricity which mostly comes from fossil fuels. It is also observed that in the same amount of energy as a conventional heating system, an air source heat pump (ASHP)system emits up to four times more heat[67].

Subsection-(v): Radiant Floor Heating

Radiant floor heating is a unique method which is used to provide warmth in the house. Unlike forced air heating, which is used in this system, radiant floor heating supplies heat from below the floor. This allows the heat to radiate from the ground up, which is a much better way for heat supply as most of the times warmth is required at ground level rather than at the top level.

A radiant floor heating system works in a very simple manner. Hot water tubes or electric wires are laid out in the floor plan and transfer safe and silent waves of thermal radiation. This electricity can be provided through alternative sources of energy like solar power installed on the roof of the housewhich makes it even more

eco-friendly. The heat supplied from the tubes and wires rises through the floor and provides warmth throughout the house.

In most houses, radiant floor heating system is used as an additional home thermal system. It has multiple benefits over a conventional heating system. The low heat distribution prevents heat circulating above your living area and there's prevents heat loss. The warmth is distributed more effectively which allows to reduce dependency on conventional or a traditional thermostat and effectively decreases utility bills. Since these systems don't have any pumps or engines, they are silent and don't have an air pump which can blow dirty air into the room[68].

Subsection-(vi): Air Conditioning (AC) in an Eco-Friendly Home

It is no secret that air conditioning is one of the highest energy consumers in the house. With global temperatures rising consistently, almost all houses in developed countries have an AC unit to decrease the indoor temperature and effectively increase the comfort of the home. But this comes at a huge cost to the environment. Air conditioners typically have a higher consumption of power rate which makes it heavy both for the occupant's footprint as well as expenses. This is because most of the electricity generated in the world is generated through coal powered thermal electric plants. This means use of air conditioning indirectly results in emission of carbon dioxide and other greenhouse gases in the atmosphere. As therate of use of air conditioning inside the house increases, the increased electric bill becomes another burden on theoccupant.

Apart fromhaving negative impact on the environment air conditioning also has harmful effects on the occupant health. Air conditioners, if not cleaned properly can cause a buildup of dirt,pollen, and other particulate matter which can increase respiratory diseases for the occupant. Many times, air conditioners recirculate the same air over and over which deplete the air quality in overtime and reduce the oxygen percentage in the air. This can result in shortness of breath. Also, constant changes in the temperature can shock the body and the occupants risk falling sick.

Air conditioning in an ecofriendly house is not necessarily convenient as well as inexpensive. Many founding principles regarding eco-friendly building or green building revolve around better insulation toreduce heat loss. As a result, these eco-

friendly techniques don't necessarily work in construction projects located in hot climate areas like the tropics. In such areas in order to create a comfortable living space use of air conditioners is required which is anything but eco-friendly[69].

Subsection-(vii): At-Home Cooling Techniques

- Ceiling Fans: Ceiling fans circulate air constantly which effectively reduces the indoor temperature during hot summer months.
- Increase Shade: Increasing shaded area will reduce the heating of wall and surfaces which keep the house cool.
- Closed Windows in Daytime: Closed windows prevent the hot outside air from entering the house. this helps in keeping the indoor environment considerably cool from outside.
- Strategic Greenery: Trees must be planted in a way to reduce the heating during the summer while also increasing passive solar gain during the winter season. This is done by covering the north face with trees which decrease the northern sunlight during summer while keeping the southern side empty to increase the passive heating during winter months.
- White Windows Shades: White shades help in prevent heating of a room in comparison to darker shades.
- Reflective Windows: Reflective windows help in radiating excess heat back into the atmosphere.[70]

Subsection-(viii): Eco Friendly Cooling Systems in Green Building

It is necessary that everything to be built in the future must be eco-sensitive and sustainable in nature. But according to the International Energy Agency EIA the number of air conditioning units in the world is expected to grow exponentially from 1.6 billion to over 5 billion by 2050 because of rapid urbanization, increasing population, and higher incomes as well as reducing AC unit prices. as a result, it is very important for developers and consumers alike to reduce dependency on AC units for cooling of their house. we need to switch to alternative cooling systems which can achieve a similar effect without causing damage to the environment. lots of research is

being conducted in this field to develop eco-friendly alternatives to cooling. these systems our ofa special importance in countries like India which have a comparatively hot climate. There are multiple green solutions developed to cool a house. they are as follows[71]:

Lime and Mud Mortar Instead of Cement

- Using a combination of lime and mud mortar to bind tiles and bricks alongside naturally available stone and mud bricks will allow better circulation of air as these materials are porous.
- Lime is recyclable and it also possesses a greater thermal insulation value when it is compared to cement.
- cement is known to obstruct a structures ability to transfer air in and out of the house effectively

Heat and Resilient Rooftops

- One of the unique home cooling solutions designed especially for low income households in India is called heat resilient rooftops.
- They are called Mod roofs, developed by HasitGanatara, the founder of sustainable roofing firm Re-materials
- These resilient rooftops are waterproof modular roofs which are made of paper waste and coconut husks blended together which reduces the temperature of homes and provides an eco-friendly alternative to RCC or PVC roofs.

Green Roofs

- Green roof are roofs where patches of vegetation in the form of grass, moss, and other types of plants is grown.
- This helps in reducing the temperature as these plants absorb the heat and reduce the temperature.
- Moreover, these plants also absorb the carbon dioxide and other greenhouse gases in the area and emit oxygen which help in increasing the air quality

surrounding the house.

- Although they are difficult to build and maintain, if done properly they have for hire positive effect than any other solution.

The decision "to build or not to build"

As, all businesses depends on a cost benefit analysis. This means a particular project is constructed or executed if it is expected to generate monetary value which exceeds the costs of the building. On the other hand, if the costs incurred in constructions of buildings are expected to be higher than the expected revenue the project is shelved. After referring following research papers, The researcher, found a gap in the study of eco-friendly homes that no such study was undertaken on the factors influencing buyers' decision on purchasing eco-friendly homes, hence the study.

1. "Eco-Friendly Housing Materials- A study with reference to Kerala", a study by Manoj P.K & Vidya Vishwanath, published in International Journal of Management and Social Science Research Review; Submitted in September, 2015, Vol I, Issue 15, Page 259-270.

In this research paper, the researchers have done an analytical study taking 11 housing schemes of Kerala on the material used for construction. Apart from that, they have also done a study on the loan proportion given by banks. The paper gives a detail of the proportion of material used in construction along with its composition of expenditures in construction. They concluded that a good eco-housing scheme requires a good financial support system by the banking companies. It also concluded that housing finance system in particular & favorable macro-economic environment, it appears through promotion of affordable housing in a big way. Apart from a quantum jump in the living of the masses, it ensures a very high level of economic development, with a good prospect to the nation.

2. "Critically Interrogating Eco-Homes", a research paper submitted by Jerry Pickerel in International Journal of Urban and Social Research in May 2017, Vol -41, Issue 2, Pgs. 343-355.

In this research paper, the researcher has in detail studied the composition of construction cost including all raw material, labor and other expenses. He has then

analyzed upon the materials used for each component in construction and the ways in which construction cost can be reduced. After analyzing, concluded that constructing homes using natural resources to make the houses eco-friendly makes the construction cost of the houses, a bit higher than conventional houses.

3. "Construction of Eco Building homes using Green Approach", a research paper submitted by Ashish Kumar Parashar and Rinku Parashar in International Journal of Scientific and Engineering Research, Vol 3, Issue 6, June 2012, Pgs.- 1 to 7

The researcher in his paper has studied about the factors for eco-houses and his paper emphasizes only on one approach i.e. Green approach. The study which was done on Raipur district compared and concluded that the temperature using bara roofs reduced considerably than it was before using Green concept.

The researcher, found a gap in the study of eco-friendly homes that no such study was undertaken on the factors influencing buyers' decision on purchasing eco-friendly homes, hence the study.

All these details provided in this entire chapter may be sufficient in narrating the research gap observed on the aspect of green building, eco-friendly homes and purchasing behavior of the customers of this section.

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Chapter-3

Research Methodology

Present study entitled as the “STUDY OF FACTORS AFFECTING BUYING BEHAVIOUR OF ECO-FRIENDLY HOUSES (EFHS) IN PUNE & PCMC” may be pointed as the descriptive study involving survey method to accommodate deductive reasoning approach. Consumer behavior has been an important research topic for decades. This has been impacted various policy level interventions to be implemented while strategizing the sales activities. A review of existing theoretical reports indicates a clear shift from rational to psychological and social decision factors. This has included transformation of sales activity from traditional approach to modern approach anticipating psychological and social factors. Specifically speaking construction industry and more of residential construction businesses are now operative from social point of view. In short, it is to be noted that purchasing of the house is not merely a satisfying shelter needs but it has now became a status quo. Thus, continuous research is expected in this filed, however, even the recent models have not managed to embrace all the knowledge in the field of consumer behavior: subconscious processes, the role of needs, goals and emotions. All these factors are important and essential while studying the consumer behavior. Alost all the industries are putting their efforts on understanding and establishing the relationships between these factors.

Apart from leaving out these important findings the existing literature also lacks studies of decisions that consumers are most concerned about, termed ‘big’ or ‘strategic decisions’ urges researchers to further explore the most important and challenging consumer decisions, which include house and car purchases, dealing with a building contractor etc. In case of present study, the decision of purchasing house has been explained with the help of 31 variables impacting on the purchase decision. Thus present study is more of the research investigating these factors based on the opinions of the two respondents, such as, buyer of the flats and seller of the flats.

As mentioned earlier, strategic decision making refers to the process of decision making when buying strategically important goods. The living space or the purchase of flats is the more important decision involving long term impact. Either purchaser

has to spend maximum portion of his / her saving for buying the flats or he/she has to avail loan or long term (minimum of 10 years and maximum of 20 years). Thus, ultimately customer spend entire savings at the end of his active age or he will generate financial burden at the initial stage of his working age. Though, in general, following characteristics define the strategic importance of a purchase: high involvement in the process; long-term commitment of resources; truncated budget available for other goods and services. Strategic purchases imply several important categories of decisions, such as; decisions with regard to allocation of the household budget, namely, (a) how the household's economic resources are influenced? For an example for travelling, visits to restaurants; (b) categorization of alternative means choosing either from various product groups (e. g. apartments or houses) or defining a more narrow product category (e. g. houses of a given size); (c) decision making within the defined product category takes place once the product group is specified. Ultimately speaking, purchase of flat is the significant decision made by purchaser and policy makers from construction industry has to consider these aspects of purchase decision.

The purchase of a house may be considered as a good example of such a purchase decision. Strategic decisions are being made in a range of fields, including when consumers decide about health issues or financial investments. Considering the focus of this study on consumer behavior with respect to a very specific product, such as a prefabricated house, empirical research in the area of durable goods needs to be examined to support existing theoretical knowledge. Empirical research conducted in the field of durable goods purchase behavior can be useful for at least two reasons: (a) the house is the most important durable goods in the household; and (b) many studies of consumer decision-making for a car or household appliances indicates that there are similarities among the buying processes related to different durable goods. The majority of literature researching individual and organizational customers is dealing with buying processes of durables. Though, in case of present study, purchasing behavior related to house or flat is considered. More specifically, purchase of eco-friendly house is more concerned of this study. Thus, it is to be noted that purchasing a house is the task involving consideration of the multiple factors. Specifically speaking, purchasing of ecofriendly houses involve certainly more factors. The understanding and concept of customer regarding ecofriendly houses is may differ

from the understanding of the builders. Thus in such a case, customers may expect different amenities in ecofriendly houses whereas builder may seem to be different due to competition and internal marketing strategy.

Compared to buying convenience products, consumers perceive these kinds of 'large ticket' purchases as riskier, sometimes even 'traumatic'. Outcomes of such purchases are unknown in advance and some of them are likely to be unpleasant. A common attribute of durables is that the buying decision is complex, especially when the price is perceived as high. Purchasing flat may be classified under this task. Thus prediction of the buying decision is seem to be very complex as it involves strategic decision for getting long term responsibility. Also purchasing of house is not frequent decision. This is to be anticipated in case of Indian buyers that purchasing of the flat happens once or twice during the entire productive working life. This aspect is enough to highlight the importance of this buying decision.

Keeping in mind the entire discussion made above, it need to be mentioned that an investigation of the customer buying behavior specifically observed in the construction industry while purchasing ecofriendly homes is the main concern of the present study. Thus, to accommodate the entire discussion, below chapter has been presented with the help of seven sections. Such as, in ***Section-(a)*** statement of the research problem has been provided.

3.1.1` Section-(a)

Statement of the research problem

The title of the present study itself to be considered as the statement of the research problem. Though, buying behavior and factors that affects the decision of buying has a varied impact directly depend on the products. Thus in case of purchasing house is the biggest decision in the life of any common middle class citizen. Thus, to the extent of buying specific eco-friendly houses or can be termed as green homes, it has been essential to understand current status of the construction industry in Pune focusing on availability of the ecofriendly homes. This primary question has been forming a part of research questions of the present study. Secondly, understanding impact of the marketing strategies of the Ecofriendly Houses on the buyer' behavior is also has been considered as the second question of the research statement considered

under this study. Further, it is also important to understand level of the awareness of buyers of the ecofriendly houses. The understanding regarding this will be helpful to conclude this study. Understanding challenges of buying behavior for purchasing ecofriendly homes is also essential to provide the remedies for free flow of ecofriendly houses.

Ultimately, present research has been focused on the three major research questions such as (a) what is the current status of co-friendly houses in Pune; (b) what is the impact of marketing strategies of ecofriendly houses on the buyer's behavior and (c) what is the level of awareness among buyers regarding ecofriendly homes and the challenges thereof.

All this discussion made above may be sufficient to understand the statement of the research problem considered under the study.

3.1.2 Section-(b)

Aims and objectives[i]

The primary aim of this research study is to understand factors that affect buying behavior of the customers in ecofriendly houses industry. Though, this aim has been accommodated in below mentioned specific research objectives, such as;

(a) To undertake a survey of the Ecofriendly houses in Pune
(b) To understand an impact of marketing strategies of ecofriendly houses on the buyer's behavior
(c) To study the awareness among the builders and buyers about eco-friendly houses, and
(d) To find out the bottle necks or barriers in the free flow of ecofriendly houses and to suggest the remedies.

All the above objectives are in line with the research questions addressed in the section on statement of the research problem. With the purpose of generalizing the research findings an effort has been made to transform these research objectives into attainable scientific hypotheses.

3.1.3 Section-(c)

Hypothesis of the Study[ii]

Keeping in mind the title of the present study along with extensive literature review carried out for the purpose of this research, directive hypotheses have been worked out and mentioned in below section. The basic intension of these hypotheses is to offer scientifically tested conclusions based on the probabilistic generalizations.

Hypothesis-H1: Larger portion of the society is not much aware about the Ecofriendly Houses

Hypothesis-H2: Ecofriendly houses are costlier than the regular houses and naturally buyers attract towards the cheaper homes.

Assumption behind this hypothesis is; Ecofriendly houses are not that much worth enough to pay heavy purchase price. It needs to be pointed out here that the quantification, tabulation, testing and interpretation of both of these hypotheses have been made and presented with the help of chapter-4 on data analysis and interpretation.

3.1.4 Section-(d)

Database of the study

The present research has been naturally based on the two well-known data sources such as primary data and secondary data. The detailed discussion on this aspect of both the data sources have been presented with the help of two different subsections.

Subsection-(i)

Primary Data[iii]

Primary data have been collected from the randomly selected customers of the ecofriendly houses. In another way, it may be noted that the entire study has been based on the responses collected from customers observed in construction industry of Pune along with the marketing executives of the construction industry.

Defining the Population

The population is referred to the totality of the entire units under investigation, subject to the mentioned criteria covering, Population Element, Sampling Unit, Extent and time. In case of present study, element of the study has been defined as the customers of the construction industry. Though the sampling units have been defined as the customers buying eco-friendly houses in Pune. Finally, in regards to the 'extent' of population; Pune City consisting of Pune Municipal Corporation and Pimpri Chinchwad Municipal Corporation has been considered. Now considering the entire discussion the list of the eco-friendly apartments (schemes) has been obtained and the same has been provided below-

Table No. 3.1

Eco-friendly Construction Sites in Pune

Sr. No.	Area / Location	Number of schemes	Number of flat owners
1	Alandi	1	19
2	Alka Talkies	5	161
3	[a]Aundh	3	44
5	Camp	4	134
6	Deccan	8	153
7	Hadapsar	3	37
8	Khadki	1	5
9	Kothrud	2	87
10	Nagar Road	2	27
11	PCMC	7	158
12	Satara Road	2	43
13	Sinhgad Road	3	11
14	Swargate	4	57
	Grand Total	45	936

(Note: Includes: Balewadi, Bavdhan and Baner)

(Source:https://www.ecohousing.in/List%20of%20Eco%20%20Housing%20Projects%20With%20Ratings.php)

In this situation the entire flat owners have been considered as the population of the present study. Also, the number of schemes has been considered as the population for the purpose of selecting respondents representing sales executives from the construction industries.

Identifying Sampling Frame

Sampling frame refers to the representation of the elements of target population. In case of present study, owner and purchasers of the eco-friendly homes are considered as the element and thus, number of customers owning eco-friendly houses in Pune are considered to be the sampling frame of the present study. The list of the schemes has been obtained from the website of government authorities and the list of the customers is sourced in from the similar responding authorities.

Sampling Unit

Sampling unit is the basic unit containing the elements of the target population. Now in present study, respondents from construction industry drawn from the list of customers purchased eco-friendly homes have been considered is the sampling unit along with sales executives of these construction industries.

Sample Design

The detailed procedure for deciding the sample size is said to be the sample design to the extent of population size. Now in this study, it is to be noted that stratified probability sampling technique has been applied as a sample design.

Sample Size

The sample size considered for the present study is good representative of the population considered and defined in this research. A simple random sampling technique has been implemented during selection of the sample size. The customer brought the ecofriendly houses in Pune and Pimpri Chinchwad (PCMC) is the unit of analysis considered for the present study. Though the detailed discussion on the sample size determination has been provided on the next page-

Sample Size for the undertaken research:

1. Population Size: 44 schemes bearing 936 customers[iv] is the size of population worked out under this study.
2. Precision Level (Sampling Error tolerated or Margin Of Error or Degree Of Accuracy) : 5 % i.e. 0.05
3. Confidence Level : 95 %
4. Confidence Interval: 7
5. Degree Of Variability: Homogeneous Population Therefore assuming 20%.
6. Response Rate: 70 % of the distributed questionnaires.

Now based on the Base Sample size for above data from table[v]: 162[vi].

Data Collection and Actual Sample Size

The present basically intends to provide the analysis of the opinions of the customers purchased ecofriendly flats in Pune. Thus, the survey of the customers who purchased ecofriendly flats have been conducted. It is not only the survey of the customers but the opinions also have been investigated from the sales executives of the builders who constructed ecofriendly houses. The complied data classified according to the purchase of flats and the price of the purchase has been presented below in ***Table No. 3.2***.

Table No. 3.2

Distribution of Sample according to Type of Flat and Budget

Sr. No	Row Labels	1 BHK	2 BHK	3 BHK	Row house	Any other	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	30 L to 50 L	0	32	28	0	0	60
2	50 L to 75 L	0	24	44	4	0	72
3	75 L to 1 Cr.	0	0	0	0	0	0
4	1 Cr. to 2 Cr.	0	16	28	0	0	44
	Grand Total	**0**	**72**	**100**	**4**	**0**	**176**

The table above provides the details on the sample size of 176 respondent's customer which is more than calculated sample size (such as 162). This reflect that present research is based on appropriate number of samples providing significant level of population representation essential for scientific investigation and generalizations.

Now from the below ***Table No. 3.3***, details have been provided for sample size of sales executives.

Table No. 3.3

Sample Size for Sales Executives

Sr. No.	Area / Location	Number of schemes	Sample of Sales Executives
1	Alandi	1	2
2	Alka Talkies	5	8
3	[a]Aundh	3	3
5	Camp	4	5
6	Deccan	8	12
7	Hadapsar	3	5
8	Khadki	1	2
9	Kothrud	2	5
10	Nagar Road	2	2
11	PCMC	7	13
12	Satara Rd	2	3
13	Sinhgad Rd	3	6
14	Swargate	4	5
	Grand Total	45	71

Source: Field investigation

Ultimately, it has to be noted that total 71 respondents have been contacted from 45 schemes. Reflecting 100 per cent response rate. Finally, it has to be mentioned here that the sample schemes adopted for this study are appropriate to represent the population consider for the present study.

Questionnaires and Scale of Measurement

The present study is based on the two questionnaires separately prepared for the customers of the construction industry who have purchased eco-friendly homes in Pune and for the sales executives involved in selling the ecofriendly homes. The quantification of the data has been made using Likert Scale with five point summation measurement. The questionnaires are based on the two sections collecting demographic information of the respondents and the opinions of the respondents on certain parameters identified during the investigation for capturing behavioral aspects. The used questionnaires have been pilot tested for reliability and same has been reported in this chapter.

Methods of Analysis

The database of the present research has been managed in the MS Excel software and same has been used for tabulation and chart preparation. Appropriate statistical techniques have been applied in the present study such as mean, standard deviation, frequencies and cross tabulation. The testing of the hypotheses has been made using SPSS software. For the purpose of the hypothesis one sample 't' test has been applied.

Subsection-(ii)

Pilot Study

The basic intention of the pilot study is to test reliability of the questionnaire tool prepared and used for collecting primary data on which entire premises of the study has been based. Thus, statistical reliability of this study has been tested by using very well-known statistical technique, namely, Chronbach's Alpha. For internal consistency, Cronbach's alpha is a reliable measure. It is considered to be a measure of scale reliability. A "high" value for alpha does not imply that the measure is unidimensional. On the aspect of validity, it is to be noted that mapping of the objectives and the questions asked to respondents have been carefully mapped reflecting content validity. Also on the part of criteria validity sampling strategy of selecting customers of ecofriendly homes itself provide technical justification with appropriate acceptance.

Chronbach's Alpha

(i) Responses from Eco-friendly houses

Total 44 responses have been used to perform the reliability test. Further, it also has to be mentioned that, responses from Questionnaire involving assessment of hypothesis related data are coded in SPSS for performing the test. The test results have been mentioned with the help of ***Table No. 3.5***, below.

Table No. 3.5

Chronbach's Alpha for Questionnaire

(A) Case Processing Summary

		N	%
Cases	Valid	44	100.0
	Excluded[a]	0	.0
	Total	44	100.0

a. Listwise deletion based on all variables in the procedure.

(B) Reliability Statistics

Cronbach's Alpha	N of Items considered
.783	8

The value of Chronbach's Alpha for the variables used for assessing factors that affect buying behavior in the eco-friendly houses purchase has been found to be the magnitude of 0.783 which is showing high level of internal consistency in the variables scaled and considered under the test. This is with reference to the testing hypotheses in the present study.

Suitability for attaining objectives

Ultimately, it may be concluded, based on the pilot study that, questionnaire tool prepared and used reliable with statistical point of view and also is valid for content as far as the objectives and hypotheses considered under the present study.

Subsection-(iii)

Secondary Data

The secondary data regarding consumer behavior and the aspects of eco-friendly houses are available in plenty in the context of construction and real estate companies' operative in Pune. All these data are available on the internet as also, will

be easily seen from the chapter on literature review. Several books, magazines and journals have been analyzing these phenomena and lots of literature in this connection is also available in several periodicals and reports of the construction industries. All these sources of secondary data have been relevant to the time period mentioned in the section on time span, scope and limitation, and also for the region and the related concerned activity. Some of this material has also been utilized during the course of the present study. The secondary data was also obtained from several renowned libraries in Pune. Though Jaykar library of Savitribai Phule Pune University, Pune has been frequently visited and referred.

Section-(f)

Rationale and Significance of the study[vii]

In environmentally aware society, demand for the ecofriendly homes need to be on higher side. But considering the supply side of the ecofriendly homes intentionally reflect that buyers of the construction industry still give the priority to the commercial sides. Though on the long run ecofriendly homes are more affordable but required larger investments in initial period. Housing comers under the very basic, essential and primary need of any human being and thus it has been prioritized by the customers. This situation reflects the entries of huge and larger industry players reflecting increased competition in the market. Naturally, cost cutting is the major focus in this industry to survive in this competition. Up gradation of the technologies provided significant productivity. Though more essentially, application of advanced technology has risen the bad impact on environment.

There is only one solution to this situation and it is constructing the ecofriendly homes specifically built by using local level construction material with negligible loss to the environment. All these things can be worked out once there is a demand for ecofriendly homes. Now, here is the scope for the present study to understand the bottle neck of the buying behavior of ecofriendly homes.

Section-(g)

Scope and limitations of the study

Geographical scope of the present study has been limited to the administrative

boundaries of Pune Municipal Corporation and Pimpri Chinchwad Municipal Corporation.

On the aspect of scope, it is to be noted that present study only considers the behavioral aspect of the buying preferences observed during buying of ecofriendly homes. This naturally reflect that present study is not assessing technical specificities of the ecofriendly homes impacting on purchasing decision

On the part of the time span, it to be mentioned here that, this present study has been conducted between F.Y. 2013-14 and F.Y. 2018-19. Thus data collected for primary analysis is having legacy to the extent of only above mentioned time period.

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Chapter-4

TABULATION, ANALYSIS OF THE DATA AND HYPOTHESES TESTING

This chapter deals with the quantification, tabulation and interpretation of the primary data collected in this present research from buyers of the ecofriendly houses. The entire write up comprises in this chapter has been based on the objective assessment intended in this present research. The basic intension of this chapter is to provide fundamental interpretation based on the factual data and also observations of this chapter have been used as an input for arriving at concluding observations of this entire research. Total 44 successful buyers of ecofriendly homes have been considered as the sample of the present study and thus it has been contacted for primary data collection. The primary unit of analysis has been considered to be the budget for the buying eco-friendly houses and secondary variable used is the location of the property.

To accommodate all the discussion made above, this chapter has been classified in three parts. Such as, in ***PART-I***, analysis of the customer responses have been provide and in ***PART-II*** analysis of the executives of builders and contractors have been elaborated, while finally in ***PART-III*** of this chapter, quantification, and testing of the hypotheses have been offered along with scientific interpretation.

4.1 PART-I

Analysis of the Customer Responses

In this part efforts have been made to analyze fundamental variables considered in the present research study. Thus to accommodate the scientific observations carried out in this study, present part has been classified and detailed with the help of five sections as mentioned ahead. As stated, in ***Section-(I)*** detailed analysis of general variables have been presented. ***Section-(ii)*** deals with the analysis of variables related to cost and financial factors. In ***Section-(iii)*** analysis of awareness regarding ecofriendly homes along with promotional strategies adopted by the builders have been made and presented. Ultimately, decision variables responsible for final purchase of ecofriendly houses have been analyzed and presented with the help of ***Section-(iv)*** while assessment

of role of facilities provided in ecofriendly homes have been presented in ***Section-(v)*** along with analysis and interpretation.

4.1.1 Section-(I)

Analysis General Variables

The decision of purchase of house has been considered to be the most important decision of the life of any common man. Specifically speaking, in Pune area buying a house is considered to be the lifetime achievement and thus required a serious note before taking final decision. Thus, present study considers age and location of the respondents as one of factors responsible for this study.

It would be seen from the study that, almost more than one half of the respondents (52 per cent to exact) have provided their preference to the location for 'within city'. It is surprising to note that no any respondents decided to buy the residential property near to their workplace. The logical reasoning behind this observation may be attributed to the higher pricing of the property and within city location may provide proper justification to this decision. Secondly, it has been observed that all the respondents purchased ecofriendly homes are educated at least up to graduate level. Further details on this aspect have been provided with the help of ***Table and Chart No. 4.1***.

Table No. 4.1

Distribution of respondents according to Location and qualification

Sr. No.	Row Labels	Diploma	Graduate	Post Graduate	Potential	Any other	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
1	near to nature	0	8	20	0	0	28
2	outside of city	0	20	36	0	0	56
3	within city	0	60	32	0	0	92
4	Near Work Place	0	0	0	0	0	0
5	Any other	0	0	0	0	0	0
	Grand Total	**0**	**88**	**88**	**0**	**0**	**176**

Source: Field investigation

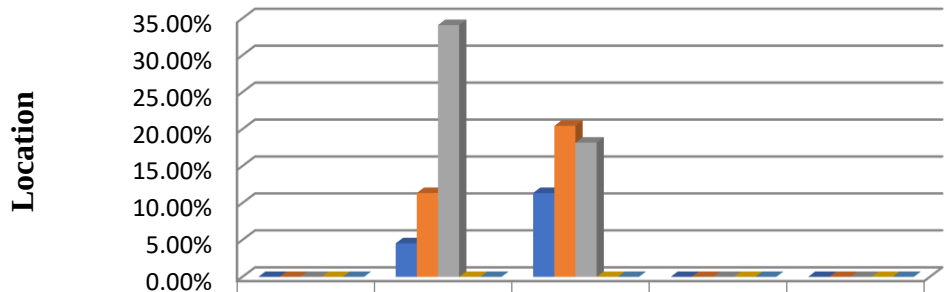
Table No. 4.1a

Distribution of respondents according to Location and qualification (In %)

Sr. No.	Row Labels	Diploma	Graduate	Post Graduate	Potential	Any other	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	near to nature	0.00%	4.55%	11.36%	0.00%	0.00%	15.91%
2	outside of city	0.00%	11.36%	20.45%	0.00%	0.00%	31.82%
3	within city	0.00%	34.09%	18.18%	0.00%	0.00%	52.27%
4	Near Work Place	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	Any other	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Grand Total	**0.00%**	**50.00%**	**50.00%**	0.00%	0.00%	**100.00%**

Source: Field investigation

Chart No. 4.1
Distribution of respondents according to Location and qualification



	Diploma	Graduate	Post Graduate	Potential	Any other
near to nature	0.00%	4.55%	11.36%	0.00%	0.00%
outside of city	0.00%	11.36%	20.45%	0.00%	0.00%
within city	0.00%	34.09%	18.18%	0.00%	0.00%
Near Work Place	0.00%	0.00%	0.00%	0.00%	0.00%
Any other	0.00%	0.00%	0.00%	0.00%	0.00%

There are basically four types of property have been considered for the present study such as, (a) One BHK flat, (b) Two BHK flat, (c) 3 BHK Flat and (d) Row House. (Where BHK stands for Bedroom-Hall-Kitchen). The last category of housing property, Row house, has been considered as more luxury and independent from other influences

thus it is most costly than earlier three options. This fact has been reflected from the below mentioned ***Table and Chart No. 4.2***. Though, more preference to the extent of ecofriendly homes has been given to the apartments of 3 BHK (56 per cent of the respondents) and 2 BHK (40 per cent of the respondents). The ecofriendly row house is on last preference though the reason behind may be the supply side as there may not be sufficient builders investing to construct eco-friendly row houses.

Table No. 4.2

Distribution of respondents according to budget and what type of flat/house are you looking for

Sr. No	Row Labels	1 BHK	2 BHK	3 BHK	Row house	Any other	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	30 L to 50 L	0	32	28	0	0	60
2	50 L to 75 L	0	24	44	4	0	72
3	75 L to 1 Cr.	0	0	0	0	0	0
4	1 Cr. to 2 Cr.	0	16	28	0	0	44
	Grand Total	**0**	**72**	**100**	**4**	**0**	**176**

Source: Field investigation

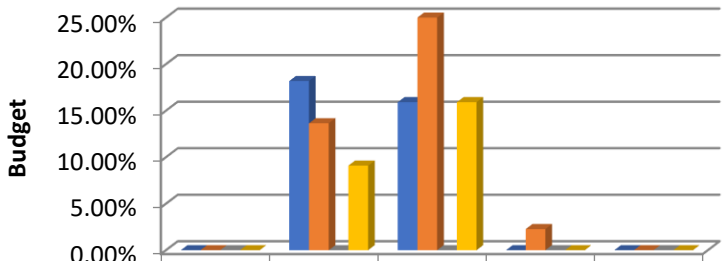
Table No. 4.2a

Distribution of respondents according to budget and what type of flat/house are you looking for (In %)

Sr. No	Row Labels	1 BHK	2 BHK	3 BHK	Row house	Any other	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	30 L to 50 L	0.00%	18.18%	15.91%	0.00%	0.00%	34.09%
2	50 L to 75 L	0.00%	13.64%	25.00%	2.27%	0.00%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	0.00%	9.09%	15.91%	0.00%	0.00%	25.00%
	Grand Total	**0.00%**	**40.91%**	**56.82%**	**2.27%**	**0.00%**	**100.00%**

Source: Field investigation

Chart No. 4.2
Distribution of respondents according to budget and what type of flat/house are looking



	1 BHK	2 BHK	3 BHK	Row house	Any other
30 L to 50 L	0.00%	18.18%	15.91%	0.00%	0.00%
50 L to 75 L	0.00%	13.64%	25.00%	2.27%	0.00%
75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
1 Cr. to 2 Cr.	0.00%	9.09%	15.91%	0.00%	0.00%

In the ***Table no. 4.3***, an effort has been made to investigate relationship between location of the property and the budget of the buyer. This is naturally that rate of properties are basically depend on the location. The price of the property located in to the heart of the city is obviously higher than the property on outskirts of the city. This aspect has been quantified, tabulated and presented with the help of ***Table and Chart No. 4.3*** below. It would be seen therefore that, properties within city are much costlier than the properties at outside city.

Table No. 4.3

Distribution of respondents according to Location and budget

Sr. No.	**Row Labels**	**Rs. 30 L to 50 L**	**50 L to 75 L**	**75 L to 1 Cr.**	**1 Cr. to 2 Cr.**	**Grand Total**
I	**II**	**IV**	**V**	VI	**III**	**VII**
1	near to nature	16	8	0	4	28
2	outside of city	8	24	0	24	56
3	within city	36	40	0	16	92
4	Near Work Place	0	0	0	0	0
5	Any other	0	0	0	0	0
	Grand Total	**60**	**72**	**0**	**44**	**176**

Source: Field investigation

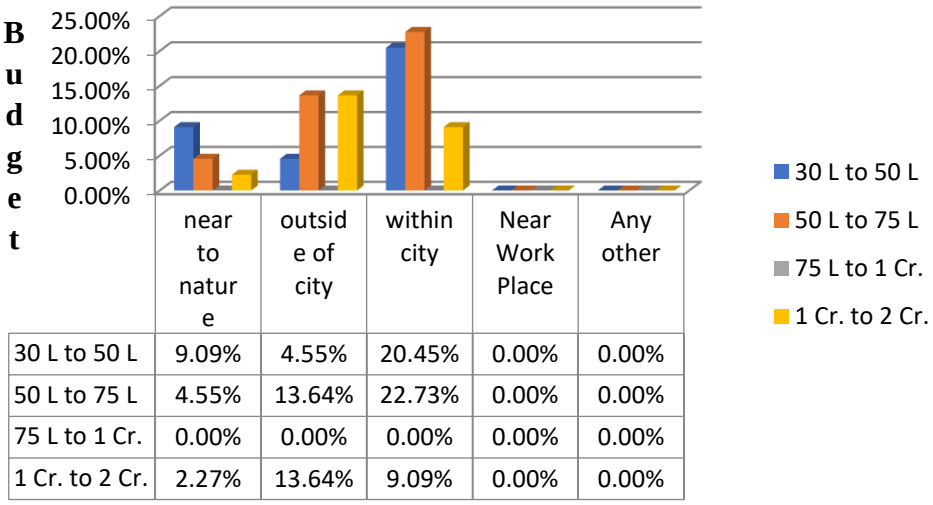
Table No. 4.3a

Distribution of respondents according to Location and budget (In %)

Sr. No.	Row Labels	30 L to 50 L	50 L to 75 L	75 L to 1 Cr.	1 Cr. to 2 Cr.	Grand Total
I	II	IV	V	VI	III	VII
1	near to nature	9.09%	4.55%	0.00%	2.27%	15.91%
2	outside of city	4.55%	13.64%	0.00%	13.64%	31.82%
3	within city	20.45%	22.73%	0.00%	9.09%	52.27%
4	Near Work Place	0.00%	0.00%	0.00%	0.00%	0.00%
5	Any other	0.00%	0.00%	0.00%	0.00%	0.00%
	Grand Total	**34.09%**	**40.91%**	**0.00%**	**25.00%**	**100.00%**

Source: Field investigation

Chart No. 4.3
Distribution of respondents according to Location and budget



	near to nature	outside of city	within city	Near Work Place	Any other
30 L to 50 L	9.09%	4.55%	20.45%	0.00%	0.00%
50 L to 75 L	4.55%	13.64%	22.73%	0.00%	0.00%
75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
1 Cr. to 2 Cr.	2.27%	13.64%	9.09%	0.00%	0.00%

In the present study, total four factors have been considered as the major role player influencing decision of the buyer such as, connectivity of road, location, price, and surrounding. This aspect has been cross tabulated with location and presented in the ***Table and Chart No. 4.4***, below. It would be seen therefore from the table that, more than 80 per cent of the respondents have been provided preference to the location by considering nature, Near to the market/hospital/schools and the price of the property.

Table No. 4.4

Distribution of respondents according to Location and Major factors do you consider for your purchase

Sr. No	Row Labels	near to nature	outside of city	with in city	Near Work Place	Any other	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	Connectivity of road	0	0	4	0	0	4
2	Location	0	0	4	0	0	4
3	Near to nature	8	0	0	0	0	8
4	Price, Location, Connectivity of road, Near to nature	4	0	0	0	0	4
5	Price, Location, Connectivity of road, near to nature, near to market/hospital/schools	0	56	100	0	0	156
	Grand Total	**12**	**56**	**108**	**0**	**0**	**176**

Source: Field investigation

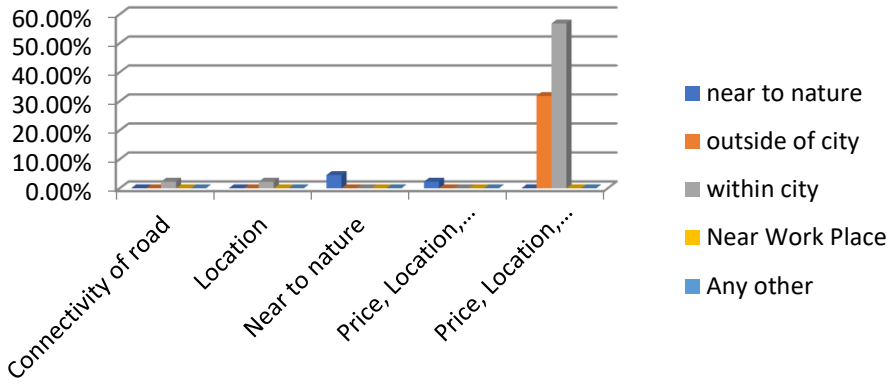
Table No. 4.4a

Distribution of respondents according to Location and Major factors do you consider for your purchase (In %)

Sr. No	Row Labels	near to nature	outside of city	with in city	Near Work Place	Any other	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	Connectivity of road	0.00%	0.00 %	2.27 %	0.00%	0.00 %	2.27%
2	Location	0.00%	0.00 %	2.27 %	0.00%	0.00 %	2.27%
3	Near to nature	4.55%	0.00 %	0.00 %	0.00%	0.00 %	4.55%
4	Price, Location, Connectivity of road, Near to nature	2.27%	0.00 %	0(0. 00%	0.00%	0.00 %	2.27%
5	Price, Location, Connectivity of road, near to nature, near to the market/hospital/schools,	0.00%	31.82 %	56.8 2%	0.00%	0.00 %	88.64 %
	Grand Total	**6.82%**	**31.82 %**	**61.3 6%**	**0.00%**	**0.00 %**	**100.00 %**

Source: Field investigation

Chart No. 4.4
Distribution of respondents according to Location and Major factors do you consider for purchase



There are four types of purposes have been observed generally for buying properties such as, (a) capital appreciation, (b) investment, (c) residential purpose and (d) tax benefit. In case of buying behavior of the ecofriendly homes, almost 75 per cent of the respondents mentioned that they gave purchased it for residential purpose. This simply reflects the intention of buying ecofriendly homes. Thus, preference for the location of within city properties has been provided by almost 50 per cent of the responding buyers. Further details on this aspect have been presented in ***Table No. 4.5*** and narrated with the help of ***Chart No. 4.5***.

Table No. 4.5

Distribution of respondents according to Location and purpose of purchase

Sr. No.	Row Labels	Capital appreciation	Investment purpose	Residential purpose	Tax benefit	Any other	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	near to nature	0	4	24	0	0	28
2	outside of city	12	28	16	0	0	56
3	within city	0	4	88	0	0	92
4	Near Work Place	0	0	0	0	0	0

5	Any other	0	0	0	0	0	0
	Grand Total	**12**	**36**	**128**	**0**	**0**	**176**

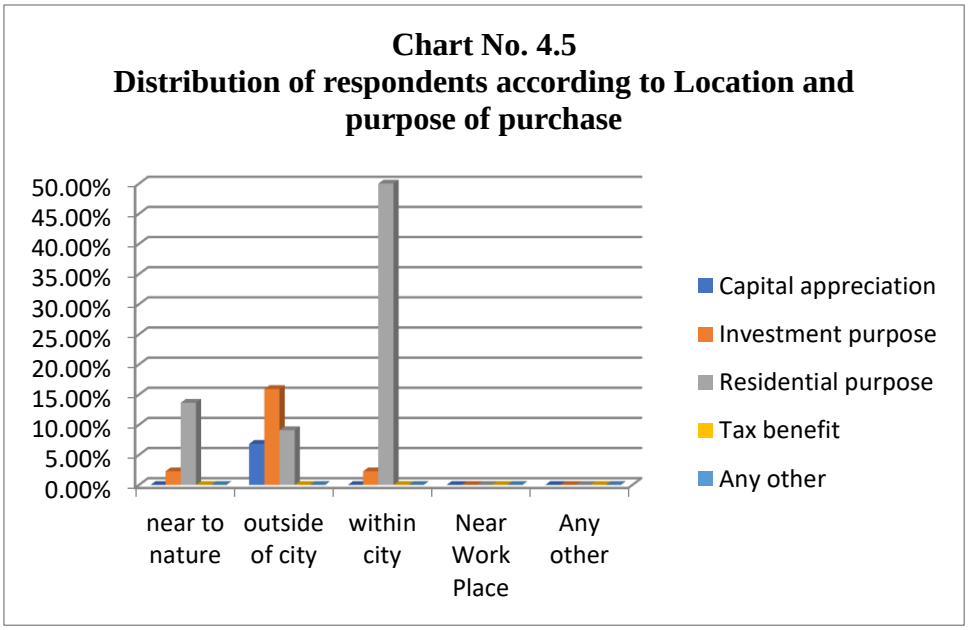
Source: Field investigation

Table No. 4.5a

Distribution of respondents according to Location and purpose of purchase (In %)

Sr. No.	Row Labels	Capital appreciation	Investment purpose	Residential purpose	Tax benefit	Any other	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	near to nature	0.00%	2.27%	13.64%	0.00%	0.00%	15.91%
2	outside of city	6.82%	15.91%	9.09%	0.00%	0.00%	31.82%
3	within city	0.00%	2.27%	50.00%	0.00%	0.00%	52.27%
4	Near Work Place	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	Any other	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Grand Total	**6.82%**	**20.45%**	**72.73%**	**0.00 %**	**0.00 %**	**100.00 %**

Source: Field investigation



Moreover the purpose of the buying ecofriendly homes, almost 70 per cent of the responding buyers preferred 5th floor of the apartment followed by 29 per cent

respondents for 4th floor. Naturally, position of the residential property plays a significant role in deciding the price of the flats. Thus, 4th and 5th floors are covered under the normal cost of the purchase. Thus, from these details it has been observed that buyers of the ecofriendly homes are cost conscious as well as care for nature. Further details on this aspect have been provided in ***Table No. 4.6*** and presented graphically in ***Chart No. 4.6***.

Table No. 4.6

Distribution of respondents according to Location and which floor wills you prefer in a 5 floor building

Row Labels	4th floor	5th floor	Grand Total
near to nature	20	8	28
outside of city	4	52	56
within city	28	64	92
Grand Total	**52**	**124**	**176**

Source: Field investigation

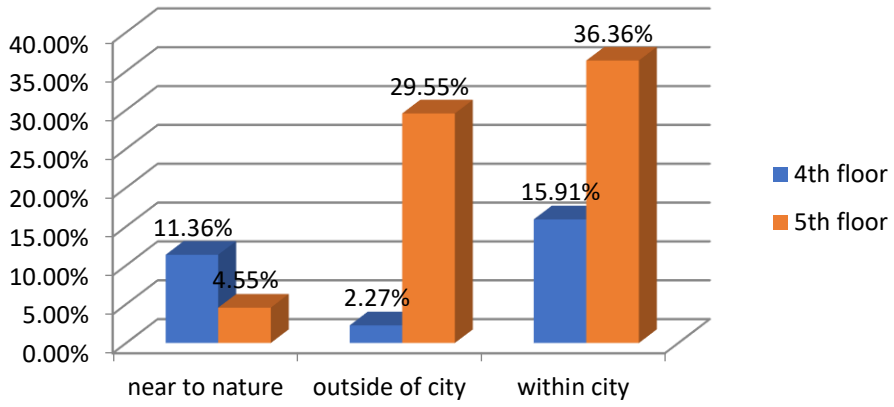
Table No. 4.6a

Distribution of respondents according to Location and which floor will you prefer in a 5 floor building (In %)

Row Labels	4th floor	5th floor	Grand Total
near to nature	11.36%	4.55%	15.91%
outside of city	2.27%	29.55%	31.82%
within city	15.91%	36.36%	52.27%
Grand Total	**29.55%**	**70.45%**	**100.00%**

Source: Field investigation

Chart No. 4.6
Distribution of respondents according to Location and which floor will prefer in a 5 floor building



In Pune there are basically two types of building preferences have been found such as 6 floor and 12 floor. These are the most preferred storied buildings observed in Pune specifically for constructing ecofriendly homes. Thus in the present study an effort has been made to understand the preferences of the responding buyers for the same. Ultimately, from ***Table No. 4.7***, it would be seen that more than 50 per cent of the respondents provided their preferences for 6 floor apartments and 40 per cent respondents registered their choice for 12 floor buildings. This may be treated as the factor impacting directly on the buying behavior of the ecofriendly houses. The same details have been presented in graphical representation with the help of ***Chart No. 4.7***.

Note - All the prices are in Indian Rupees & L stands for Lakhs

Table No. 4.7

Distribution of respondents according to budget and the building preference

Sr. No.	Row Labels	any other	Building with 12 floor	Building with 6 floor	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**
1	30 L to 50 L	0	12	48	60
2	50 L to 75 L	4	44	24	72
3	75 L to 1 Cr.	0	0	0	0
4	1 Cr. to 2 Cr.	0	16	28	44
	Grand Total	**4**	**72**	**100**	**176**

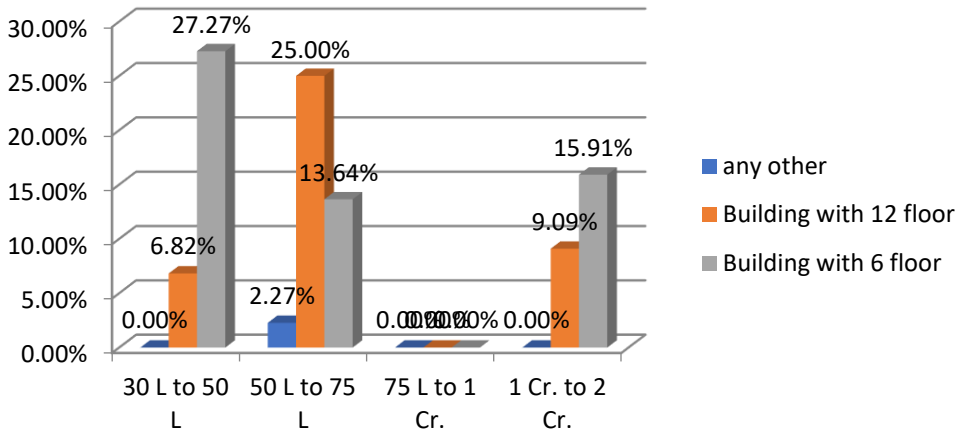
Source: Field investigation

Table No. 4.7aDistribution of respondents according to budget and the building preference (In %)

Sr. No.	Row Labels	any other	Building with 12 floor	Building with 6 floor	Grand Total
I	II	III	IV	V	VI
1	30 L to 50 L	0.00%	6.82%	27.27%	34.09%
2	50 L to 75 L	2.27%	25.00%	13.64%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	0.00%	9.09%	15.91%	25.00%
	Grand Total	**2.27%**	**40.91%**	**56.82%**	**100.00%**

Source: Field investigation

Chart No. 4.7
Distribution of respondents according to budget and what type of building preferring



In a summary, it may be stated that, most of the buyers of the ecofriendly houses are preferring property in the heart of the city to get connectivity to hospital, schools etc and thus for residential purposes only. Thus, they prefer 4th or 5th floor to stay from the 6 storied building.

4.1.2 Section-(ii)

Analysis of Cost and Financial Factors

Apart from the general factors influencing buying behavior of the buyers of ecofriendly houses, present study put its efforts in analyzing financial and cost factors. With this intention responses have been collected, quantified, tabulated in this section to provide logical interpretation.

Now, on the aspect of budget and intension to bargain on the basic cost, pinions of the respondents have been collected. Based on the quantified results mentioned in the ***Table No. 4.8***, it will be seen that, almost 50 per cent of the respondents have not mentioned their solid opinions though also not mentioned that they are not negotiating on the basic cost. Finally, almost 12 per cent of the respondents mentioned that they bargain on the

basic cost. This simply provides understanding that construction industry is having monopoly at least on the pricing strategies of the ecofriendly houses. Further details on this aspect have been tabulated in table no. 4.8 and presented in ***Chart No. 4.8***.

Table No. 4.8

Distribution of respondents according to budget and do you bargain on basic cost

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	4	20	12	24	60
2	50 L to 75 L	4	20	4	44	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	0	8	4	32	44
	Grand Total	**8**	**48**	**20**	**100**	**176**

Source: Field investigation

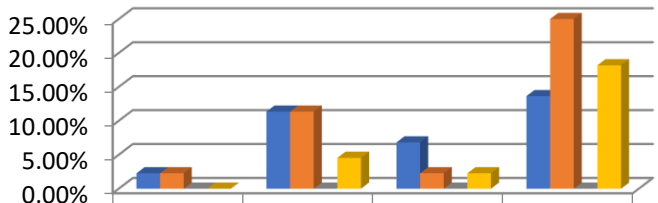
Table No. 4.8a

Distribution of respondents according to budget and do you bargain on basic cost (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	2.27%	11.36%	6.82%	13.64%	34.09%
2	50 L to 75 L	2.27%	11.36%	2.27%	25.00%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	0.00%	4.55%	2.27%	18.18%	25.00%
	Grand Total	**4.55%**	**27.27%**	**11.36%**	**56.82%**	**100.00%**

Source: Field investigation

Chart No. 4.8
Distribution of respondents according to budget and bargain on basic cost



	Yes	Sometimes	No	Can't say
30 L to 50 L	2.27%	11.36%	6.82%	13.64%
50 L to 75 L	2.27%	11.36%	2.27%	25.00%
75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%
1 Cr. to 2 Cr.	0.00%	4.55%	2.27%	18.18%

It also has been investigated in the present research that what is ability of the buyer to estimate the cost of the ecofriendly houses. This aspect has been quantified by using Likert Scale compare the reality of the prices. Based on the quantified details of the buyer's opinions, it has been observed that, almost 22 per cent buyers have reached near about the real price of the ecofriendly houses. Though, big chunk of 45 per cent respondents aren't provided right estimate of the ecofriendly houses. This has reflected that the buyers are having biased opinions about the price of ecofriendly houses and thus can't generate active demand for it. Further details on this aspect have been presented with the help of ***Table No. 4.9*** and ***Chart No. 4.9.***

Table No. 4.9

Distribution of respondents according to location and perception regarding current price of flats

Sr. No.	Row Labels	As per perception	Near to perception	Not according to perception	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	near to nature	0	20	4	4	28
2	outside of city	0	16	20	20	56
3	within city	0	4	32	56	92
4	Near Work Place	0	0	0	0	0
5	Any other	0	0	0	0	0

	Grand Total	**0**	**40**	**56**	**80**	**176**

Source: Field investigation

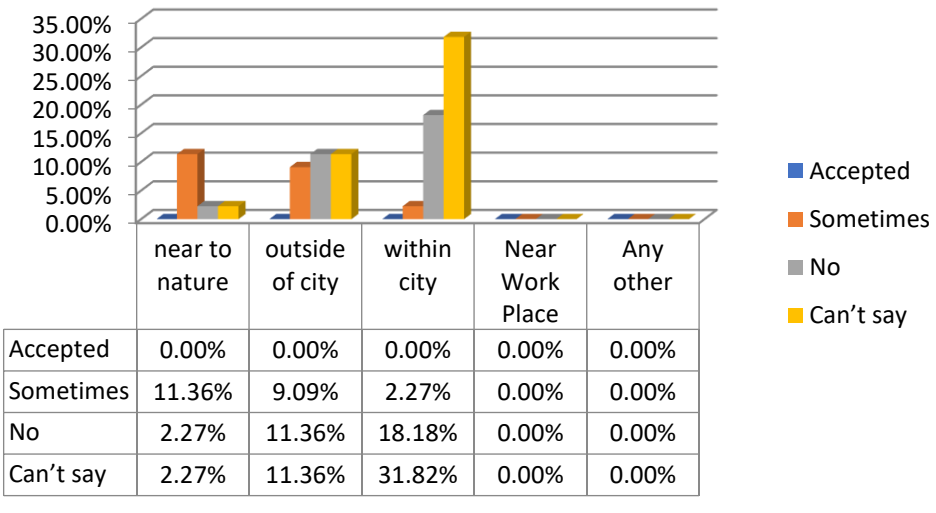
Table No. 4.9a

Distribution of respondents according to location and perception regarding current price of flats (In %)

Sr. No.	Row Labels	As per perception	Near to perception	Not according to perception	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	near to nature	0.00%	11.36%	2.27%	2.27%	15.91%
2	outside of city	0.00%	9.09%	11.36%	11.36%	31.82%
3	within city	0.00%	2.27%	18.18%	31.82%	52.27%
4	Near Work Place	0.00%	0.00%	0.00%	0.00%	0.00%
5	Any other	0.00%	0.00%	0.00%	0.00%	0.00%
	Grand Total	**0.00%**	**22.73%**	**31.82%**	**45.45%**	**100.00%**

Source: Field investigation

Chart No. 4.9
Distribution of respondents according to location and what is your perception regarding current price of flats



	near to nature	outside of city	within city	Near Work Place	Any other
Accepted	0.00%	0.00%	0.00%	0.00%	0.00%
Sometimes	11.36%	9.09%	2.27%	0.00%	0.00%
No	2.27%	11.36%	18.18%	0.00%	0.00%
Can't say	2.27%	11.36%	31.82%	0.00%	0.00%

Surprisingly need to note that buyers of the ecofriendly homes have not considered their income while purchasing the flats. It seems abnormal but the reasons behind this may be attributed to the fact that instead of income buyers may be considering the EMI of the flat to be purchased and the availability of loan facility. (***Table and Chart No. 4.10***)

Table No. 4.10

Distribution of respondents according to Location and purchasing decision according to income

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	near to nature	0	8	0	20	28
2	outside of city	0	24	0	32	56
3	within city	4	20	24	44	92
4	Near Work Place	0	0	0	0	0
5	Any other	0	0	0	0	0
	Grand Total	**4**	**52**	**24**	**96**	**176**

Source: Field investigation

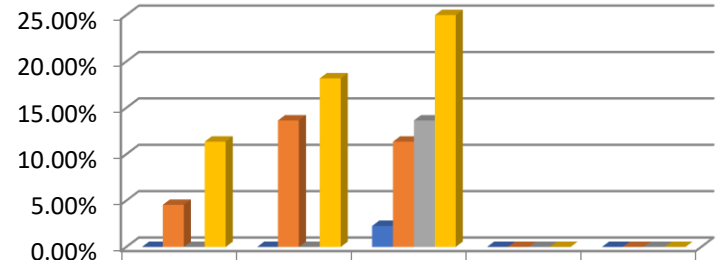
Table No. 4.10a

Distribution of respondents according to Location and purchasing decision according to income (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	near to nature	0.00%	4.55%	0.00%	11.36%	15.91%
2	outside of city	0.00%	13.64%	0.00%	18.18%	31.82%
3	within city	2.27%	11.36%	13.64%	25.00%	52.27%
4	Near Work Place	0.00%	0.00%	0.00%	0.00%	0.00%
5	Any other	0.00%	0.00%	0.00%	0.00%	0.00%
	Grand Total	**2.27%**	**29.55%**	**13.64%**	**54.55%**	**100.00%**

Source: Field investigation

Chart No.4.10
Distribution of respondents according to Location and purchasing the flat/house according to income



	near to nature	outside of city	within city	Near Work Place	Any other
Yes	0.00%	0.00%	2.27%	0.00%	0.00%
Sometimes	4.55%	13.64%	11.36%	0.00%	0.00%
No	0.00%	0.00%	13.64%	0.00%	0.00%
Can't say	11.36%	18.18%	25.00%	0.00%	0.00%

The budget specified by the responding buyers of ecofriendly houses is playing key decisive factors in buying decision. Though two other factors such as, protection and status also have been investigated in this research to get realistic understanding of the buying behavior. Thus, from the ***Table No. 4.11***, it has been seen that almost 30 per cent of the respondents considers the protection and status while buying ecofriendly houses. Further details on this aspect have been presented with the help of ***Chart No. 4.11***.

Table No. 4.11

Distribution of respondents according to budget and purchasing the flat/house according to protection and status

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	0	32	0	28	60
2	50 L to 75 L	4	12	20	36	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	0	12	8	24	44
	Grand Total	**4**	**56**	**28**	**88**	**176**

Source: Field investigation

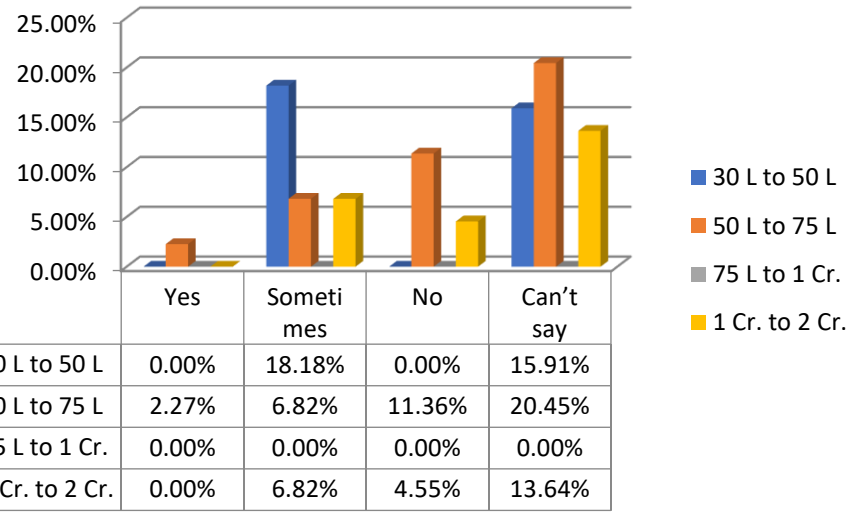
Table No. 4.11a

Distribution of respondents according to budget and purchasing the flat/house according to protection and status (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	0.00%	18.18%	0.00%	15.91%	34.09%
2	50 L to 75 L	2.27%	6.82%	11.36%	20.45%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	0.00%	6.82%	4.55%	13.64%	25.00%
	Grand Total	**2.27%**	**31.82%**	**15.91%**	**50.00%**	**100.00%**

Source: Field investigation

Chart No. 4.11
Distribution of respondents according to budget and purchasing the flat/house according to protection and status



	Yes	Sometimes	No	Can't say
30 L to 50 L	0.00%	18.18%	0.00%	15.91%
50 L to 75 L	2.27%	6.82%	11.36%	20.45%
75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%
1 Cr. to 2 Cr.	0.00%	6.82%	4.55%	13.64%

Age of the respondents is also playing significant role in buying of the ecofriendly houses. Naturally, oldest buyers are more preferring ecofriendly homes though in the present study, based on the opinions quantified regarding this aspect it has been seen that 38 per cent of the respondents are sometime considering the age factors while purchasing the ecofriendly homes. Near about half of the total respondents mentioned that they have not thought of this factor while making the decision. ***(Table No. 4.12 and Chart No. 4.12)***.

Table No. 4.12

Distribution of respondents according to budget and purchasing the flat/house according to age

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	0	24	4	32	60
2	50 L to 75 L	0	24	4	44	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	0	20	4	20	44
	Grand Total	**0**	**68**	**12**	**96**	**176**

Source: Field investigation

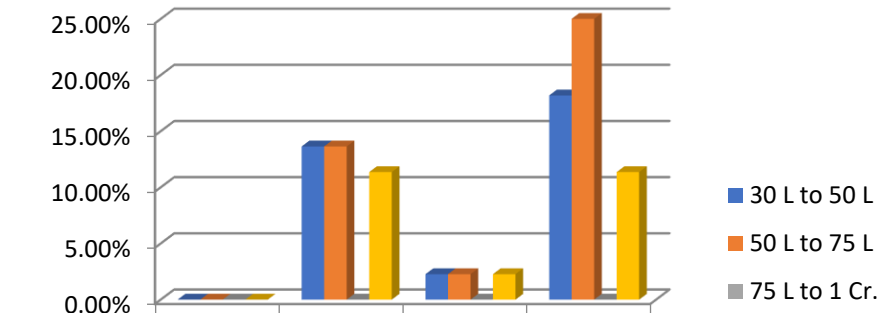
Table No. 4.12a

Distribution of respondents according to budget and purchasing the flat/house according to age (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	0.00%	13.64%	2.27%	18.18%	34.09%
2	50 L to 75 L	0.00%	13.64%	2.27%	25.00%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	0.00%	11.36%	2.27%	11.36%	25.00%
	Grand Total	**0.00%**	**38.64%**	**6.82%**	**54.55%**	**100.00%**

Source: Field investigation

Chart No. 4.12
Distribution of respondents according to budget and purchasing the flat/house according to age



	Yes	Sometimes	No	Can't say
30 L to 50 L	0.00%	13.64%	2.27%	18.18%
50 L to 75 L	0.00%	13.64%	2.27%	25.00%
75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%
1 Cr. to 2 Cr.	0.00%	11.36%	2.27%	11.36%

Family size is also considered as one of the factor for deciding the purchase of the flat. Though, it also has been observed on similar notes as age that, very small portion (35 per cent) of the respondents have found that they consider family size while buying the ecofriendly houses. (***Table No. 4.13 and Chart No. 4.13)***.

Table No. 4.13

Distribution of respondents according to budget and are you purchasing the flat/house according to your family size

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	8	12	0	40	60
2	50 L to 75 L	8	20	8	36	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	0	16	8	20	44
	Grand Total	**16**	**48**	**16**	**96**	**176**

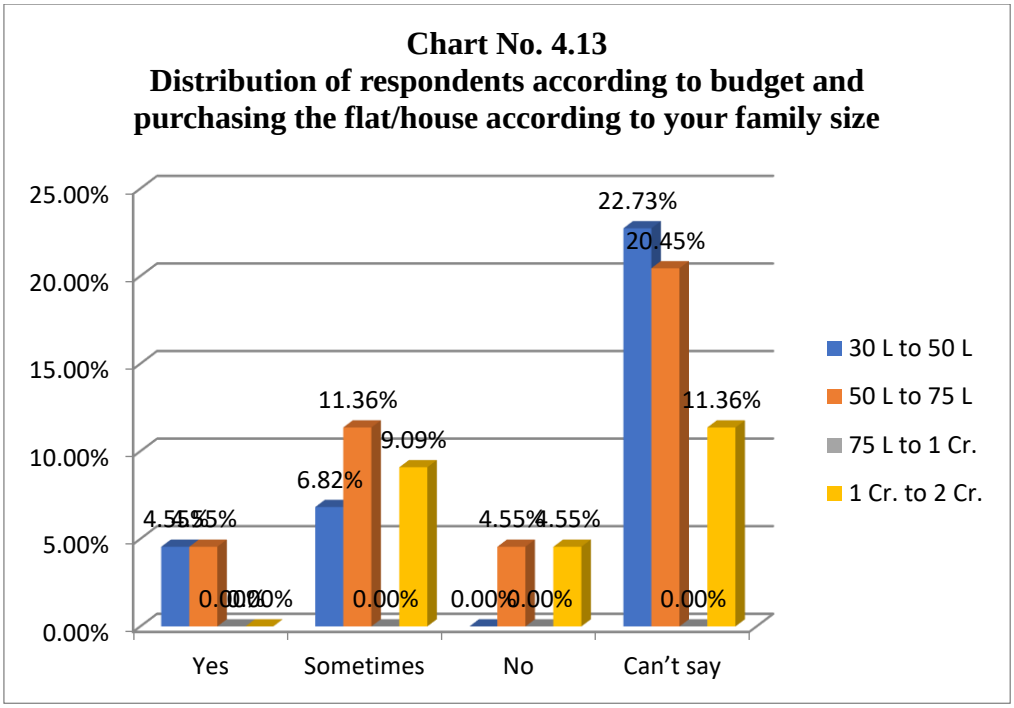
Source: Field investigation

Table No. 4.13a

Distribution of respondents according to budget and are you purchasing the flat/house according to your family size (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	4.55%	6.82%	0.00%	22.73%	34.09%
2	50 L to 75 L	4.55%	11.36%	4.55%	20.45%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	0.00%	9.09%	4.55%	11.36%	25.00%
	Grand Total	**9.09%**	**27.27%**	**9.09%**	**54.55%**	**100.00%**

Source: Field investigation



In a summary of this section, it needs to be specifically highlighted that, decision of the buying ecofriendly homes are not hampered due to budget, family size and age factors. Also buyers are not bargaining on the basic cost of these schemes. This has reflected the greatest scope for constructing ecofriendly homes.

4.1.3 Section-(iii)

Analysis of Awareness and Promotional Strategy

Based on the earlier discussions and the surprising observations, an effort has been made to understand level of awareness of the responding buyers regarding promotional strategies of the companies involved in constructing ecofriendly homes.

The understanding of the project has five sources for the potential buyers of the construction industry such as, banners, hording, magazines, pamphlets and posters. It has been observed based on the observations made in Table No. 4.14 that, almost all the buyers got information about ecofriendly project promptly from only two sources such as, (a) banners (47 per cent of the respondents) and (b) pamphlets (47.73 per cent of the respondents.

Further details on this aspect have been presented graphically with the help of ***Chart No. 4.14***.

Table No. 4.14

Distribution of respondents according to budget and how do you come to know about this project

Sr. No.	Row Labels	Banners	Hording	Magazines	Pamphlets	Poster	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	30 L to 50 L	28	0	0	32	0	60
2	50 L to 75 L	44	4	4	20	0	72
3	75 L to 1 Cr.	0	0	0	0	0	0
4	1 Cr. to 2 Cr.	12	0	0	32	0	44
	Grand Total	**84**	**4**	**4**	**84**	**0**	**176**

Source: Field investigation

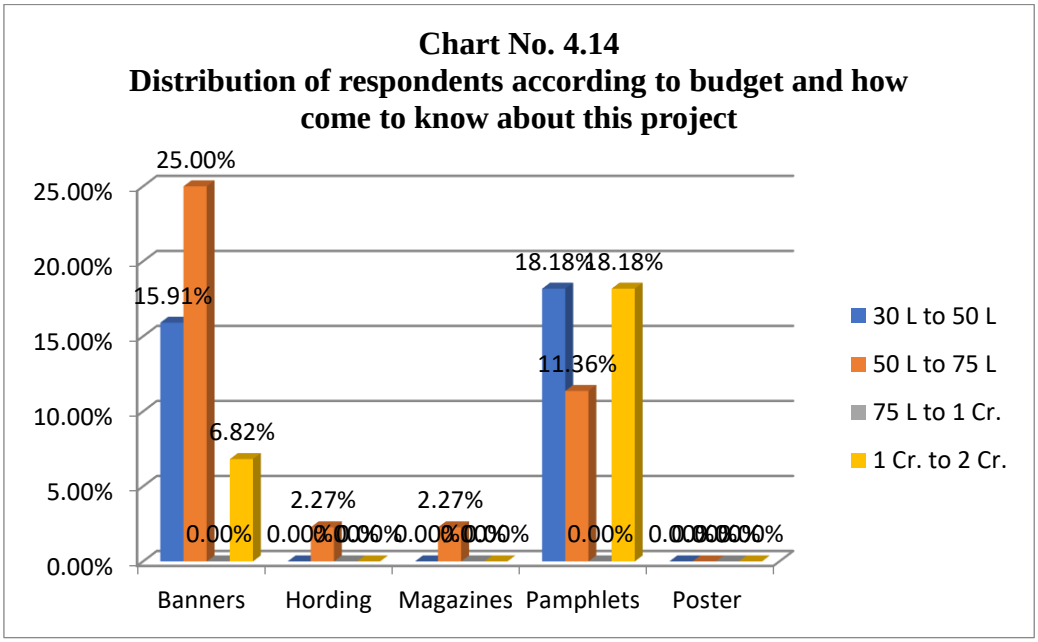
Table No. 4.14a

Distribution of respondents according to budget and how do you come to know about this project (In %)

Sr. No.	Row Labels	Banners	Hording	Magazines	Pamphlets	Poster	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	30 L to 50 L	15.91%	0.00%	0.00%	18.18%	0.00 %	34.09%
2	50 L to 75 L	25.00%	2.27%	2.27%	11.36%	0.00 %	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00 %	0.00%

4	1 Cr. to 2 Cr.	6.82%	0.00%	0.00%	18.18%	0.00 %	25.00%
	Grand Total	**47.73 %**	**2.27%**	**2.27%**	**47.73%**	**0.00 %**	**100.00%**

Source: Field investigation



Apart from advertising channels, it is also investigated on the preference of customers on media channels for seeking property. Quantified details on this aspect have been presented with the help of ***Table No. 4.15***. It has been observed that almost more than 45 per cent of the responding buyers prefer social media as the most preferred channel for searching the properties followed by websites and Radio/FM. These details are presented graphically with the help of ***Chart No. 4.15***.

Table No. 4.15

Distribution of respondents according to budget and which digital media you prefer for seeking property

Sr. No.	Row Labels	Websites	Radio/FM	Social Media	T.V	Random message	Grand Total
I	II	III	IV	V	VI	VII	IX
1	30 L to 50 L	16	12	32	0	0	60
2	50 L to 75 L	20	12	40	0	0	72

3	75 L to 1 Cr.	0	0	0	0	0	0
4	1 Cr. to 2 Cr.	20	16	8	0	0	44
	Grand Total	**56**	**40**	**80**	**0**	**0**	**176**

Source: Field investigation

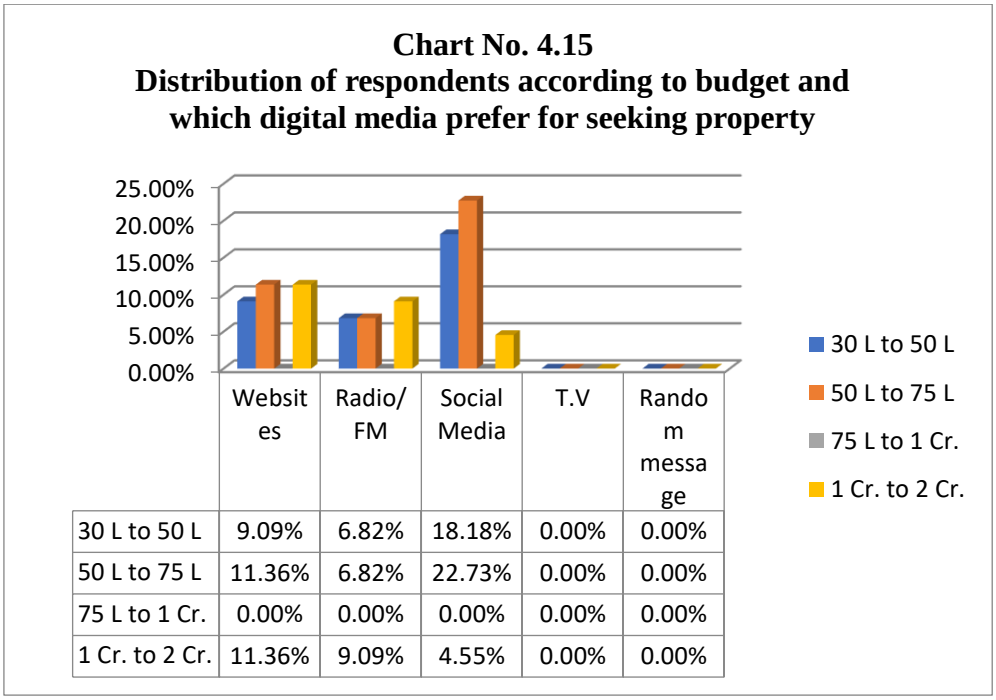
Table No. 4.15a

Distribution of respondents according to budget and which digital media you prefer for seeking property (In %)

Sr. No.	Row Labels	Websites	Radio/FM	Social Media	T.V	Random message	Grand Total
I	II	III	IV	V	VI	VII	IX
1	30 L to 50 L	9.09%	6.82%	18.18%	0.00 %	0.00%	34.09%
2	50 L to 75 L	11.36%	6.82%	22.73%	0.00 %	0.00%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00 %	0.00%	0.00%
4	1 Cr. to 2 Cr.	11.36%	9.09%	4.55%	0.00 %	0.00%	25.00%
	Grand Total	**31.82 %**	**22.73%**	**45.45%**	**0.00 %**	**0.00%**	**100.00%**

Source: Field investigation

Chart No. 4.15
Distribution of respondents according to budget and which digital media prefer for seeking property



	Websites	Radio/FM	Social Media	T.V	Random message
30 L to 50 L	9.09%	6.82%	18.18%	0.00%	0.00%
50 L to 75 L	11.36%	6.82%	22.73%	0.00%	0.00%
75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
1 Cr. to 2 Cr.	11.36%	9.09%	4.55%	0.00%	0.00%

In the buying decision of the ecofriendly homes, mediators also play a significant role. Thus, five sources of information have been investigated in this study on understanding the mediators for approaching ecofriendly housing sites. The details on this aspect have been quantified, tabulated in ***Table No. 4.16*** and presented with the help of ***Chart No. 4.16***. It has been observed form the quantified response that friends/relative and real estate agents are playing major role of mediator in this process of buying ecofriendly homes.

Table No. 4.16

Distribution of respondents according to budget and through whom you have visited the site actually

Sr. No.	Row Labels	Exhibition	Friends/relatives recommendation	Real Estate Agent	Walk in	Channel Partner	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	30 L to 50 L	0	36	24	0	0	60
2	50 L to 75 L	4	20	48	0	0	72
3	75 L to 1 Cr.	0	0	0	0	0	0
4	1 Cr. to 2 Cr.	8	36	0	0	0	44
	Grand Total	**12**	**92**	**72**	0	0	**176**

Source: Field investigation

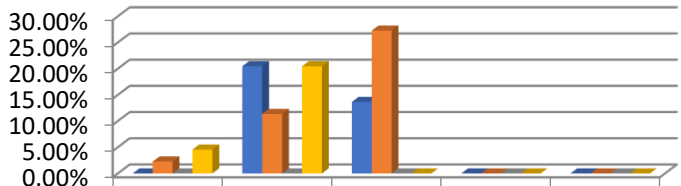
Table No. 4.16a

Distribution of respondents according to budget and through whom you have visited the site actually (In %)

Sr. No.	Row Labels	Exhibition	Friends/relatives recommendation	Real Estate Agent	Walk in	Channel Partner	Grand Total
I	II	III	IV	V	VI	VII	VIII
1	30 L to 50 L	0.00%	20.45%	13.64%	0.00%	0.00%	34.09%
2	50 L to 75 L	2.27%	11.36%	27.27%	0.00%	0.00%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	4.55%	20.45%	0.00%	0.00%	0.00%	25.00%
	Grand Total	**6.82 %**	**52.27%**	**40.91%**	0.00%	0.00%	**100.00 %**

Source: Field investigation

Chart No. 4.16
Distribution of respondents according to budget and through whom have visited the site actually



	Exhibition	Friends /relatives recommendation	Real Estate Agent	Walk in	Channel Partner
30 L to 50 L	0.00%	20.45%	13.64%	0.00%	0.00%
50 L to 75 L	2.27%	11.36%	27.27%	0.00%	0.00%
75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
1 Cr. to 2 Cr.	4.55%	20.45%	0.00%	0.00%	0.00%

On the aspect of strategies marketing of the ecofriendly homes, four basic strategies have been investigated in the research study. Such as, discounts, No EMI till possession, pre-launch offer and publicity. The quantified details are referred from the ***Table No. 4.17***. It has been seen that 'No EMI still possession' is the most preferred promotional strategy followed by discount and prelaunch offers.

It simply reflect that hassle free buying and no financial burden at least for some time is the right marketing strategy implemented by the industry players. Further details graphical presented in ***Chart No. 4.17***.

Table No. 4.17

Distribution of respondents according to budget and what promotional activity attracts you more for final purchase

Sr. No.	Row Labels	Discount	No EMI till Possession	Pre-lunch offer	Publicity	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	32	24	4	0	60
2	50 L to 75 L	32	20	20	0	72

3	75 L to 1 Cr.	0	0	0	0	0
00	1 Cr. to 2 Cr.	0	36	8	0	44
	Grand Total	**64**	**80**	**32**	**0**	**176**

Source: Field investigation

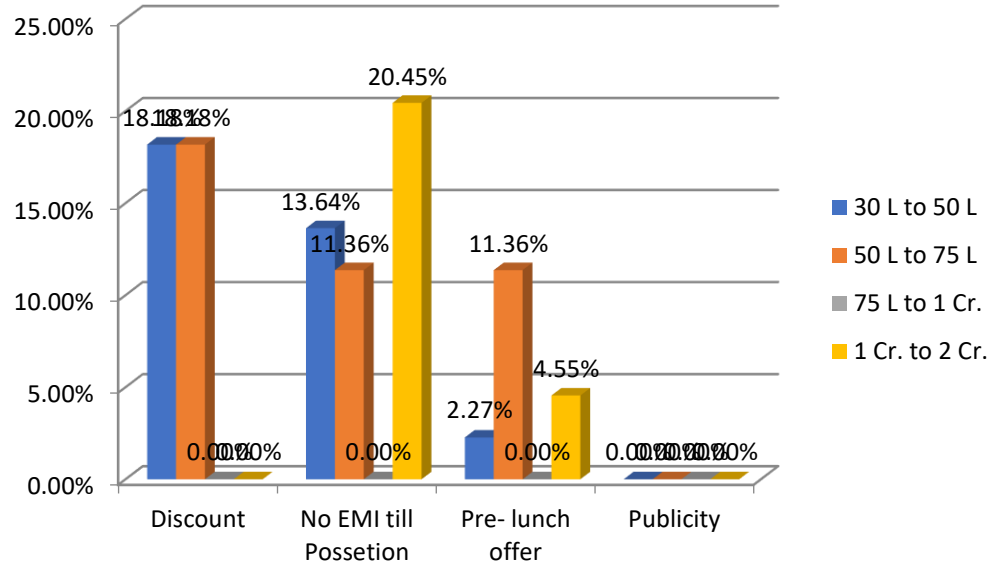
Table No. 4.17a

Distribution of respondents according to budget and what promotional activity attracts you more for final purchase (In %)

Sr. No.	**Row Labels**	**Discount**	**No EMI till Possession**	**Pre-lunch offer**	**Publicity**	**Grand Total**
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	18.18%	13.64%	2.27%	0.00%	34.09%
2	50 L to 75 L	18.18%	11.36%	11.36%	0.00%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	0.00%	20.45%	4.55%	0.00%	25.00%
	Grand Total	**36.36%**	**45.45%**	**18.18%**	**0.00%**	**100.00%**

Source: Field investigation

Chart No. 4.17
Distribution of respondents according to budget and what promotional activity attracts more for final purchase



Also financial support arranged by builders have observed mixed response from the buyers as, almost 30 per cent of the respondents nodded in affirmation whereas 20 per cent provided preference for some time and 20 per cent stand strict negative on this aspect. This fact may be depending on the hassle free loans provided by the banks and support extended from the employers. Thus seeking support from builders is rarely preferred. ***(Table and Chart No. 4.18)***

Table No. 4.18

Distribution of respondents according to budget and do you prefer builders arranging financial support for selling

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	24	12	8	16	60
2	50 L to 75 L	16	12	12	32	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	12	12	16	4	44
	Grand Total	**52**	**36**	**36**	**52**	**176**

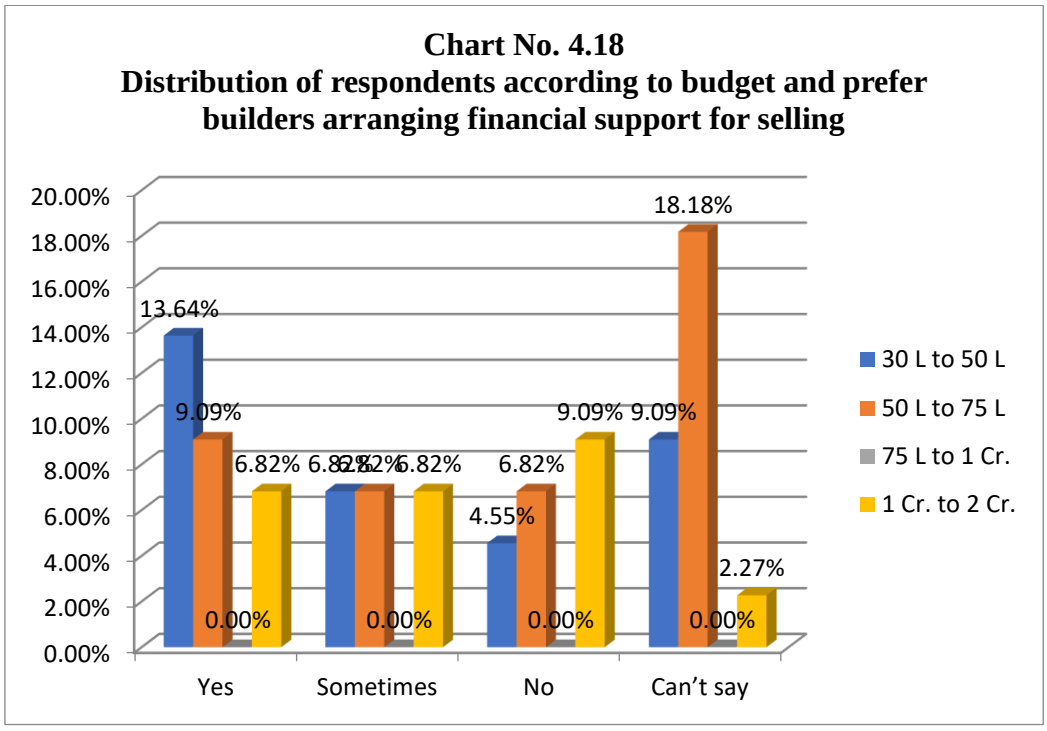
Source: Field investigation

Table No. 4.18a

Distribution of respondents according to budget and do you prefer builders arranging financial support for selling (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	13.64%	6.82%	4.55%	9.09%	34.09%
2	50 L to 75 L	9.09%	6.82%	6.82%	18.18%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	6.82%	6.82%	9.09%	2.27%	25.00%
	Grand Total	**29.55%**	**20.45%**	**20.45%**	**29.55%**	**100.00%**

Source: Field investigation



In a summary of the section, it has to be noted that policy makers of the builders should prefer social media as marketing tool and focus on pamphlets and banners. The stronger network of agents and mouth publicity shall give more preference.

4.1.4 Section-(iv)

Analysis of Decision Variables

Decision of buying homes and apartments is the joint function of various factors such

as space, security, safety, ventilation and light. Thus an effort has been made in this section to investigate similar factors playing essential role in buying decision of the ecofriendly homes.

In this view of matter, ***Table No. 4.19*** considers the above mentioned variables and provides tabulated results of the same. The price of the flats and these variables has been jointly cross tabulated in this section. It will be seen therefore from the table that, 68 per cent respondents provided joint rating for security and safety, Ventilation and light, Garden view, Amenities along with more space. Though on the individual basis, more space has been rated by 25 per cent of the respondents. These details also have been presented with the help of ***Chart No. 4.19***.

Table No. 4.19

Distribution of respondents according to budget and which factor influence for final purchase of your home

Sr. No.	Row Labels	30 L to 50 L	50 L to 75 L	75 L to 1 Cr.	1 Cr. to 2 Cr.	Grand Total
I	II	III	IV	V	VI	
1	more space	4	40	0	0	44
2	security and safety	0	4	0	0	4
3	security and safety, Ventilation and light, Garden view, Amenities, more space	0	104	0	16	120
4	Ventilation and light	4	0	0	4	8
	Grand Total	**8**	**148**	**0**	**20**	**176**

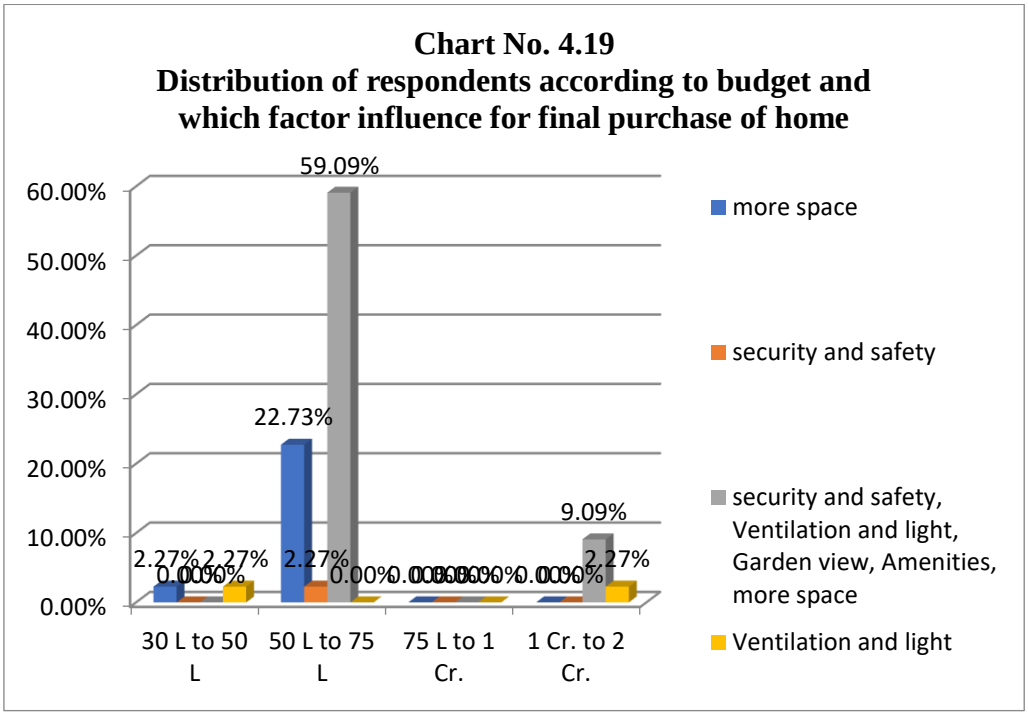
Source: Field investigation

Table No. 4.19a

Distribution of respondents according to budget and which factor influence for final purchase of your home (In %)

Sr. No.	Row Labels	30 L to 50 L	50 L to 75 L	75 L to 1 Cr.	1 Cr. to 2 Cr.	Grand Total
I	II	III	IV	V	VI	
1	more space	2.27%	22.73%	0.00%	0.00%	25.00%
2	security and safety	0.00%	2.27%	0.00%	0.00%	2.27%
3	security and safety, Ventilation and light, Garden view, Amenities, more space	0.00%	59.09%	0.00%	9.09%	68.18%
4	Ventilation and light	2.27%	0.00%	0.00%	2.27%	4.55%
	Grand Total	**4.55%**	**84.09%**	**0.00 %**	11.36%	**100.00%**

Source: Field investigation



Apart from more space and other factors quantified above, there are other internal factors present in the family structure of the decision makers. Thus with the help of ***Table No. 4.20*** and ***Chart No. 4.20*** and an effort has been made to quantify responses

for these variables such as, parents, wife, friends, media and advertising. It has been seen that more influence has been found by wife or female members in the family as mentioned by 70 per cent of the respondents. The reason behind this may be attributed to the fact that females are having longer in a home as compared to their male counterparts.

Table No. 4.20

Distribution of respondents according to budget and who influence you for final decision in buying your home

Sr. No.	Row Labels	Any other	Parents/senior in company	Wife/Female	Friends	Media and advertising	Grand Total
I	II	III	IV	V	VI	VIII	IX
1	30 L to 50 L	12	0	48	0	0	60
2	50 L to 75 L	24	4	44	0	0	72
3	75 L to 1 Cr.	0	0	0	0	0	0
4	1 Cr. to 2 Cr.	12	0	32	0	0	44
	Grand Total	**48**	**4**	**124**	**0**	**0**	**176**

Source: Field investigation

Table No. 4.20a

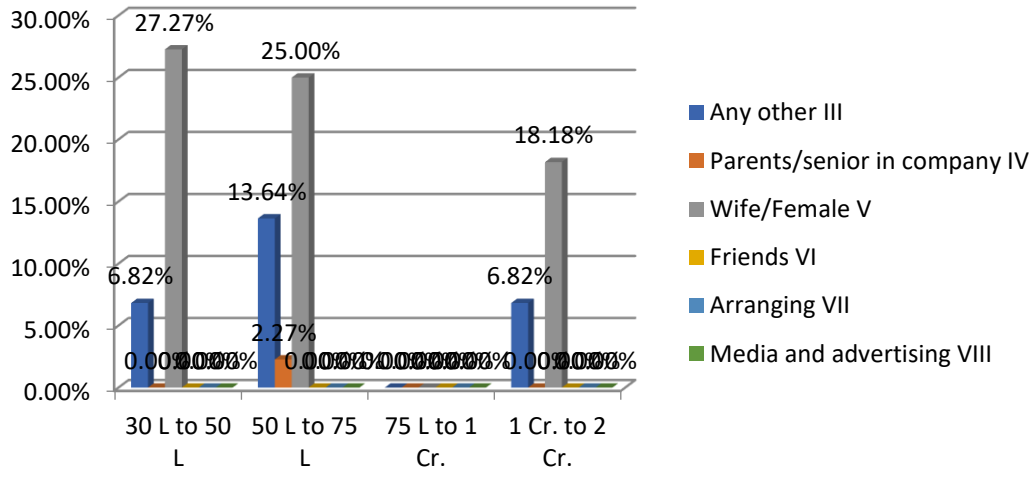
Distribution of respondents according to budget and who influence you for final decision in buying your home (In %)

Sr. No.	Row Labels	Any other	Parents/senior in company	Wife/Female	Friends	Media and advertising	Grand Total
I	II	III	IV	V	VI	VIII	IX
1	30 L to 50 L	6.82%	0.00%	27.27%	0.00 %	0.00%	34.09%
2	50 L to 75 L	13.64 %	2.27%	25.00%	0.00 %	0.00%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00 %	0.00%	0.00%
4	1 Cr. to 2 Cr.	6.82%	0.00%	18.18%	0.00 %	0.00%	25.00%

	Grand Total	**27.27 %**	**2.27%**	**70.45%**	**0.00 %**	**0.00%**	**100.00 %**

Source: Field investigation

Chart No. 4.20
Distribution of respondents according to budget and who influence you for final decision in buying home



Though, it is important to know that whether opinion of the females have taken into consideration before buying the homes. This aspect has been quantified and tabulated using ***Table No. 4.21*** and graphically presented in ***Chart No. 4.21***. The observation mentioned here provides to underline gender equality in decision making of this significant aspect at the household level. As almost 98 per cent respondents mentioned that female decision is taken into consideration for final purchase.

Table No. 4.21

Distribution of respondents according to budget and does female decision is taken into consideration for final purchase

Sr. No.	**Row Labels**	**Yes**	**sometimes**	**No**	**Can't say**	**Grand Total**
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
2	30 L to 50 L	40	20	0	0	60
3	50 L to 75 L	36	32	0	4	72
4	75 L to 1 Cr.	0	0	0	0	0
1	1 Cr. to 2 Cr.	44	0	0	0	44
	Grand Total	**120**	**52**	**0**	**4**	**176**

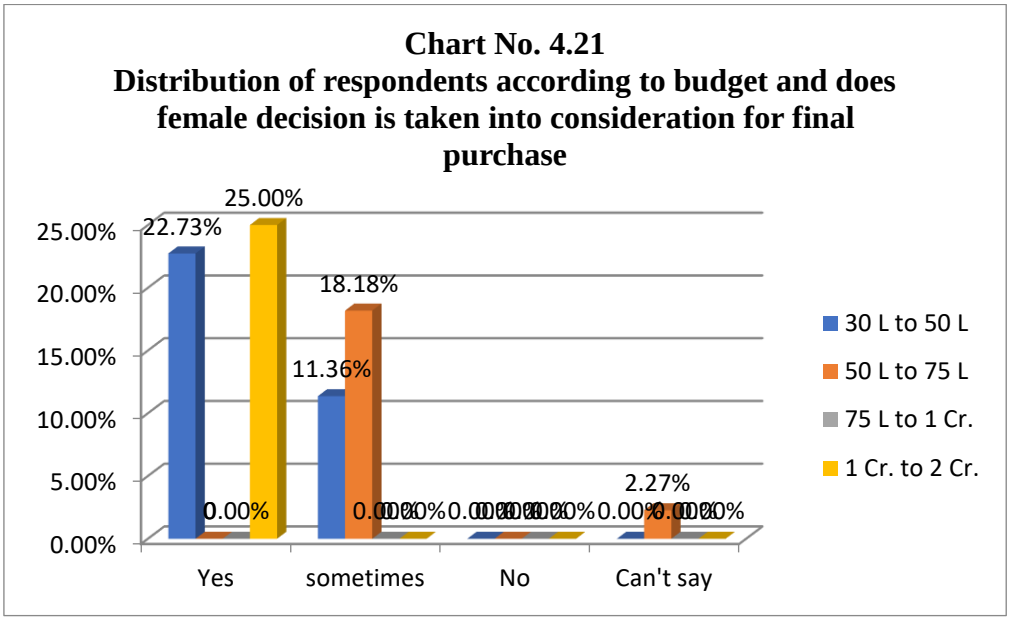
Source: Field investigation

Table No. 4.21a

Distribution of respondents according to budget and does female decision is taken into consideration for final purchase (In %)

Sr. No.	Row Labels	Yes	sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
2	30 L to 50 L	22.73%	11.36%	0.00%	0.00%	34.09%
3	50 L to 75 L	20.45%	18.18%	0.00%	2.27%	40.91%
4	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
1	1 Cr. to 2 Cr.	25.00%	0.00%	0.00%	0.00%	25.00%
	Grand Total	**68.18%**	**29.55%**	**0.00%**	**2.27%**	**100.00%**

Source: Field investigation



Further it also has been investigated that what kind of factors have been considered by the female members of family while deciding the final purchase decision. The female members of the family which considered the biggest decision maker in purchasing homes has found to be considering factors such as 24 hours water supply, Road connectivity, Near to school/hospital, Near to market, Travelling facility and Amenities. It naturally shows that almost all the necessities have been considered by the female members before arriving at the final decision. Further details on this aspect

have been provided with the help of ***Table No. 4.22*** and presented graphically with ***Chart No. 4.22***.

Table No. 4.22

Distribution of respondents according to budget and which factors are generally seen by females/wife while purchasing flat

Sr. No.	Row Labels	30 L to 50 L	50 L to 75 L	75 L to 1 Cr.	1 Cr. to 2 Cr.	Grand Total
I	II	III	IV	V	VI	VII
1	24 hours water supply, Near to school/hospital, Near to market, Travelling facility, Amenities, Carpet area	0	0	0	12	12
2	24 hours water supply, Road connectivity, Amenities	0	0	0	4	4
3	24 hours water supply, Road connectivity, Near to school/hospital, Near to market, Travelling facility, Amenities	0	144	0	4	148
4	Near to market, Travelling facility, Amenities	0	4	0	0	4
5	Road connectivity	8	0	0	0	8
	Grand Total	**8**	**148**	**0**	**20**	**176**

Source: Field investigation

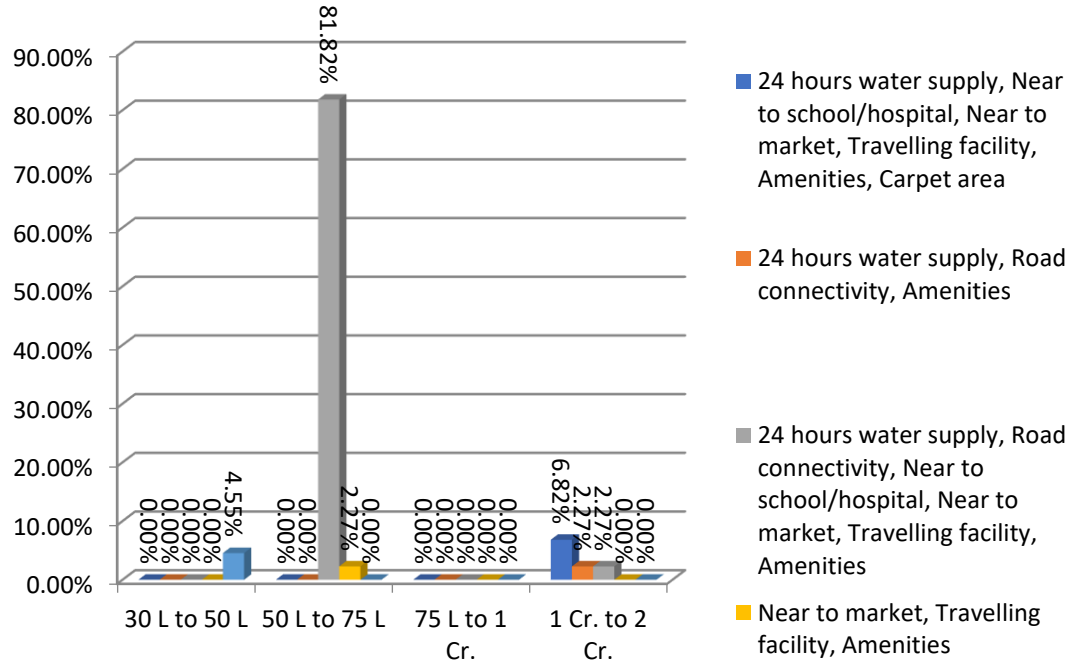
Table No. 4.22 a

Distribution of respondents according to budget and which factors are generally seen by females/wife while purchasing flat (In %)

Sr. No.	Row Labels	30 L to 50 L	50 L to 75 L	75 L to 1 Cr.	1 Cr. to 2 Cr.	Grand Total
I	II	III	IV	V	VI	VII
1	24 hours water supply, Near to school/hospital, Near to market, Travelling facility, Amenities, Carpet area	0.00%	0.00%	0.00%	6.82%	6.82%
2	24 hours water supply, Road connectivity, Amenities	0.00%	0.00%	0.00%	2.27%	2.27%
3	24 hours water supply, Road connectivity, Near to school/hospital, Near to market, Travelling facility, Amenities	0.00%	81.82%	0.00%	2.27%	84.09 %
4	Near to market, Travelling facility, Amenities	0.00%	2.27%	0.00%	0.00%	2.27%
5	Road connectivity	4.55%	0.00%	0.00%	0.00%	4.55%
	Grand Total	**4.55%**	**84.09%**	**0.00%**	**11.36%**	**100.00 %**

Source: Field investigation

Chart No. 4.22
Distribution of respondents according to budget and which factors are generally seen by females/wife while purchasing flat



In a summary of this section, it is to be noted that; female are most important decision makers in buying the homes and also considering all the necessities while arriving at the specific decisions. Also security and safety, Ventilation and light, Garden view, Amenities, more space are some of the variables that have been considered by the general buyer of eco-friendly houses.

4.1.5 Section-(v)

Preference for Facilities and Buying Decision

Eco-friendly home basically known for their environment friendly facilities, such as bio gas plant, rain water harvesting and solar energy utilization. Thus, with the help of this final section of the part-I, an effort has been made to investigate role of these factors in decision making regarding buying decision.

The calm and greener atmosphere is found to be at the outskirt of the city. Thus genuinely, constructing ecofriendly sites at outside of the city is almost feasible considering the atmosphere. This aspect has been investigated with the help of ***Table No. 4.23*** below. It would be seen therefore from the table that, distance of the project

far from city doesn't provide any influence on the decision making of buying ecofriendly homes. This aspect has been graphically presented in ***Chart No. 4.23***.

Table No. 4.23

Distribution of respondents according to budget and do you prefer an Eco friendly house which is far from city

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	0	8	12	40	60
2	50 L to 75 L	0	16	16	40	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	0	4	20	20	44
	Grand Total	**0**	**28**	**48**	**100**	**176**

Source: Field investigation

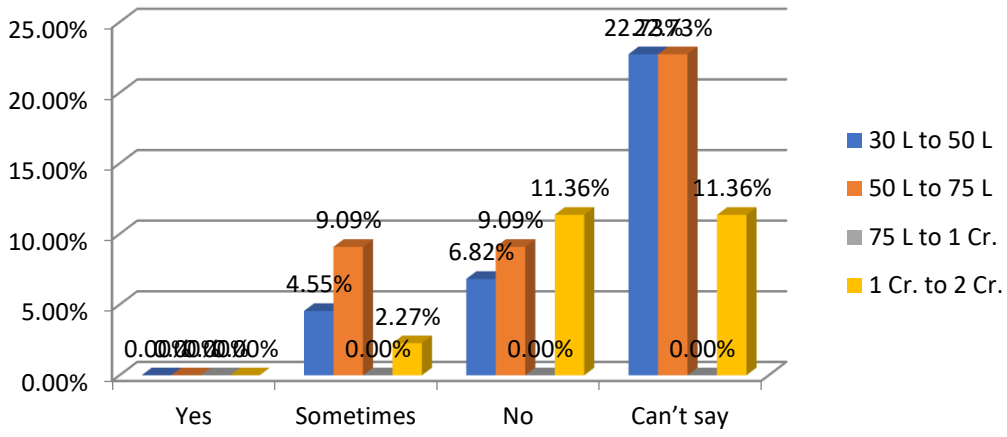
Table No. 4.23a

Distribution of respondents according to budget and do you prefer an Eco friendly house which is far from city (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	0.00%	4.55%	6.82%	22.73%	34.09%
2	50 L to 75 L	0.00%	9.09%	9.09%	22.73%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	0.00%	2.27%	11.36%	11.36%	25.00%
	Grand Total	**0.00%**	**15.91%**	**27.27%**	**56.82%**	**100.00%**

Source: Field investigation

Chart No. 4.23
Distribution of respondents according to budget and prefer a Eco friendly house which is far from city



It has been already cleared in above mentioned sections that purchasing ecofriendly houses are intended for residential purposes. Though, it is interested to know whether it has been pre-decided to stay on the long term basis in ecofriendly homes. This aspect has been quantified with the help of ***Table No. 4.24 and Chart No. 4.24***. Thus, only 36 per cent of the responding buyers of ecofriendly homes have mentioned that they decided to stay for long term in this house. But significantly big chunk of respondents have stated that they didn't decided anything about it.

Table No. 4.24

Distribution of respondents according to budget and will you specifically choose Eco friendly house for your long them stay

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	4	20	16	20	60
2	50 L to 75 L	8	12	20	32	72
3	75 L to 1 Cr.	0	0	0	0	0

4	1 Cr. to 2 Cr.	8	12	12	12	44
	Grand Total	**20**	**44**	**48**	**64**	**176**

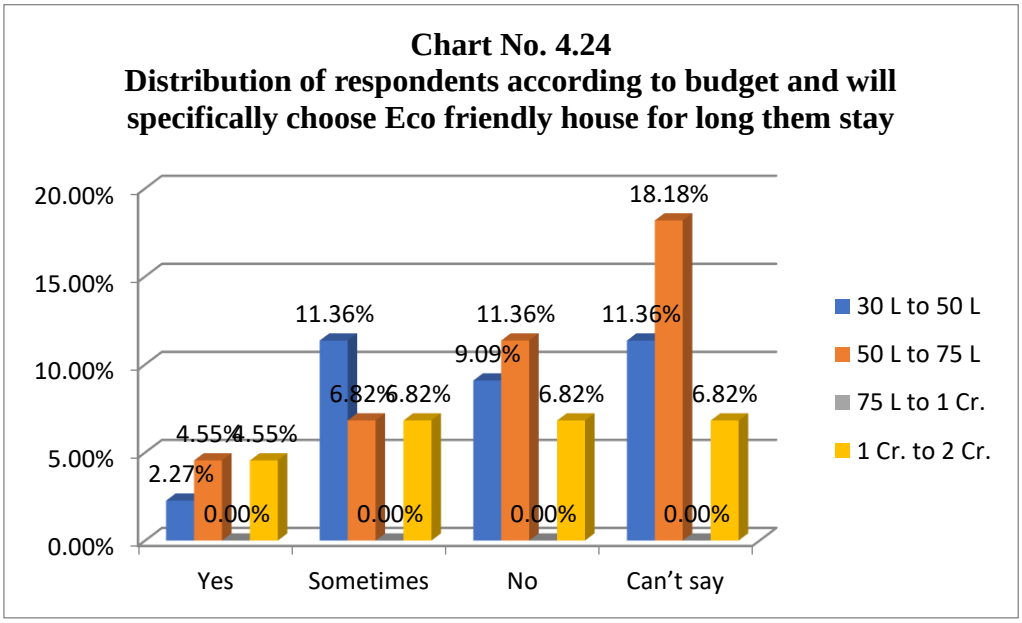
Source: Field investigation

Table No. 4.24a

Distribution of respondents according to budget and will you specifically choose Eco friendly house for your long them stay (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	2.27%	11.36%	9.09%	11.36%	34.09%
2	50 L to 75 L	4.55%	6.82%	11.36%	18.18%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	4.55%	6.82%	6.82%	6.82%	25.00%
	Grand Total	**11.36%**	**25.00%**	**27.27%**	**36.36%**	**100.00%**

Source: Field investigation



Now, on the aspect of facilities those expected more from the ecofriendly houses have been investigated. Thus with reference made to the ***Table No. 4.25***, an assessment of the facility of providing solar heating facility has been made. In this view of matter it

has been observed that, almost 65 per cent of the respondents have not considered this facility at the time of decision to buy the ecofriendly homes. This aspect graphically presented with the help of ***Chart No. 4.25***.

Table No. 4.25

Distribution of respondents according to budget and do you prefer building with solar heating facilities

Sr. No	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	8	12	32	8	60
2	50 L to 75 L	8	4	52	8	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	8	0	32	4	44
	Grand Total	**24**	**16**	**116**	**20**	**176**

Source: Field investigation

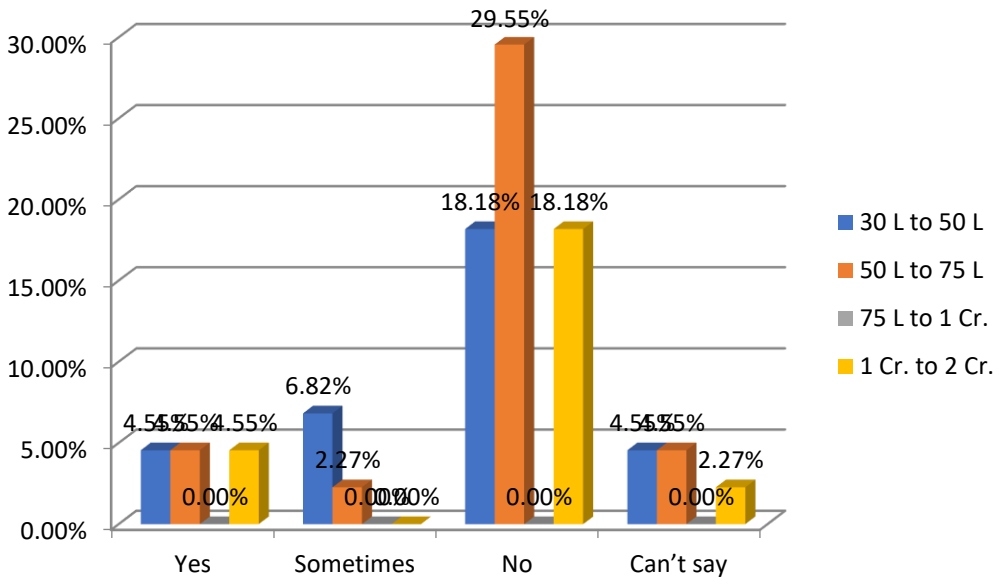
Table No. 4.25a

Distribution of respondents according to budget and do you prefer building with solar heating facilities (In %)

Sr. No	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	4.55%	6.82%	18.18%	4.55%	34.09%
2	50 L to 75 L	4.55%	2.27%	29.55%	4.55%	34.09%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	4.55%	0.00%	18.18%	2.27%	25.00%
	Grand Total	**13.64%**	**9.09%**	**65.91%**	**11.36%**	**100.00%**

Source: Field investigation

Chart No. 4.25
Distribution of respondents according to budget and prefer building with solar heating facilities



The similar observations have been made on the facility of providing rainwater harvesting. Thus only 38 per cent of the total buyers considered rain water harvesting facility while buying the ecofriendly homes. This simply reflects that the buyers are more interested in having water availability and least bother about the source. Thus it is the complete decision of builder to provide water to the residents irrespective of the buyers' preferences. Further details on this aspect have been provided with the help of Table No. 4.26 and presented graphically in ***Chart No. 4.26***.

Table No. 4.26

Distribution of respondents according to budget and do you prefer building with rain water harvesting

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	12	8	8	32	60
2	50 L to 75 L	8	20	8	36	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	4	16	8	16	44
	Grand Total	**24**	**44**	**24**	**84**	**176**

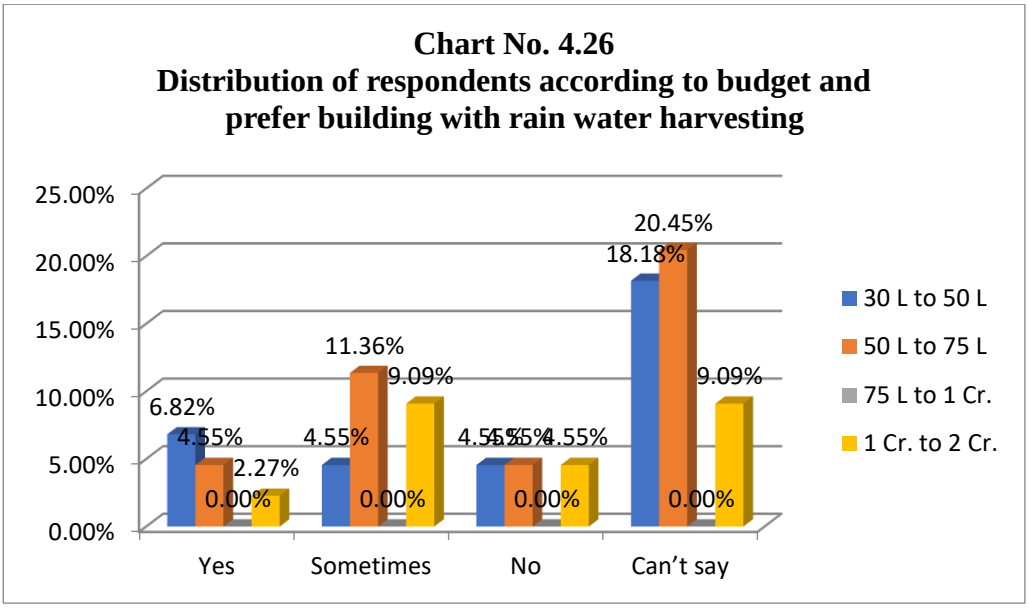
Source: Field investigation

Table No. 4.26a

Distribution of respondents according to budget and do you prefer building with rain water harvesting (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	6.82%	4.55%	4.55%	18.18%	34.09%
2	50 L to 75 L	4.55%	11.36%	4.55%	20.45%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	2.27%	9.09%	4.55%	9.09%	25.00%
	Grand Total	**13.64%**	**25.00%**	**13.64%**	**47.73%**	**100.00%**

Source: Field investigation



Slightly more respondents have been observed to be considering the garbage disposal facility at the apartments. Total 34 per cent of the respondents have found to be worried about this facility while purchasing the homes. Further details provided in the ***Table No. 4.27*** and ***Chart No. 4.27***.

Table No. 4.27

Distribution of respondents according to budget and do you prefer building with garbage disposal facility

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	4	28	8	20	60
2	50 L to 75 L	4	16	8	44	72
3	75 L to 1 Cr.	0	0	0	0	0

4	1 Cr. to 2 Cr.	0	8	4	32	44
	Grand Total	**8**	**52**	**20**	**96**	**176**

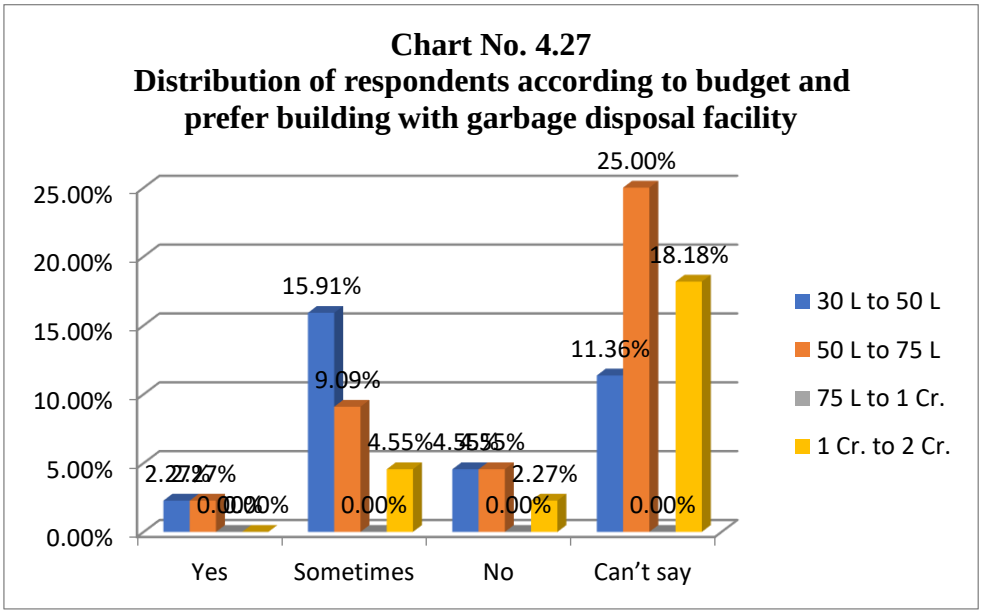
Source: Field investigation

Table No. 4.27a

Distribution of respondents according to budget and do you prefer building with garbage disposal facility (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	2.27%	15.91%	4.55%	11.36%	34.09%
2	50 L to 75 L	2.27%	9.09%	4.55%	25.00%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	0.00%	4.55%	2.27%	18.18%	25.00%
	Grand Total	**4.55%**	**29.55%**	**11.36%**	**54.55%**	**100.00%**

Source: Field investigation



Moreover, building with bio gas plant also has not been seen with more preference by the buyers of the ecofriendly homes. Ultimately it may be noted that the environmental

considerations are not the core areas of the buyers for purchasing ecofriendly homes. These details are tabulated and presented in ***Table and Chart No. 4.28.***

Table No. 4.28

Distribution of respondents according to budget and do you prefer building with Bio gas plant

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	4	16	4	36	60
2	50 L to 75 L	0	24	8	40	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	4	8	8	24	44
	Grand Total	**8**	**48**	**20**	**100**	**176**

Source: Field investigation

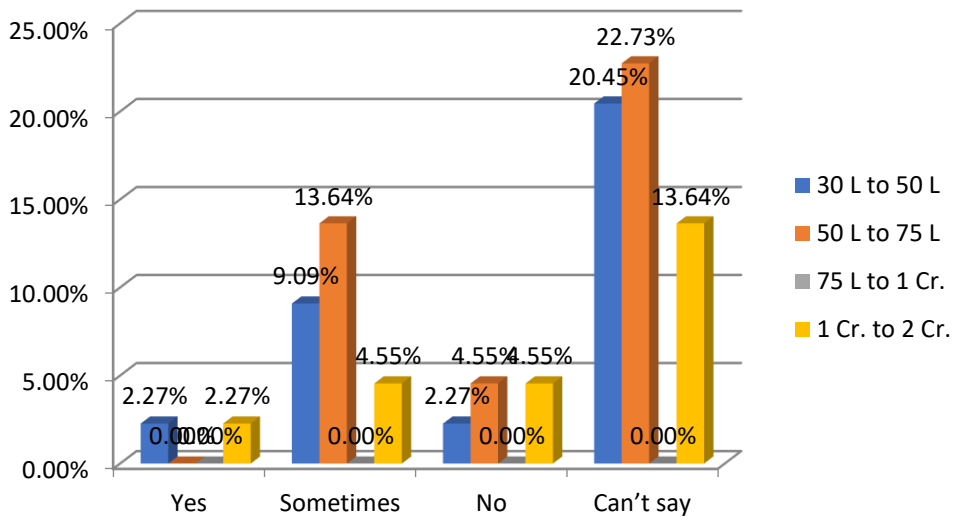
Table No. 4.28a

Distribution of respondents according to budget and do you prefer building with Bio gas plant (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	2.27%	9.09%	2.27%	20.45%	34.09%
2	50 L to 75 L	0.00%	13.64%	4.55%	22.73%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	2.27%	4.55%	4.55%	13.64%	25.00%
	Grand Total	**4.55%**	**27.27%**	**11.36%**	**56.82%**	**100.00%**

Source: Field investigation

Chart No. 4.28
Distribution of respondents according to budget and prefer building with Bio gas plant



On the aspect of providing solid waste management in the building is somehow considered by comparatively more respondents. Thus, almost 38 per cent of the respondents found to be positive for preferring building with solid waste management. These details have been presented with the help of ***Table No. 4.29*** and ***Chart No. 4.29***.

Table No. 4.29

Distribution of respondents according to budget and do you prefer building with solid waste management

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	**II**	**III**	**IV**	**V**	**VI**	**VII**
1	30 L to 50 L	0	20	0	40	60
2	50 L to 75 L	4	24	4	40	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	12	4	0	28	44
	Grand Total	**16**	**48**	**4**	**108**	**176**

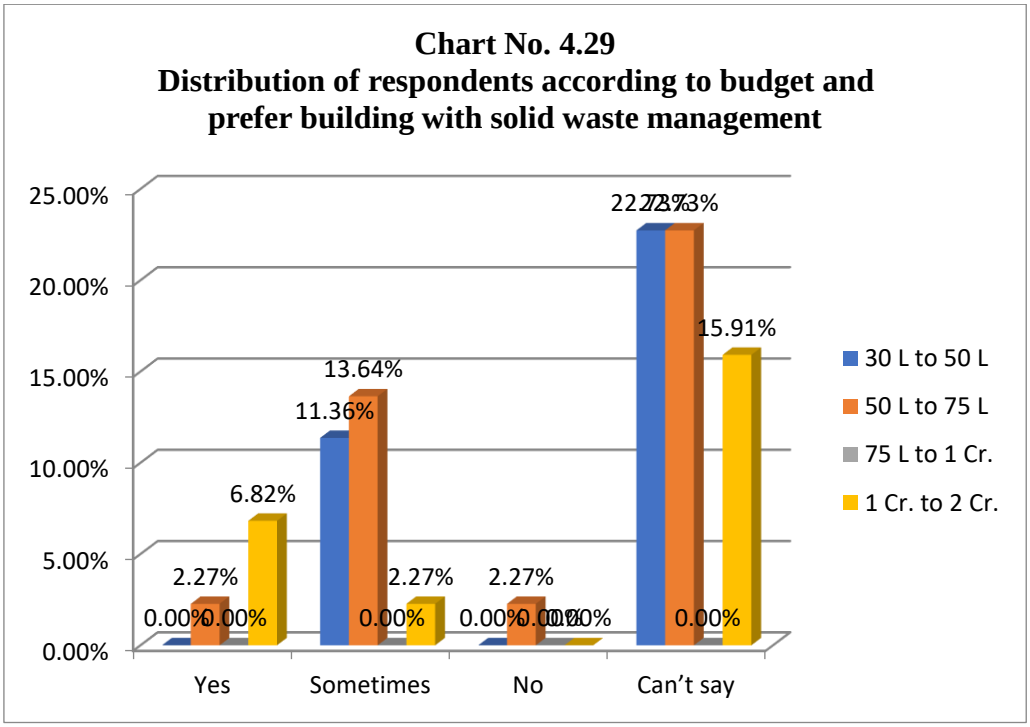
Source: Field investigation

Table No. 4.29a

Distribution of respondents according to budget and do you prefer building with solid waste management (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	0.00%	11.36%	0.00%	22.73%	34.09%
2	50 L to 75 L	2.27%	13.64%	2.27%	22.73%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	6.82%	2.27%	0.00%	15.91%	25.00%
	Grand Total	**9.09%**	**27.27%**	**2.27%**	**61.36%**	**100.00%**

Source: Field investigation



This section has been considered to assess solar wind and hybrid lighting facilities. The quantified responses have been mentioned with the help of ***Table No. 4.30*** and depicted in ***Chart No. 4.30***. It would be seen that, almost 38 per cent of the respondents have mentioned that, they have provided preference for solar wind hybrid for lighting.

Table No. 4.30

Distribution of respondents according to budget and do you prefer solar wind hybrid for lighting

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	4	20	0	36	60
2	50 L to 75 L	4	24	0	44	72
3	75 L to 1 Cr.	0	0	0	0	0
4	1 Cr. to 2 Cr.	12	4	0	28	44
	Grand Total	**20**	**48**	**0**	**108**	**176**

Source: Field investigation

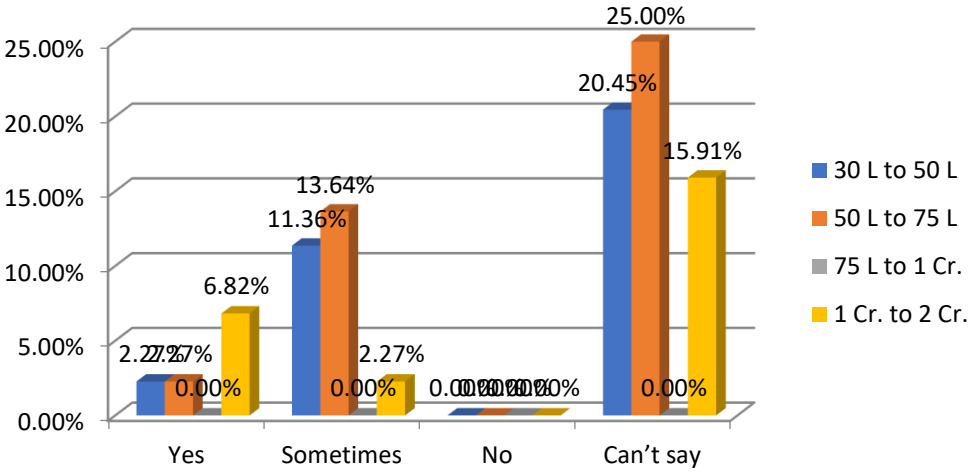
Table No. 4.30a

Distribution of respondents according to budget and do you prefer solar wind hybrid for lighting (In %)

Sr. No.	Row Labels	Yes	Sometimes	No	Can't say	Grand Total
I	II	III	IV	V	VI	VII
1	30 L to 50 L	2.27%	11.36%	0.00%	20.45%	34.09%
2	50 L to 75 L	2.27%	13.64%	0.00%	25.00%	40.91%
3	75 L to 1 Cr.	0.00%	0.00%	0.00%	0.00%	0.00%
4	1 Cr. to 2 Cr.	6.82%	2.27%	0.00%	15.91%	25.00%
	Grand Total	**11.36%**	**27.27%**	**0.00%**	**61.36%**	**100.00%**

Source: Field investigation

Chart No. 4.30
Distribution of respondents according to budget and prefer solar wind hybrid for lighting



In a summary of this entire part, it has to be noted that, buyers of the ecofriendly homes are found to be least concerned about the facilities provided by the builders such as, bio gas, rain water harvesting and solar and wind energy. Though, these assumptions have been generalized based on the part-II of the hypotheses testing.

4.2 PART-II

Analysis of the Sales Executives

In this part of the chapter, efforts have been made to investigate the opinions of the marketing executives working in construction industries and specifically responsible for selling of eco-friendly houses. The basic intension of this investigation is to understand the various reasons for buying ecofriendly houses observed by these executives during buying process of the customers.

Thus with this intension total 30 parameters have been investigated in this part. Entire quantified details have been presented with the help of ***Table No. 4.31*** and ***Table No. 4.32***. In both the tables frequencies have been tabulated for total 71 responding executives. The former table contains solid frequencies and later contains the frequencies according to the per cent of total respondents.

The quantification of the responses is based on the five point Likert Scale measured between extreme values such as Least Important (Score-1) to Most Important (Score-5). Now merely a cursory glance at the tables below provides that six parameters are highly considered by the buyers, such as, (a) Producer (builder)/Brand image, (b) construction as per Vaastu Shastra, (c) price and built-up area, (d) income of the buyer, and (e) occupation.

Table No. 4.31

Selling flats which factors influence more on the buyers towards purchase decision

Sr. No.	Factors	1	2	3	4	5	Total
1	Producer (builder)/Brand image	1	6	22	30	12	71
2	Quality or Reputation of the builder	40	16	9	5	1	71
3	Construction as per Vaastu Shastra	4	2	1	40	24	71
4	Build up/ Capet area	6	13	6	27	19	71
5	Price	6	4	1	35	25	71
6	Occupation	13	2	2	36	18	71
7	Income	2	2	2	41	24	71
8	Economic	20	19	6	17	9	71
9	Technology	1	0	0	38	32	71
10	Social	30	23	5	12	1	71
11	Culture	9	7	0	33	22	71
12	Launching offer	7	2	3	33	26	71
13	Sample flat	8	0	2	33	28	71
14	Luxurious flat	1	7	13	33	17	71
15	Duplex flat	13	19	15	14	10	71
16	Furnished Flat	17	33	18	0	5	71
17	Semi-furnished flat	15	22	22	10	2	71
18	Under Construction	19	33	18	1	0	71
19	No EMI till possession 3	2	4	16	29	20	71
20	Amenities	0	0	5	27	39	71
21	Facilities	0	2	17	30	22	71

22	Common parking	3	11	23	23	11	71
23	Own parking	0	1	15	36	19	71
24	Maintenance	0	0	25	36	10	71
25	Solar heating system	1	0	14	35	21	71
26	Rain water harvesting	1	3	17	31	19	71
27	Garbage disposal facility	1	0	7	34	29	71
28	Bio gas plant	1	7	28	27	8	71
29	Solid waste management	1	0	12	32	26	71
30	Solar wind hybrid for lighting	16	30	20	4	1	71

Source: Field investigation

The quantified details of the opinions regarding the buying preferences have been presented in the format of percentages with the help of ***Table No. 4.32***. It has been assumed that the data in per cent may provide more lucid presentation. Though, it is also need to be noted that the data transformation doesn't change the interpretation of the results.

Table No. 4.32

Selling flats which factors influence more on the buyers towards purchase decision (%)

Sr. No.	**Factors**	**1**	**2**	**3**	**4**	**5**	**Total**
1	Producer Brand image	1.41%	8.45%	30.99%	42.25%	16.90%	100.00%
2	Quality or Reputation of the builder	56.34%	22.54%	12.68%	7.04%	1.41%	100.00%
3	Construction as per Vaastu Shastra	5.63%	2.82%	1.41%	56.34%	33.80%	100.00%
4	Build up/ Capet area	8.45%	18.31%	8.45%	38.03%	26.76%	100.00%

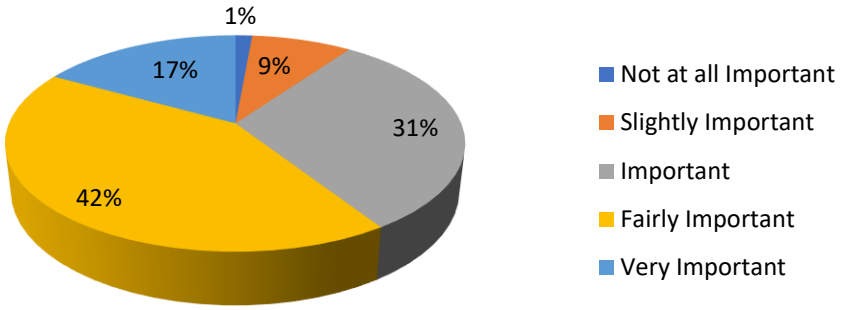
5	Price	8.45%	5.63%	1.41%	49.30%	35.21%	100.00%
6	Occupation	18.31%	2.82%	2.82%	50.70%	25.35%	100.00%
7	Income	2.82%	2.82%	2.82%	57.75%	33.80%	100.00%
8	Economic	28.17%	26.76%	8.45%	23.94%	12.68%	100.00%
9	Technology	1.41%	0.00%	0.00%	53.52%	45.07%	100.00%
10	Social	42.25%	32.39%	7.04%	16.90%	1.41%	100.00%
11	Culture	12.68%	9.86%	0.00%	46.48%	30.99%	100.00%
12	Launching offer	9.86%	2.82%	4.23%	46.48%	36.62%	100.00%
13	Sample flat	11.27%	0.00%	2.82%	46.48%	39.44%	100.00%
14	Luxurious flat	1.41%	9.86%	18.31%	46.48%	23.94%	100.00%
15	Duplex flat	18.31%	26.76%	21.13%	19.72%	14.08%	100.00%
16	Furnished Flat	23.94%	46.48%	25.35%	0.00%	4.23%	100.00%
17	Semi-furnished flat	21.13%	30.99%	30.99%	14.08%	2.82%	100.00%
18	Under Construction	26.76%	46.48%	25.35%	1.41%	0.00%	100.00%
19	No EMI till possession 3	2.82%	5.63%	22.54%	40.85%	28.17%	100.00%
20	Amenities	0.00%	0.00%	7.04%	38.03%	54.93%	100.00%
21	Facilities	0.00%	2.82%	23.94%	42.25%	30.99%	100.00%
22	Common parking	4.23%	15.49%	32.39%	32.39%	15.49%	100.00%
23	Own parking	0.00%	1.41%	21.13%	50.70%	26.76%	100.00%
24	Maintenance	0.00%	0.00%	35.21%	50.70%	14.08%	100.00%
25	Solar heating system	1.41%	0.00%	19.72%	49.30%	29.58%	100.00%
26	Rain water harvesting	1.41%	4.23%	23.94%	43.66%	26.76%	100.00%
27	Garbage disposal facility	1.41%	0.00%	9.86%	47.89%	40.85%	100.00%
28	Bio gas plant	1.41%	9.86%	39.44%	38.03%	11.27%	100.00%
29	Solid waste management	1.41%	0.00%	16.90%	45.07%	36.62%	100.00%
30	Solar wind hybrid for lighting	22.54%	42.25%	28.17%	5.63%	1.41%	100.00%

Source: Field investigation

Now, details mentioned in the above tables have been discussed separately for individual aspects expressed in the variables. The key variables have been transformed in a pie chart to visualize the meaning of the quantified results. Now with the help of Chart No. 4.31, the variable mentioned as brand image has been presented and interpreted.

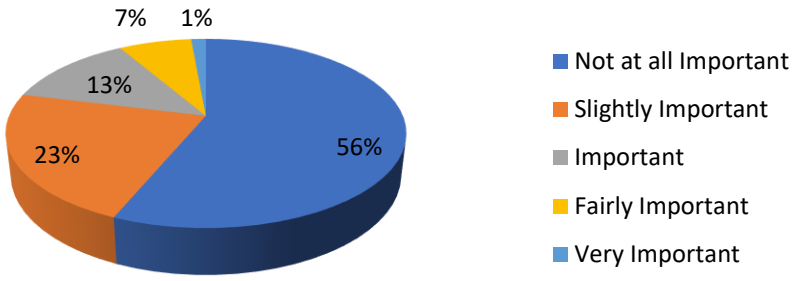
Brand image in construction industry is a result of number of efforts put by the construction industry for providing quality work and performing the responsibilities as committed to the customers. Thus, there is a trend to evaluate the quality of construction work by their brand. In this view of matter an effort has been made to assess importance of the brand image in the mind of customers at the time of purchasing eco-friendly houses. Now, it would be seen from the ***Chart No. 4.31***, that at least 99 per cent of the respondents mentioned the importance of the brand image while purchasing the homes. Though, 17 per cent respondents have mentioned that brand image is most important factor impacting on buyer's decision.

Chart No. 4.31
Selling flats which factors influence more on the buyers towards purchase decision- Producer Brand image



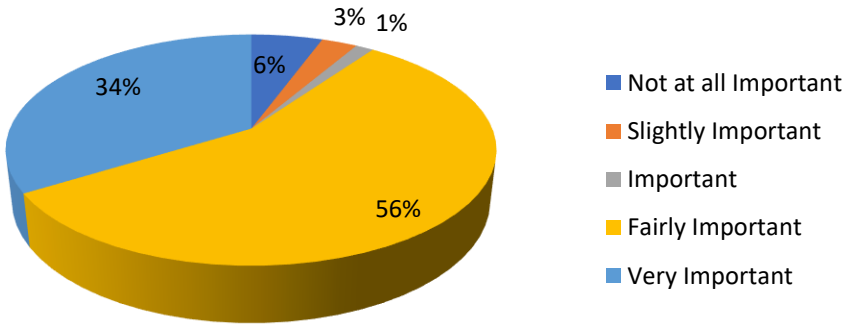
Apart from the brand image, reputation of the builder in construction industry is also considered for the investigation among these factors. This aspect has been presented graphically with the help of ***Chart No. 4.32***. It will be seen from the chart below that almost 56 per cent of the respondents have mentioned that reputation of the builder is most important factor considered by buyer while purchasing the flats.

Chart No. 4.32
Selling flats which factors influence more on the buyers towards purchase decision- reputation of the builder



Vaastu Shastra is the latest trend in the construction industry but has ancient presence in the Hindu Mythological literature. It has been based on the certain assumptions and also considers some sort of scientific and logical premises. Thus, while purchasing the eco-friendly flats almost 90 per cent of the customers prefer construction based on the Vaastu Shastra. Though, straight away 34 per cent of the respondents mentioned that customers give high importance to the Vaastu Shastra. Further details have been provided with the help of ***Chart No. 4.33***.

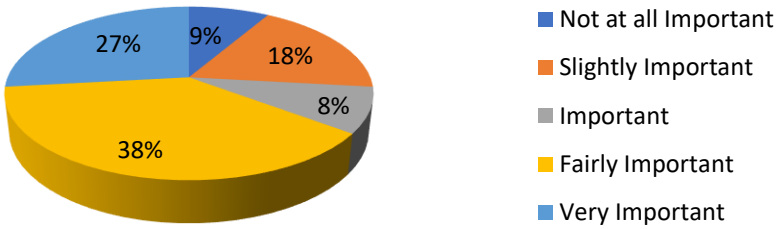
Chart No. 4.33
Selling flats which factors influence more on the buyers towards purchase decision- Construction as per Vastu Shastra



In the construction industry built up area and carpet area are the two terms highly used and referred. Total 65 per cent of the marketing executives from this industry have mentioned that customers gave considerable importance to these two factors. Basically, built up area is exact area which has been constructed and the carpet area reflect the

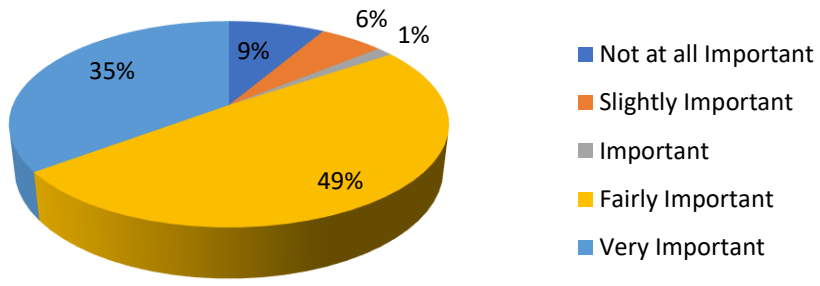
exact area that is to be used by the customer. Further details have been provided with the help of ***Chart No. 4.34***.

Chart No. 4.34
Selling flats which factors influence more on the buyers towards purchase decision- Build up/ Carpet area



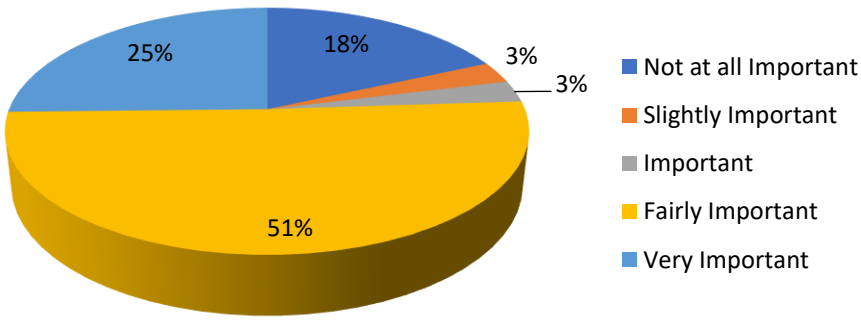
Highest considered factor in any purchase is price. While purchasing the flats also price has been considered. In this case of buying ecofriendly flats almost 35 per cent of the responding marketing executives have mentioned highest importance to the price. While 49 per cent respondents mentioned fairly consideration of the price while purchasing the flats. Further details on this aspect have been presented with the help of ***Chart No. 4.35***.

Chart No. 4.35
Selling flats which factors influence more on the buyers towards purchase decision- Price



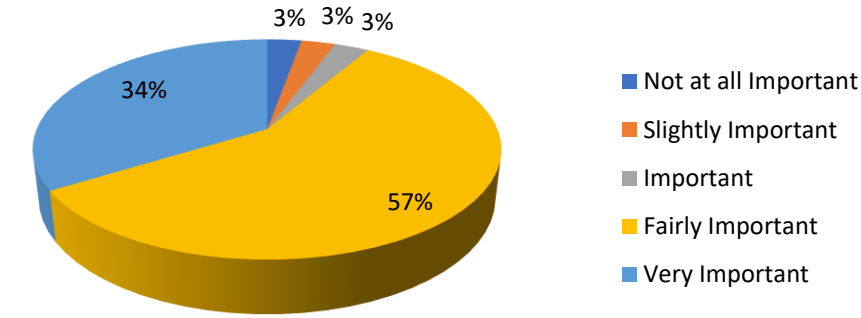
Occupation of the buyer is also assumed to be important factor considered while purchasing the flat. Surprisingly need to note that almost 25 per cent of the marketing executives noticed that occupation is the most important factor influencing the buying behavior while purchasing the flat. Also, almost 50 per cent of the respondents their experience that occupation plays a fair role in decision of purchasing the flat. The details are based on the ***Chart No. 4.36***.

Chart No. 4.36
Selling flats which factors influence more on the buyers towards purchase decision- Occupation



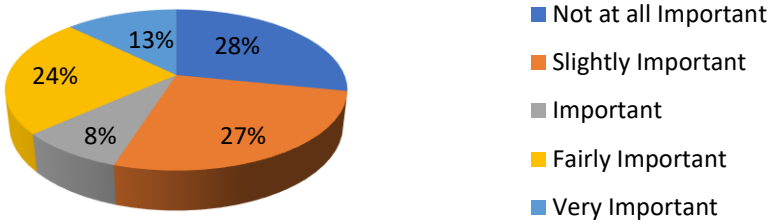
Income of the buyer is the most important factor while purchasing the flat. This assumption hardly needs any evidence. Though, 91 per cent of the respondents mentioned same observation on this aspect. (***Chart No. 4.37***)

Chart No. 4.37
Selling flats which factors influence more on the buyers towards purchase decision- Income



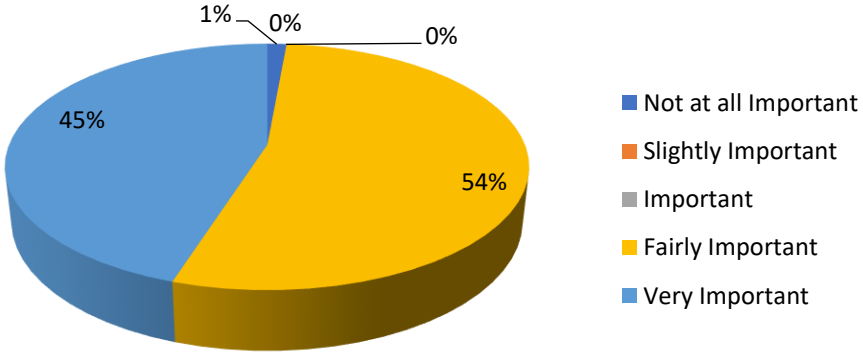
The overall condition of the entire economy has been considered and represented as the economic condition. It has been assumed that economic condition has the direct impact of demand and supply, income of buyer etc. thus assumed to be more significant in buying decision. Though according to the ***Chart No. 438***, only 27 per cent of the respondents mentioned its importance while purchasing the flats.

Chart No. 4.38
Selling flats which factors influence more on the buyers towards purchase decision- Economic Condition



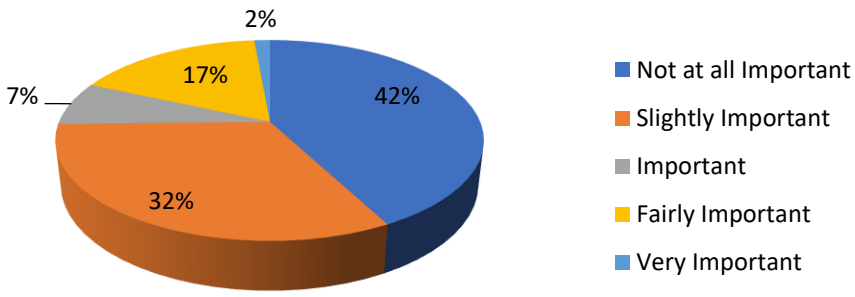
The buyers of the eco-friendly homes are surprisingly observed to be given priority to the technology provided in the flat or apartment. It has been observed that almost 99 per cent of the respondents mentioned this experience while dealing with customers. Further details on this aspect have been provided with the help of ***Chart No. 4.39***.

Chart No. 4.39
Selling flats which factors influence more on the buyers towards purchase decision- Technology



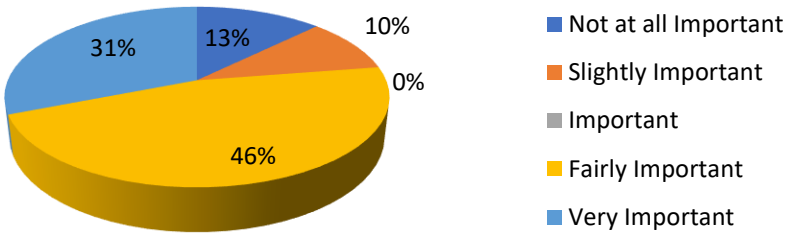
Social customs or social trends also has played a significant role in buying decision. This aspect has been investigated and presented with the help of ***Chart No. 4.40***. It has been observed that almost 32 per cent of the respondents mentioned that social factors are important in buying decision.

Chart No. 4.40
Selling flats which factors influence more on the buyers towards purchase decision- Social



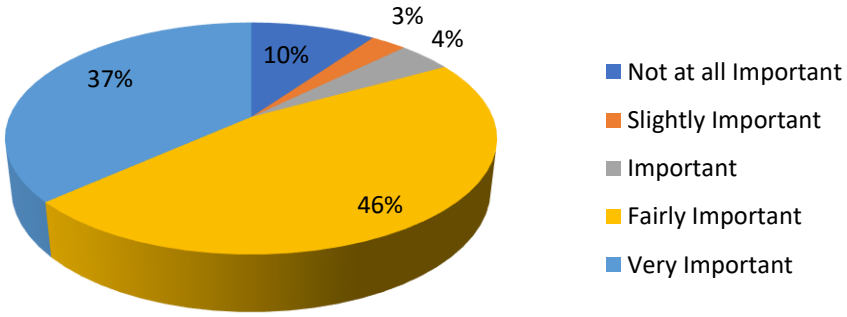
In India, culture is also plays the vital role in deciding the standard of living. There is a direct correlation between culture and standard of living. Thus ultimately based on the quantified details mentioned with the help of ***Chart No. 4.41***, it would be seen that almost more than three fourth of the respondents mentioned culture is the important factor in deciding the purchase of flat.

Chart No. 4.41
Selling flats which factors influence more on the buyers towards purchase decision- Culture



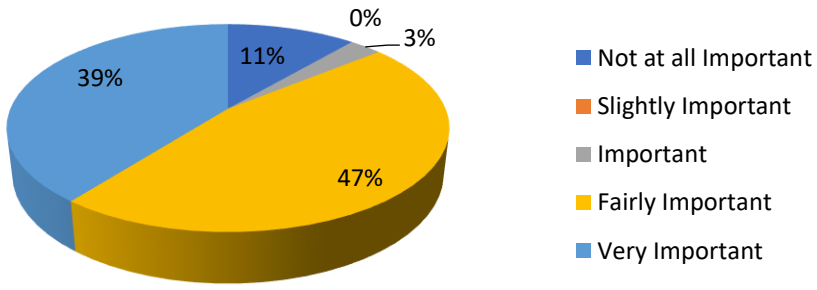
Offers, discounts and special attractions are some of the marketing tactics used in every industry and the construction industry is also not the exception to it. It would be seen from the ***Chart No. 4.42*** below that, almost 83 per cent of the respondents mentioned launching offer is the most important factor impacting on buying decision.

Chart No. 4.42
Selling flats which factors influence more on the buyers towards purchase decision- Launching offer



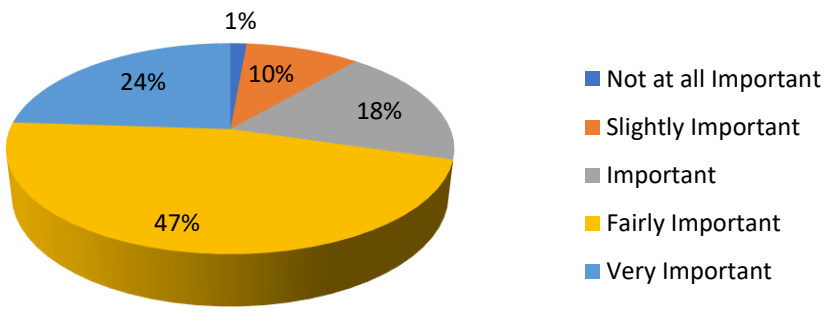
Seeing is believing is the realistic term in construction industry. Thus apart from any other aspect demonstration of the sample flats is also highly considered to be the most important factor for purchasing the flats. The same has been mentioned by the 86 per cent of the respondents in ***Chart No. 4.43***.

Chart No. 4.43
Selling flats which factors influence more on the buyers towards purchase decision- Sample flat



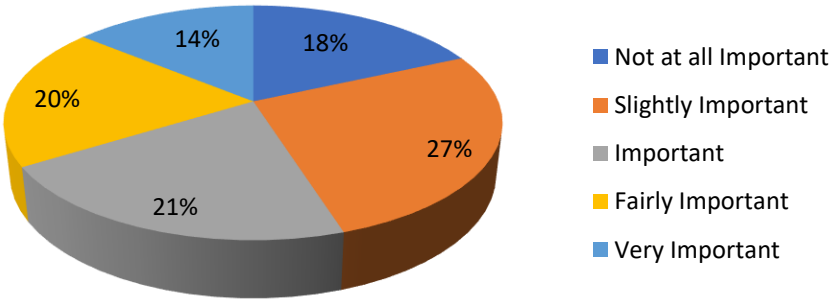
The luxury in the construction industry has been considered a based on the amenities provided by the builder to the customer. In the present research it has been observed that more than 47 per cent of the respondents mentioned that luxury is fairly important while purchasing the flats. Further details have been provided with the help of ***Chart No. 4.44***.

Chart No. 4.44
Selling flats which factors influence more on the buyers towards purchase decision- Luxurious flat



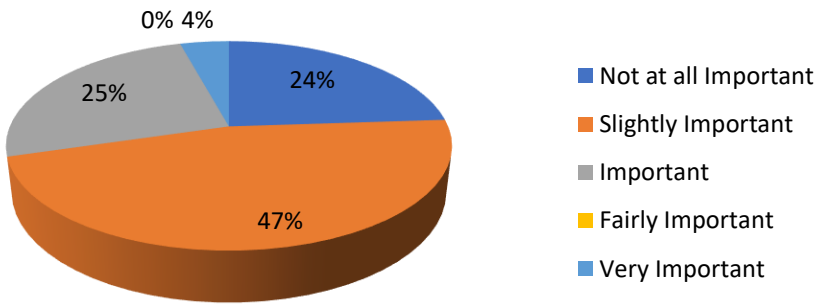
Duplex flats are the newer concept in the construction industry providing double floored residences. But in the present study this aspect doesn't observed significant in influencing buyers' decision. Further details are provided with the help of ***Chart No. 4.45***.

Chart No. 4.45
Selling flats which factors influence more on the buyers towards purchase decision- Duplex flat



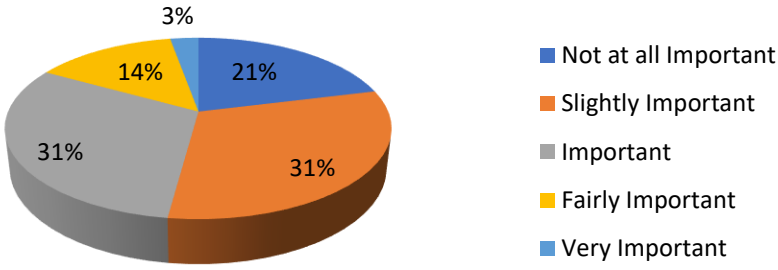
The potential buyers of the flats have consideration of price though after occupying the flat there is a certain expenditure of interior and furniture. On this assumption few builders provided customized flats with ready possession interior. This has been referred as furnished flats. Now based on the ***Chart No. 4.46***, it has been seen that almost 47 per cent of the respondents mentioned importance for furnished flats.

Chart No. 4.46
Selling flats which factors influence more on the buyers towards purchase decision- Furnished flat



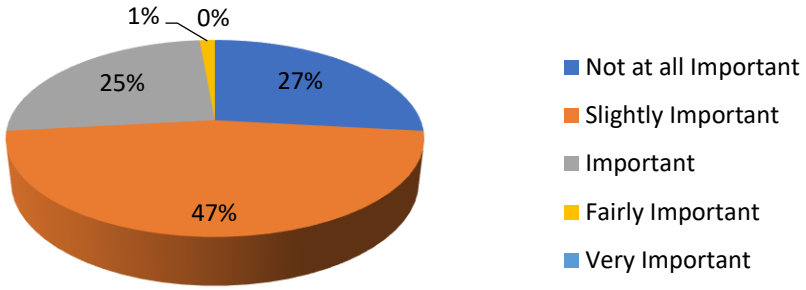
Apart from well-furnished flats; the budget of the semi furnished has been observed to be minimum. Thus this aspect of importance for semi-furnished flats also has been investigated through the present study. The details mentioned in ***Chart No. 4.47*** provides that no significant impact may be seen on the buying decision of the customers due to availability of semi-furnished flats.

Chart No. 4.47
Selling flats which factors influence more on the buyers towards purchase decision- Semi-furnished flat



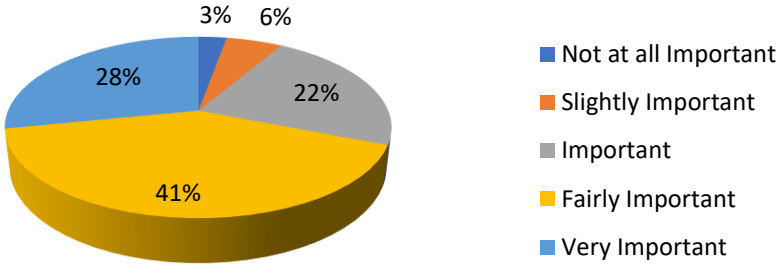
As per the ***Chart No. 4.48***, it would be seen that under construction flats are not considered by the potential buyers.

Chart No. 4.48
Selling flats which factors influence more on the buyers towards purchase decision- Under Construction



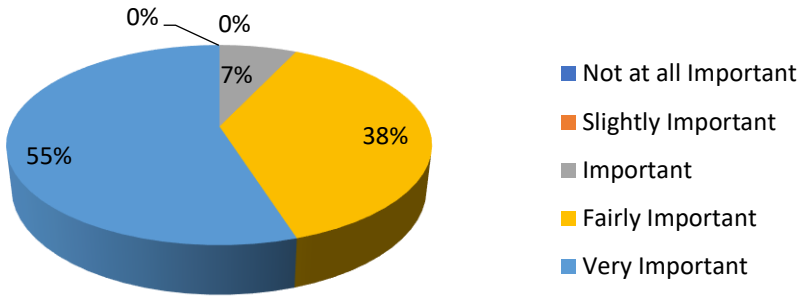
The offer, such as, no EMI till possession is the most attractive offer attracting buyers of the eco-friendly homes. Now, it would be seen from the ***Chart No. 4.49*** that almost 69 per cent of the respondents mentioned that this offer plays a significant role in buying decision.

Chart No. 4.49
Selling flats which factors influence more on the buyers towards purchase decision- No EMI till possession 3



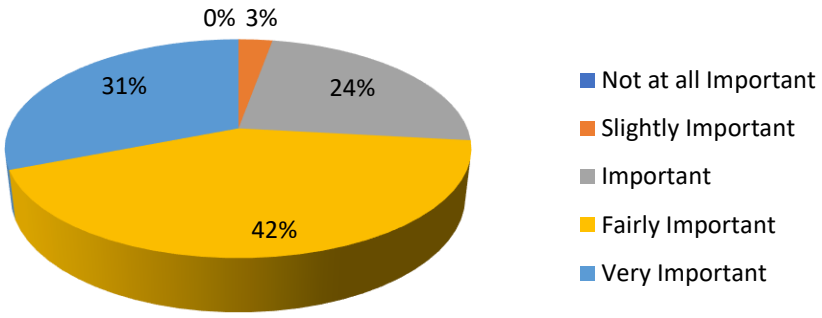
While selling the flats, amenities offered by the builders is found most significant aspect while decision of the customers. This aspect has been presented with the help of ***Chart No. 4.50***.

Chart No. 4.50
Selling flats which factors influence more on the buyers towards purchase decision- Amenities



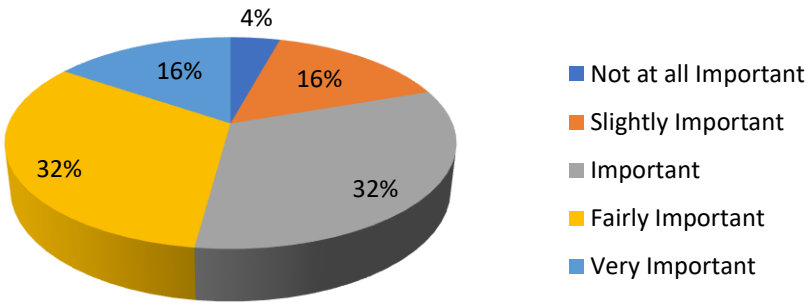
The facilities provided by the builder is also assumed to be the significant aspect of buying decision. Now based on the investigation made in the present study, it has been seen that almost 73 per cent of the respondents mentioned that while selling flats customer give fair importance to the facilities. Further details on this aspect have been provided with the help of ***Chart No. 4.51***.

Chart No. 4.51
Selling flats which factors influence more on the buyers towards purchase decision- Facilities



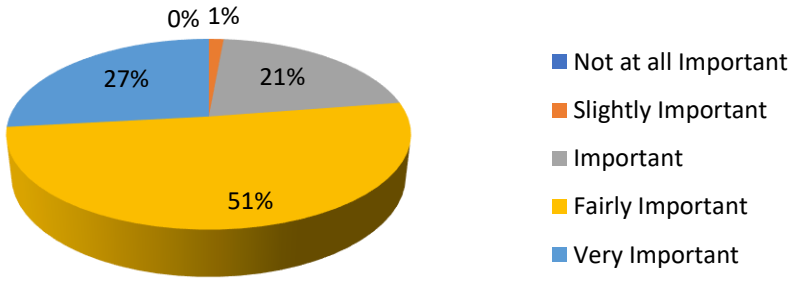
In a metro city like Pune, almost each family possess car or at least a bike. Now, parking of vehicle is the great challenge in front of every citizen. In this view of matter an investigation has been made to understand the preference of the customers for parking while purchasing the flat. Thus based on the ***Chart No. 4.52***, it has been observed that almost 64 per cent of the responding sellers have provided their opinion in favoritisms of the common parking.

Chart No. 4.52
Selling flats which factors influence more on the buyers towards purchase decision- Common parking



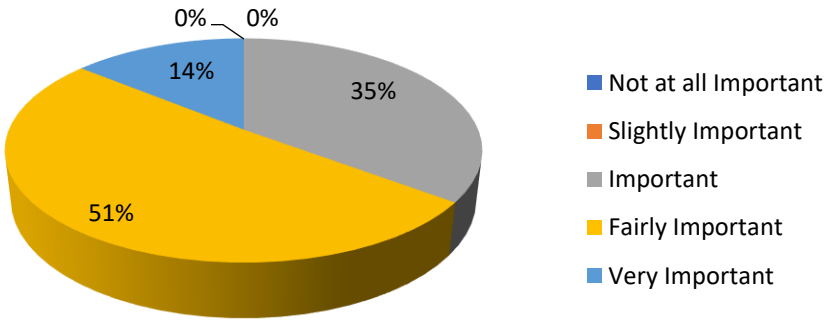
Though, more preference has been given to the own parking slot. This has been investigated and presented with the help of ***Chart No. 4.53***. It has been seen that 99 per cent of the respondents provided importance to the aspect of own parking in the apartment while purchasing the flats.

Chart No. 4.53
Selling flats which factors influence more on the buyers towards purchase decision- Own parking



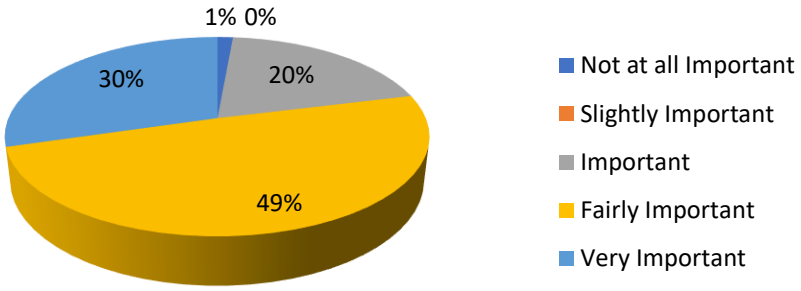
Maintenance of the flat is the running expense throughout the year for any flat system. Though eco-friendly homes are supposed to minimize this expenditure on maintenance. Thus, in the present study, it has been seen that, almost 100 per cent of the responding seller mentioned that buyer gives importance to the maintenance. Further details have been provided with the help of ***Chart No. 4.54***.

Chart No. 4.54
Selling flats which factors influence more on the buyers towards purchase decision- Maintenance



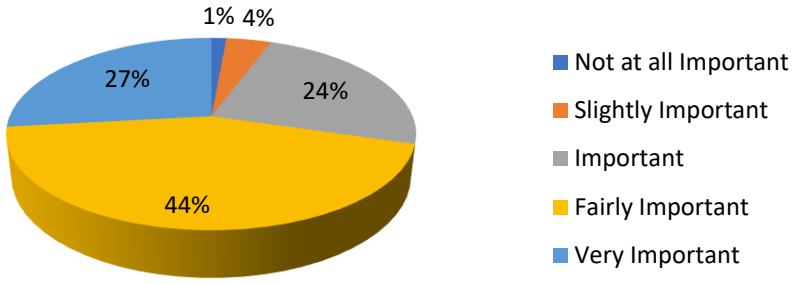
Solar water heating provided in the apartment may be classified under the amenities or facilities, though it has a direct impact on operating cost of the residents. Thus majorly, it has been assumed that solar systems reduce maintenance costs. This aspect has been investigated in this research. Now based on the observations mentioned in ***Chart No. 4.55***, it has been seen that almost 80 per cent of the responding sellers said solar heating system is considered while purchasing the flats.

Chart No. 4.55
Selling flats which factors influence more on the buyers towards purchase decision- Solar heating system



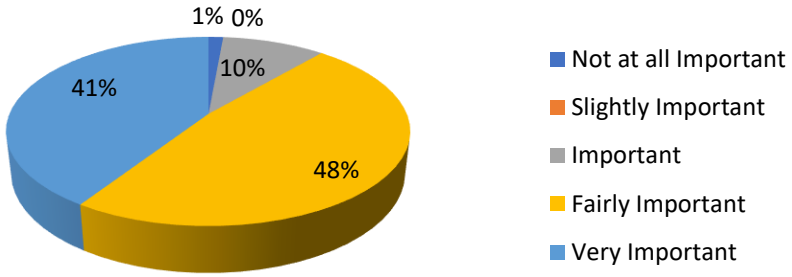
Another amenities under the eco-friendly houses is rain water harvesting. It has been seen from the ***Chart No. 4.56***, almost 71 per cent of the respondents mentioned importance to the rain water harvesting while purchasing flats.

Chart No. 4.56
Selling flats which factors influence more on the buyers towards purchase decision- Rain water harvesting



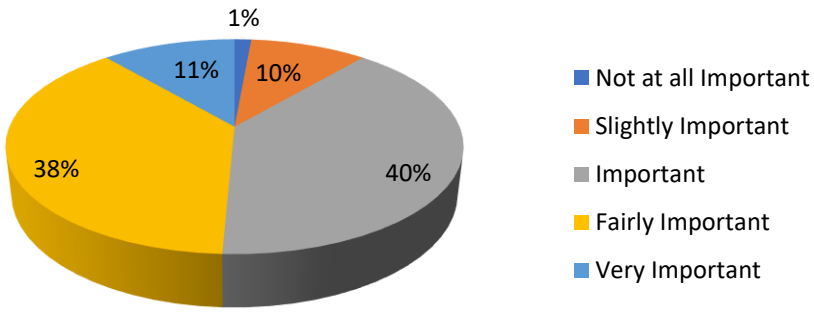
On the similar aspect, garbage disposal facility is also investigated and quantified details have been presented with the help of ***Chart No. 4.57***. It has been seen that almost 90 per cent of the respondents mentioned that garbage disposal facility is important while purchasing the flats.

Chart No. 4.57
Selling flats which factors influence more on the buyers towards purchase decision- Garbage disposal facility



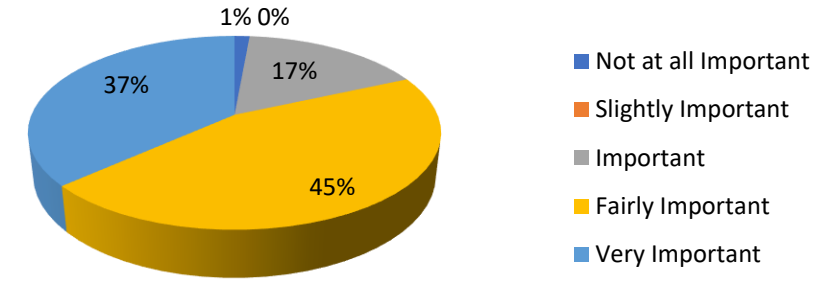
Bio gas plant is also provided by some of the builders. The responses on this aspect have been presented with the help of ***Chart No. 4.58***. It has been seen from the chart that almost 89 per cent of the respondents mentioned importance to the bio gas plant while purchasing the flats.

Chart No. 4.58
Selling flats which factors influence more on the buyers towards purchase decision- Bio gas plant



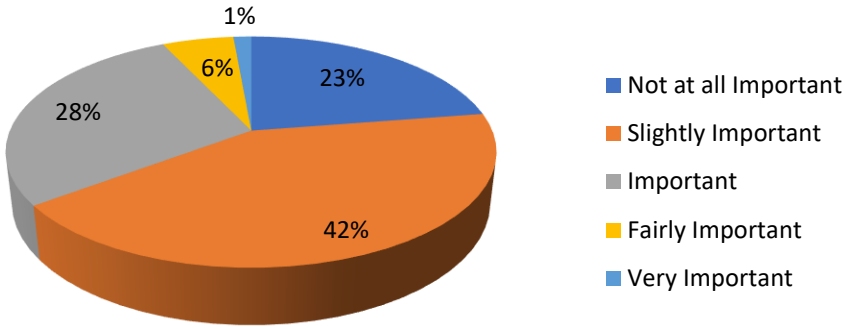
Solid waste management is also another facility and amenity provided by the builders. While selling the flats, it has been observed that solid waste management measures also taken into consideration by most of buyers. Thus ultimately, based on the ***Chart No. 4.59***, it has been seen that solid waste management is plays vital role in buying decision of the flats.

Chart No. 4.59
Selling flats which factors influence more on the buyers towards purchase decision- Solid waste management



The final and the last parameters considered in this study is hybrid solar wind for lighting though very few sellers mentioned its importance while purchasing the flats. Further details provided in ***Chart No. 4.60***.

Chart No. 4.60
Selling flats which factors influence more on the buyers towards purchase decision- Solar wind hybrid for lighting



There are total three variables considered as the non-financial parameters assumed to be influential while selling flats, such as (a) surrounding area, (b) safety living and (c) maintenance. The quantification has been made for these aspects based on the five point Likert Scale measured between least important to most important. The tabular representation of the data has been provided with the help of ***Table No. 4.33***. Though the interpretation on each of the aspect has been provided with the help of separate chart provided below.

Table No. 4.33

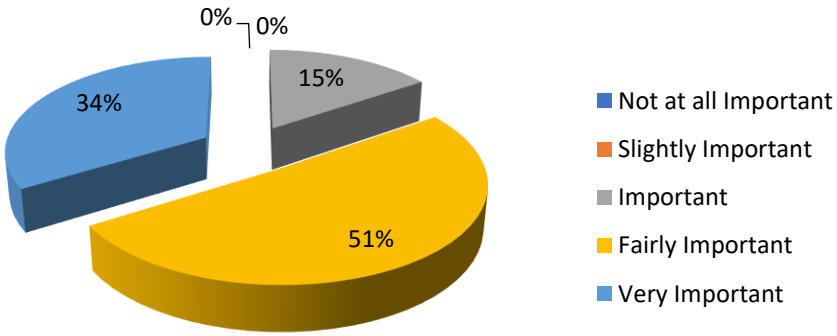
Non -financial variables are more important for selling the flat (%)

Sr. No.	Variable	1	2	3	4	5	Total
1	Surrounding area	0.00%	0.00%	15.49%	50.70%	33.80%	100.00%
2	Safety Living	0.00%	0.00%	18.31%	45.07%	36.62%	100.00%
3	Maintenance	0.00%	7.04%	23.94%	42.25%	26.76%	100.00%

Source: Field investigation

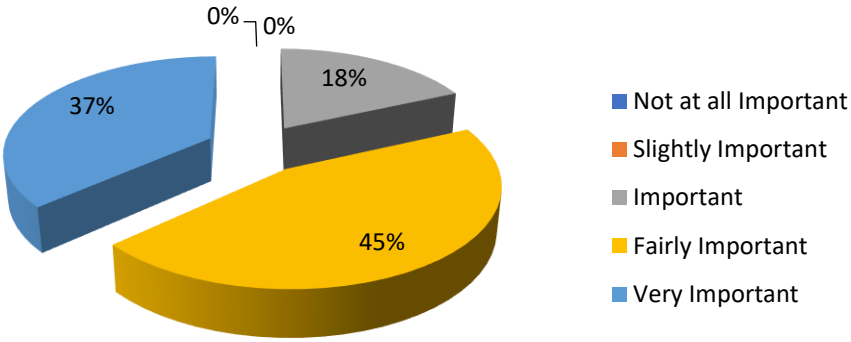
First aspect of surrounding area has been considering in ***Chart No. 4.61***. Now based on the chart, it would be seen that, almost 99 per cent of the sellers give importance to surrounding area while selling flats. Though 34 per cent responding sellers mentioned higher importance to the surrounding area.

Chart No. 4.61
Non -financial variables are more important for selling the flat - surrounding area



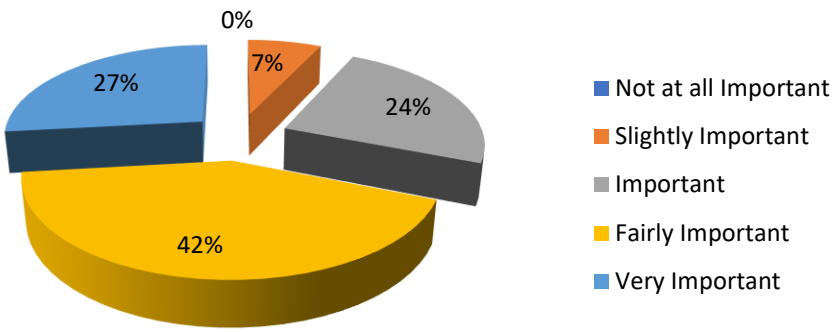
The aspect of safety living is also has been investigated in the present research and presented with the help of ***Chart No. 4.62***. The similar observation has been noted from the chart that safety living is considered as the important factor by the buyers while purchasing the flats. Slightly more importance is given to safety as compare to the surrounding environment.

Chart No. 4.62
Non -financial variables are more important for selling the flat - safety living



The last factor under this non-financial; aspect is maintenance. The tabulated responses have been presented graphically with the help of ***Chart No. 4.63***, below. It would be seen that, almost 100 per cent of the responding sellers mentioned importance to the maintenance while purchasing the flats.

Chart No. 4.63
Non -financial variables are more important for selling the flat - Maintenance



Earth quake resistant technology is also provided by some of the builder to their customers. Now an effort has been made to investigate the possibility of importance give to this aspect. Now, the quantified details have been presented here in this chapter with the help of ***Chart No. 4.64***. It would be seen therefore from the chart that, almost three fourth of respondents mentioned earth quake resistant technology is considered while purchasing the flat.

Chart No. 4.64
Specifications are more important for selling the flat- Earth Quake Resistant

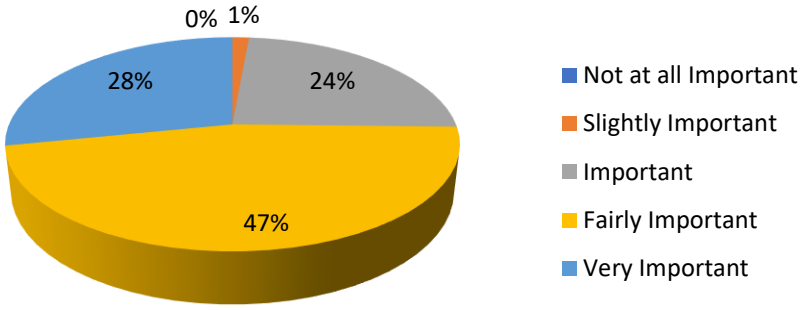


Table No. 4.34

Amenities buyers prefer while purchasing as the amenity cost is included into selling price (%)

Sr. No.	Amenities	1	2	3	4	5	Total
1	Landscape garden	0.00%	8.45%	26.76%	45.07%	19.72%	100.00%
2	Rain water harvesting	1.41%	1.41%	30.99%	50.70%	15.49%	100.00%
3	Solar system	0.00%	0.00%	9.86%	42.25%	47.89%	100.00%

Source: Field investigation

Chart No. 4.65
Amenities buyers prefer while purchasing as the amenity cost is included into selling price - Landscape garden

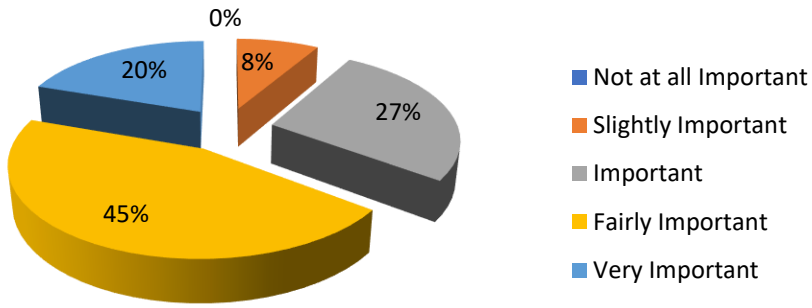


Chart No. 4.66
Amenities buyers prefer while purchasing as the amenity cost is included into selling price - Rain water harvesting

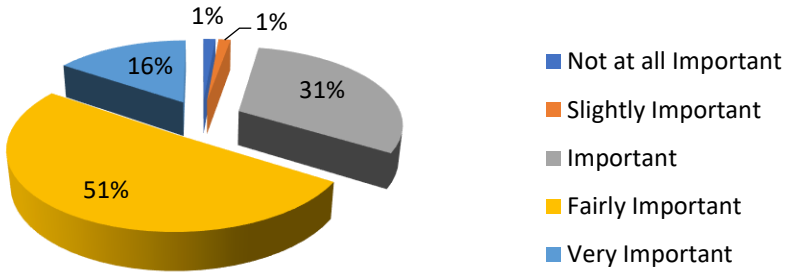
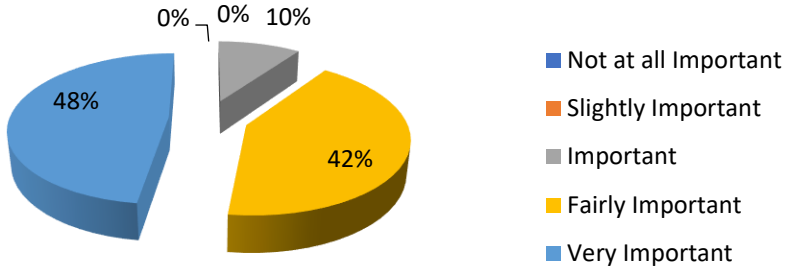


Chart No. 4.67
Amenities buyers prefer while purchasing as the amenity cost is included into selling price - Solar system



Further, most important factors have been assessed those have most important role in selling the flats. Water and adequate ventilation are those two factors assumed to be effective in selling the flats to the customers. The quantified details have been provided with the help of ***Table No. 4.35***, though an interpretation of the same has been provided through graphical presentation using pie charts.

Table No. 4.35

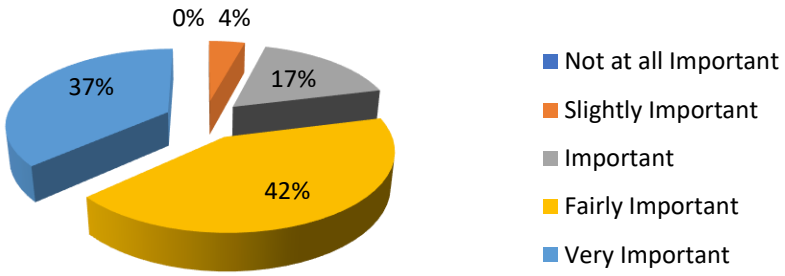
Factors that are most important for selling the flats to the customers

Sr. No.	Factors	1	2	3	4	5	Total
1	Sufficient water supply	0.00%	4.23%	16.90%	42.25%	36.62%	100.00%
2	Ventilation	5.63%	11.27%	23.94%	38.03%	21.13%	100.00%

Source: Field investigation

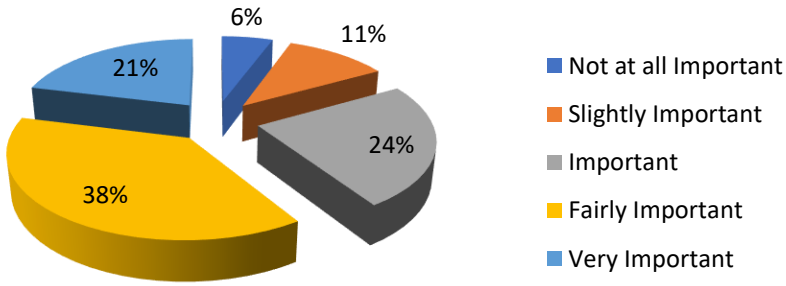
As has been stated earlier, sufficient water supply has been most significant aspect while selling the flats to the customers. It would be seen from the ***Chart No. 4.68*** below that, almost 79 per cent of the respondents mentioned that sufficient water is importantly considered while selling of the flats.

Chart No. 4.68
Factors are most important for selling the flats to the customers- suffecient water supply



Moreover, appropriate level of natural ventilation is also assumed to be important while selling the flats. Now based on the quantification presented with the help of ***Chart No. 4.69***, it would be seen that 21 per cent of the respondents have mentioned that appropriate level of ventilation is required.

Chart No. 4.69
Factors are most important for selling the flats to the customers- Ventilation



This part has been provided with the detailed interpretation of survey conducted under this study. Though, the generalizations have been made by using appropriate statistical methods. The details on this have been provided with help of PART-III of this chapter.

4.3 PART-III

Testing of Hypotheses

This part has been prepared and presented with the intention of providing scientifically tested generalized statement about the findings. To accommodate this discussion, entire part has been divided and classified into two different sections bearing each hypothesis.

4.3.1 Section-(a)

Hypothesis-H1

In this section an effort has been made to test below mentioned hypothesis.

H_0-Larger portion of the society is not significantly aware about the Ecofriendly Houses

H_a-Larger portion of the society is significantly aware about the Ecofriendly Houses

For purpose of testing this hypothesis, primary data has been considered. As has been mentioned earlier, buyers of ecofriendly homes have been contacted and survey has been implemented for purpose of collecting primary data. Considering the nature and structure of said hypothesis, question no. 14 has been considered suitable for testing purpose.

The responses of the said question have been quantified and measured by applying Likert Five Point scale; Distributed between Strongly Agree (representing score and weight of 5) and Strongly Disagree (representing score and weight of 1). The median of the scale is '3', representing neutrality of the response. Keeping in mind this discussion, it needs to be pointed out here that, One Sample's' test is found more scientific and appropriate for testing this hypothesis.

Now, arithmetic mean of the opinions regarding larger portion of the society is significantly aware about the Ecofriendly Houses has been observed to be 2.61 on five-point Likert Scale, which is considerably not favorable with the assumption made in present study. Considering all these aspects, technical hypotheses for the selected variable have been presented in below ***Table No. 4.36.***

Table No. 4.36

Technical hypotheses for H1

Sr. No.	Referred Question No.	Question of Hypothesis	H_{ull}	$A_{lternate}$
I	II	III	IV	V
1	14	On the 5 point scale standard average is 3 which stood neutral on the aspect of Larger portion of the society is significantly aware about the Ecofriendly Houses. Now, can it be said that the observed mean is significantly differed from the standard average of 3?	There is no significant difference	There is significant difference

Table No. 4.36a

Observations regarding awareness about Eco-Friendly Houses

Do you know about the Eco Friendly Houses							
		H1					Total
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Location	near to nature	8	0	0	0	4	12
	outside of city	28	12	8	8	0	56
	within city	28	20	12	20	28	108
Total		64	32	20	28	32	176

As has been mentioned earlier, considering all the aspects of the present hypothesis, one sample 't' test with 5 per cent level of significance has been observed to be appropriate for further procedure of the testing. Hence the output of testing has been presented with the help of ***Table No. 4.37***.

Table No. 4.37

Descriptive Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Hypothesis-H1	176	2.6136	1.5584	0.2349

Table No. 4.38
One-Sample Test

	Test Value = 3					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Supply of consumer durables increased due to free economy	-1.645	175	0.107	-0.386	-0.8602	-0.874

On scrutinizing the results of calculations mentioned above in ***Table No. 4.37 and Table No. 4.38*** the inferences are as follows-

In case of hypothesis-H1, opinions of respondents regarding larger portion of the society is significantly aware about the Ecofriendly Houses, one can safely conclude that because of the Significance value obtained show a tendency to be more than 0.05. In such case, the column labelled 'Sig. (2-tailed)'displays a probability from the 't' distribution with 175 degrees of freedom. The value listed is the probability of obtaining an absolute value greater than or equal to the observer's' statistic, if the difference between the sample mean and the test value is purely random. Since, confidence intervals lie entirely below 0.0; in this case, one can safely say that observed level of agreeableness regarding 'Larger portion of the society is significantly aware about the Ecofriendly Houses 'is significantly (positively) not differing from the standard mean of 3. ***Hence, in this case of the hypothesis-H1, hypothesis null may be accepted and result can be interpreted as larger portion of the society is not aware about the Ecofriendly Houses.***

4.3.2 Section-(b)

Hypothesis-H2

H_0-Ecofriendly houses are NOT costlier than the regular houses and naturally buyers attract towards this houses.

H_a-Ecofriendly houses are costlier than the regular houses and naturally buyers attract towards the cheaper houses.

For purpose of testing this hypothesis, primary data has been considered. As has been mentioned earlier, buyers of ecofriendly homes have been attracted towards cheaper houses and thus survey has been implemented for purpose of collecting primary data. Considering the nature and structure of said hypothesis, question no. 15 has been considered suitable for testing purpose.

The responses of the said question have been quantified and measured by applying Likert Five Point scale; Distributed between Strongly Agree (representing score and weight of 5) and Strongly Disagree (representing score and weight of 1). The median of the scale is '3', representing neutrality of the response. Keeping in mind this discussion, it needs to be pointed out here that, One Sample 't' test is found more scientific and appropriate for testing this hypothesis.

Now, arithmetic mean of the opinions regarding ecofriendly houses are costlier than the regular houses and naturally buyers attract towards the cheaper houses has been observed to be 2.86 on five-point Likert Scale, which is considerably not favorable with the assumption made in present study. Considering all these aspects, technical hypotheses for the selected variable have been presented in below ***Table No. 4.39.***

Table No. 4.39

Technical hypotheses for H2

Sr. No.	**Referred Question No.**	**Question of Hypothesis**	**H_{ull}**	**$A_{lternate}$**
I	II	III	IV	V
1	15	On the 5 point scale standard average is 3 which stood neutral on the aspect of ecofriendly houses are costlier than the regular houses and naturally buyers attract towards the cheaper houses. Now, can it be said that the observed mean is significantly differed from the standard average of 3?	There is no significant difference	There is significant difference

Source: Field investigation

Table No. 4.39a

Opinions regarding Eco-friendly houses are costlier than the regular houses

Opinions regarding Eco-friendly houses are costlier than the regular houses							
		H2					Total
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Location	near to nature	**0**	**0**	**0**	**8**	**4**	**12**
	outside of city	**8**	**16**	**24**	**4**	**4**	**56**
	within city	**32**	**20**	**12**	**24**	**20**	**108**
Total		**40**	**36**	**36**	**36**	**28**	**176**

Source: Field investigation

As has been mentioned earlier, considering all the aspects of the present hypothesis, one sample 't' test with 5 per cent level of significance has been observed to be appropriate for further procedure of the testing. Hence the output of testing has been presented with the help of ***Table No. 4.40***.

Table No. 4.40

Descriptive Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Hypothesis-H2	176	2.8636	1.4074	0.2121

Table No. 4.41

One-Sample Test

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Hypothesis-H2	-0.643	175	0.524	-0.1363	-0.5643	-0.2915

On scrutinizing the results of calculations mentioned above in ***Table No. 4.40 and Table No. 4.41*** the inferences are as follows-

In case of hypothesis-H2, opinions of respondents regarding ecofriendly houses are costlier than the regular houses and naturally buyers attract towards the cheaper houses, one can safely conclude that because of the Significance value obtained show a tendency to be more than 0.05. In such a case, the column labeled 'Sig. (2-tailed)'displays a probability from the 't' distribution with 175 degrees of freedom. The value listed is the probability of obtaining an absolute value greater than or equal to the observed 't' statistic, if the difference between the sample means and the test value is purely random. Since, confidence intervals lie entirely below 0.0; in this case, one can safely say that observed level of agreeableness regarding 'ecofriendly houses are costlier than the regular houses and naturally buyers attract towards the cheaper houses 'is significantly (negatively) not differing from the standard mean of 3. ***Hence, in this case of the hypothesis-H2, hypothesis null may be accepted and result can be interpreted as ecofriendly houses are NOT costlier than the regular houses and naturally buyers attract towards these houses.***

Chapter-5

SUMMARY OF THE FINDINGS, CONCLUSION

AND SUGGESTIONS

Ecofriendly homes considered as the need of the present time to the extent of the impact of construction industry on the environment. Though, there are few issues have been noticed in not having active and sufficient demand for such kind of residences to the extent of influencing supply side. The cost of any construction site is significant and it is always out of the reach of average common man. Thus the risk for deciding to construct ecofriendly constructions is always observed as rarest rare. In the city of Pune accommodating more than 25 lakh citizens hardly 45 to 50 schemes have been identified with the philosophy of ecofriendly or green constructions. Both the terms ecofriendly and green building are used interchangeably in the practice but both have a significant difference. Eco-friendly means that the construction of the particular building is not hampering more ecology. For example, it may be stated that in ecofriendly constructions more focus is given on the aspect of providing, bio gas plant, solar heating systems etc. On the other hand in green building focus has been given on the utilization of the natural substances such as easily available substances as a construction material such as bamboo.

Thus, practically speaking it is uncertain and unrealistic to implement green concept for the larger population and that to provide accommodation. In case of the scope of present study, Pune is 7^{th} metro city of India and this green concept is mostly not possible. Though, the eco-friendly constructions can be made to some of the extent. This also required significant demand to influence the policy decisions of the builders. Or on the other hand government policy is needed but this aspect is not the case of present study.

Keeping in mind this entire discussion present research has been carried out to understand the pattern of buying behavior of the customers in this industry. Now, in this chapter detailed presentation has been provided on the aspect of summary of the findings, analysis and conclusions on the study. To accommodate this discussion this entire chapter has been divided into four sections as stated in below paragraph.

Section-(i) provides introductory observations to build basic understanding of the entire research work. Summary of the findings have been provided with the help of ***Section-(ii)*** of this chapter. The concluding observations based on the findings have been provided in the ***Section-(iii)***. Finally workable suggestions have been offered with the help of ***Section-(iv)*** of this chapter.

5.1 Section-(i)

Introductory Observations

This entire study has been carried out in the geographical area of the Pune City. The basic intention of this study is to provide current status of the ecofriendly houses in the Pune city. The marketing strategies of the ecofriendly houses also have been investigated during this study. It has been observed that, ecofriendly houses are not having considerably significant demand. This has many reasons behind it and one of the reasons for this may be attributed to the fact that there is no awareness among the potential buyers. This aspect also has been investigated during the present research. The challenges in the sector pertaining to creating active demand has been explored in this research study.

The entire study has been carried out on the basic assumptions later transformed into the hypotheses. Such as, (a) larger portion of the society is not aware about the ecofriendly houses and (b) ecofriendly hoses are costly than the regularly constructed homes and thus ordinarily as the common behavior customers are tend to buy normal houses which are assumed to be more cheaper than the ecofriendly houses. This research addresses particular research questions such as, (a) what is the current status of co-friendly houses in Pune; (b) what is the impact of marketing strategies of ecofriendly houses on the buyer's behavior and (c) what is the level of awareness among buyers regarding ecofriendly homes and the challenges thereof.

The research has been based on the primary as well as secondary data primary data has been collected from 176 buyers of the ecofriendly homes in Pune. There are total 45 schemes have been registered in the Pune under the ecofriendly schemes. Thus, in this entire study each society has been selected under the sampling scheme and 71 sales representatives have been contacted and their responses have been included in the present research.

The entire primary data has been collected by using structured questionnaire. The pilot tested questionnaires have been constructed by using Five Point Likert scale measurement. This has been provided scope for applying one sample 't' test for testing of the hypothesis. The detailed discussion on the summary of findings have been presented below.

5.2 Section-(ii)

Summary of the findings

This section discusses the broader summary of the findings based on the observations made in the chapter on data analysis. The pointed summary of the findings of this entire research has been provided in below in two subsection, in ***Subsection-(a)*** summary of the findings based on customers' responses has been presented and in ***Subsection-(b)*** summary of the sales person's responses has been presented-

Subsection-(a): Customers' Responses

- While purchasing the ecofriendly homes customers are observed to be preferring location of within city. This preference has been given due to looking at the connectivity to the day to day essentials such as, market, school, banks etc. This observation further enhance that customers are interested in ecofriendly homes but along with other amenities.

- The customers are preferring specious homes ranging from at least 2 BHK to 3 BHK. This reflects the standard of living of the customers of ecofriendly homes. The reason for this preference may be attributed to the fact that buying ecofriendly homes is slightly more expensive than the regular flats and additional spaces may be expected by the customers.

- Naturally, rate of properties are basically depend on the location. The price of the property located in to the heart of the city is obviously higher than the property on outskirts of the city.

- Major chunk of respondents have been provided preference to the location by considering nature, Near to the market/hospital/schools and the price of the property. This is the general observation as feasibility of nearness to the amenities and day to day life necessities are always given higher preference by

the customers irrespective of the normal scheme or ecofriendly homes. Though, connectivity to the nature also not has been neglected by the customers and thus provided with more preference to the nature.

- The preference given for the eco-friendly homes are basically for the reason of residential purposes. Purchase of ecofriendly homes are not made for the investment. This has been reflected from almost 75 per cent of the respondents mentioned that they gave purchased it for residential purpose.

- The customers are observed to be preferring for the tallest apartments. This has been investigated based on the references mentioned by the customers for floors. It needs to be summarized here that, almost 70 per cent of the responding buyers preferred 5^{th} floor of the apartment followed by 29 per cent respondents for 4^{th} floor. The highest preference for the top most floor has been provided due to the preference for scenic view of the apartment. Almost half of the responding customers recorded their preference for 6^{th} floor apartments. Though lower preference has been recorded for the choice of 12^{th} floor building. Thus ultimately, it is to be highlighted here that in case of ecofriendly homes customers are preferring flats between 5^{th} Floor and 12^{th} Floor.

- Ecofriendly homes are the products of more than luxury. Thus whatever value addition made in the construction site and the amenities provided are levied on the pricing of the flats. Also considering the supply side of this type of construction buildings, some sort of control on pricing is necessary. This has been reflected from the present research in terms of observation of builders having monopoly at least on the pricing strategies of the ecofriendly houses.

- Ecofriendly homes are having higher references by the buyers. This has reflected from fact observed during the present study. Such as buyers of the ecofriendly homes have not considered their income while purchasing the flats.

- Another element of the purchasing ecofriendly homes is the status quo. It has been observed that, almost 30 per cent of the respondents considers the protection and status while buying ecofriendly houses. Thus, protection along with status is considered while buying the ecofriendly homes. This decision is observed to be superseding the budgetary constraints of the customer.

- The financial assistance in terms of housing loan is the preference and providing financial capability at the time of purchasing flats. The loan sanction is basically depend on the age factor of the applicant. This has been reflected from the observation that 38 per cent of the respondents are sometime considering the age factors while purchasing the ecofriendly homes.

- It has been observed that customers buying ecofriendly homes are not considering their income for buying the ecofriendly homes but few portion of the respondents have found that they consider family size while buying the ecofriendly houses.

- Based on the promotional strategies builders are observed to be implementing two promotional strategies along with other advertisement efforts. This observation has been supported by almost all the buyers by mentioning that they got information about ecofriendly project promptly from only two sources such as, (a) banners (47 per cent of the respondents) and (b) pamphlets (47.73 per cent of the respondents.

- Secondly, it has been observed that social media is the highest preference for searching properties online. Radio and FM are also the second priority for getting updated information regarding ecofriendly homes and properties.

- Mouth publicity is also the major method for updating new buyers of the ecofriendly homes. The existing customers are found to be spreading their experience among their friends and relatives regarding features of eco-friendly homes. The agreement of sales of ecofriendly homes has been completed with the help of real estate agents and thus it is to be pointed out that real estate agents are playing major role in this industry.

- Customers in real estate are observed to be kin on financial flexibility in terms of EMI. The delayed EMI up to the possession has been found more suitable strategy for the business. No EMI still possession is the scheme for introducing this financial flexibility. Also part from this scheme, builders are observed to be implementing discount and prelaunch offers to attract more customers. .

- Generally, customers seeks and avails financial supports from the banks but in some cases, builders are also observed to be providing financial support. Though customers of the ecofriendly homes are found with mixed response.

- On the basis of amenities, customers have been found with more preferences for security and safety, Ventilation and light, Garden view, Amenities along with more space. These are the general necessities provided by the ecofriendly homes.

- On aspect of more influential variables regarding buying decision, wife and female members are found on top among, parents, wife, friends, media and advertising. Almost 70 per cent of the respondents observed that their buying decision of ecofriendly homes are influenced by wife and or female members in family. More over this aspect has been supported by almost 98 per cent respondents by mentioning that female opinions are taken into consideration for final purchase.

- These decision makers have found to be considering 24 hours water supply, Road connectivity, Near to school/hospital, Near to market, Travelling facility and Amenities while taking decision of purchasing eco-friendly homes. Though it is also has been observed that buying ecofriendly homes doesn't observed influenced because of the distance of the project far from city.

- It has been previously observed that ecofriendly homes are bought for residential purposes only. Now, only 36 per cent of the responding buyers of ecofriendly homes have mentioned that they decided to stay for long term in ecofriendly homes.

- Ecofriendly homes are basically constructed considering the lowest possible impact on environment. But buyers of this homes are more interested in availability of the facilities. For example, the buyers of ecofriendly homes rate are observed to be more interested in having water availability and least bothered about the source. This has a reflection of lowest care about ecology while purchasing the ecofriendly homes. In summary, ecofriendly homes are purchased only for status quo and nor environmental care. Thus ultimately it is

to be pointed out that the environmental considerations are not the core areas of the buyers for purchasing ecofriendly homes.

- Almost 38 per cent of the respondents found to be positive for preferring building with solid waste management. Further, it has to be noted that, buyers of the ecofriendly homes are found to be least concerned about the facilities provided by the builders such as, bio gas, rain water harvesting and solar and wind energy.

All the above observations mentioned in the summary are based on the opinions collected from buyers of the eco-friendly homes. In the section below, an effort has been made to point out summary of the findings based on the opinions collected from sales executives involved in sales of ecofriendly homes.

Subsection-(b): Sales Executives' Responses

In this subsection, an effort has been made to summarize the findings of the opinions collected from sales executives engaged in selling of ecofriendly homes. Basic intension of this summary is to understand the buying behavior of the customers from the builders' point of view.

- Based on the opinions collected from sales executives it has been observed that, six parameters are highly considered by the buyers while purchasing ecofriendly homes, such as, (a) Producer (builder)/Brand image, (b) construction as per Vaastu Shastra, (c) price and built up area, (d) income of the buyer, and (e) occupation. Brand image is the primary identity of the product quality. Also reputation of the builder is also considered while taking decision of buying ecofriendly homes. Few customers are preferring for construction as per Vaastu Shastra. The sales executives also experienced the price and built up area as the primary concern of the customers buying eco-friendly homes. Income and occupation of the buyer are the intense factors influencing buying decision of the ecofriendly homes.

- Overall economic condition of the society is also found to be very crucial in deciding the purchase of the ecofriendly homes. In simplistic fashion, stable economic condition reflects the more sales of ecofriendly homes and weaker economic situation observed to be with adverse impact on purchasing behavior.

- Technology applied while constructing the ecofriendly homes is also observed as the significant factor influencing buying decision of the ecofriendly homes.
- Culture and standard of living is having direct relationship. Thus as per the opinion of the sales representatives these two factors are significant while deciding on the purchase of the ecofriendly homes.
- It has also been experienced by the sales executives of the ecofriendly homes that offers, discounts and special attractions are some of tactics which influence the buying decision of the customers in construction industry.
- The strategy of ready possession sample flats is the key towards successful sales of the ecofriendly homes. In this way potential buyers may feel the difference between ecofriendly homes and normal and regular homes. The quality of the construction is also experienced with sample flats.
- The facilities and amenities offered by the builders in ecofriendly homes is also play a significant role during buying decision.
- In a summary, it may be stated that, factors such as, reserved parking area, owned parking slot, minimum maintenance cost, solar water heater, rain water harvesting, garbage disposal facility, bio gas plant, solid waste management, safety living, land scape garden, proper ventilation, and earth quake resistance system are found to be significant while deciding purchase of the ecofriendly homes.

5.3 Section-(iii)

Conclusions

This section elaborates the concluding remarks of the present study by considering objectives of the present study. The entire discussion in this section is based on the observations of the study with reference to the statistical analysis carried out in the chapter-4 of the analysis. Further it also need to be pointed out that these concluding remarks are based on the deductive reasoning with objective approach of under the relative realism of the ontology of the research.

There are very few schemes are operative in Pune that provide and comply with the specifications related to the ecofriendly homes. Total almost 45 schemes have been submitted to the government for approval though majority of the schemes are yet not approved by the competent authority. This conclusion is in relation to the ***first objective*** of the present research. Though detailed discussion on this aspect has been provided in the chapter-1, introduction.

The marketing strategies have been studied in the present research to the extent of promotional strategies and loan availability, and discounts offered. Though, it needs to be concluded with the due care that none of the marketing strategies have been observed successful in the long run. Such as if the builders were successful in designing the effective marketing strategies then its impact should be observed on the increasing demand for the ecofriendly houses. This conclusion contributes to the ***second objective*** of the present research.

There is very less awareness has been observed during the present research. Specifically speaking potential buyers are not differentiate based on the features and other benefits that they got from these ecofriendly houses as compare to the normal common housing properties. Also it has been observed that awareness among the potential customers on the aspects of features and benefits of these houses is not significant. This has been in accordance to the ***third objective*** of the present research.

There are three basic barriers identified in the free flow of ecofriendly houses during investigation of the present study. These barriers are; (a) pricing of the ecofriendly houses and its imagination in the mind of customers. In fact the way cost factor considered by the buyers is not realistic, (b) Focus on the social benefits to be given more by the potential customers rather than looking for personal benefits. This paradigm shift will provide active demand for ecofriendly homes. And (c) government is not actively supportive the initiative of the green building or the ecofriendly homes. This conclusion to be noted regards to the ***fourth objective*** of the present study.

Also essentially, it is to be noted that, larger portion of the society is not aware About

the Ecofriendly Houses and ecofriendly houses are NOT costlier than the regular houses.

5.4 Section-(iv)

Suggestions of the Study

In this section an effort has been made to provide workable suggestions for this entire study based on the above mentioned concluding observations. These suggestions are time specific, meaning the suggestions are applicable to the time specificities in which the study has been carried out. Moreover, these suggestions and place specific. Such as entire study has been carried out based on the observations carried out Pune City only. Finally the suggestions are applicable in construction industry. Though, it also has to be noted that, these suggestions can be implemented in other places, and activities too with certain adjustments.

The suggestions of the study are:

- Policy makers in the construction industry should focus more on the spreading awareness among the potential customers with the help of posters and banners. The help from Radio or FM advertisement can be considered for this. The awareness not only required for promoting knowledge on the various schemes and facilities under ecofriendly homes but the sensitivity of the peoples need to be enhanced for ecological balance in the society.

- Secondly, policy makers in the government also suggested that, there is a need for solid policy framework for boosting ecofriendly homes. Providing easy loan, lowest interest rate, hassle free loans, significant tax benefits are some of the methods for promoting ecofriendly homes on the part of government policy makers.

Finally, it needs to be mentioned specifically that, this research was under taken with the intension of contributing to the understanding of the ecofriendly house and its awareness among the customers to offer probable solutions in the light of findings. This study has added to the current body of knowledge relating to strategic considerations for promoting ecofriendly homes, also it has provided insight into areas that warrant further exploration.

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Annexure -I

Study of factors affecting buying behaviorofEco-friendlyhouses(ECH) in Pune and PCMC

Questionnaire- for buyers

1. **Name - _____**
2. **Email Id - _____**
3. **Mobile Number - _____**
4. **Address - _____**
5. **Qualification ***
   Diploma ☐ Graduate ☐ Post Graduate ☐
   Professional ☐ Any other ☐
6. **What type of flat/house are you looking for?**
   1BHK ☐ 2BHK ☐ 3BHK ☐ Row house ☐
   Any other ☐
7. **Which location do you prefer?**
   Within city ☐ Outside of city ☐ Near work place ☐
   Near to nature ☐ Any other
8. **What is your budget?**
   Rs.30 L to 50 L ☐ Rs.50 L to 75L ☐ Rs.75 L to 1 cr ☐
   Rs.1 cr to 2 cr ☐ Any Other ☐
9. **What major factors do you consider for your purchase?**
   Price ☐ Location ☐ Connectivity of road
   Near to the market/hospital/schools ☐ Near to nature ☐
10. **What is the purpose of the purchase?**
    Residential purpose ☐ Investment purpose ☐ Tax benefit ☐
    Capital appreciation ☐ Any other ☐

11. **Which floor will you prefer in a 5 floor building?**

1st floor ☐ **2nd floor** ☐ **3rd floor** ☐ **4th floor** ☐ **5th floor** ☐

12. **Which Floor will you prefer in a 12-floor building**

1st floor ☐ **5th floor** ☐ **9th floor** ☐ **12th floor** ☐

13. **What type of Building are you preferring?**

Building with landscape garden ☐

Building with Swimming pool ☐

Building with walking track ☐

Building with Community Hall ☐ **Any other** ☐

14. **Do you have sufficient knowledge about Eco Friendly Houses? On Scale of 1 to 5 (1 -less, 5 -max)**

1 ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐

15. **Your Opinion about Price of EFHs over regular houses on scale of 1 to 5 (1= low price , 5 = High price)**

1 ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐

16. **Do you bargain on basic cost**

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

17. **What is your perception regarding current price of flats?**

Accepted ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

18. **Are you purchasing the house/flat according to your income?**

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

19. **Are you purchasing the house/flat according to your protection and status?**

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

20. **Are you purchasing the house/flat according to your age?**

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

21. **Are you purchasing the house/flat according to your family size?**

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

22. **How do you come to know about this project?**

Hording ☐ **Banners** ☐ **Pamphlets** ☐ **Posters** ☐ **Magazines** ☐

23. **Which digital media you prefer for seeking property?**

T.V. ☐ **`Internet** ☐ **``Random message** ☐ **Websites** ☐ **Radio** ☐

24. **Through whom you have visited the side actually?**

Walk in Exhibition ☐ **Real Estate Agent** ☐

Channel-Partner ☐ **Friends/relatives recommendation** ☐

25. **What promotional activity attract you more for final purchase?**

Pre-launch offer ☐ **Discount** ☐ **Publicity** ☐

No EMI till Possession ☐

26. **Do you prefer builders arranging financial support for selling?**

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

27. **Which factors influence for final purchase of your home?**

Security and Safety ☐ **Ventilation and light** ☐

Garden view ☐ **Amenities** ☐ **More Space** ☐

Vaastu Shastra ☐

28. **Who influence you for final decision in buying your home?**

Wife/Female Friends ☐ **Parents/senior in company Arranging** ☐

Media and advertising ☐ **Any other** ☐

29. **Does female decision is taken into consideration for final purchase?**

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

30. **Which factors are generally seen by females/ wife while purchasing flat?**

24 hours water supply ☐ **Road connectivity** ☐

Near to school/hospital ☐ **Near to market** ☐

Travelling facility ☐ **Amenities** ☐ **Carpet area** ☐

31. **Do you prefer a Eco friendly house which is far from city?**

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

32. Will you specifically choose Eco friendly house for your long them stay?

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

33. Do you prefer building with solar heating facilities?

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

34. Do you prefer building with rain water harvesting?

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

35. Do you prefer building with garbage disposal facility?

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

36. Do you prefer building with Bio gas plant?

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

37. Do you prefer building with solid waste management?

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

38. Do you prefer solar wind hybrid for lighting?

Yes ☐ **Sometimes** ☐ **No** ☐ **Can't say** ☐

Annexure-II

Study of factors affecting buying behaviour of Eco-friendly houses (ECH) in Pune and PCMC

Questionnaire For Sales Executives

1. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 1) Producer (builder)/Brand image

   Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

2. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 2) Quality or Reputation of the builder

   Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

3. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 3) Construction as per Vastu Shastra

   Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

4. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 4) Build up/ Capet area

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

5. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 5) Price

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

6. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 6) Occupation

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

7. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 7) Income

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

8. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 8) Economic

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

9. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 9) Technology

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

10. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 10) Social

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

11. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 11) Culture

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

12. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 12) Launching offer

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

13. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 13) Sample flat

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

14. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 14) Luxurious flat

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

15. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 15) Duplex flat

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

16. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 16) Furnished Flat

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

17. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 17) Semi-furnished flat

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

18. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 18) Under Construction

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

19. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 19) No EMI till possession 3

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

20. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 20) Amenities

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

21. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 21) Facilities

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

22. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 22) Common parking

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

23. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 23) Own parking

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

24. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 24) Maintenance

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

25. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 25) Ready Possession

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

26. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 26) Loan for reputed bank

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

27. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 27) After sales service

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

28. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 28) Solar heating system

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

29. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 29) Rain water harvesting

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

30. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 30) Garbage disposal facility

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

31. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 31) Bio gas plant

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

32. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 32) Solid waste management

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

33. 1. While selling flats which factors influence more on the buyers towards purchase decision? - 33) Solar wind hybrid for lighting

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

34. 2. Which Non financial variables are more important for selling the flat?- 1) Road connectivity

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

35. 2. Which Non financial variables are more important for selling the flat?- 2) Bus stop (Transportation)

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

36. 2. Which Non financial variables are more important for selling the flat?- 3) Railway station

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

37. 2. Which Non financial variables are more important for selling the flat?- 4) Express highway

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

38. 2. Which Non financial variables are more important for selling the flat?- 5) School, Hospital

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

39. 2. Which Non financial variables are more important for selling the flat?- 6)Nearness of market

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

40. 2. Which Non financial variables are more important for selling the flat?- 7) Nearness of Office

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

41. 2. Which Non financial variables are more important for selling the flat?- 8) Near MIDC

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

42. 2. Which Non financial variables are more important for selling the flat?- 9) Bank, College

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

43. 2. Which Non financial variables are more important for selling the flat?- 10) Proposed Mumbai Pune ring road

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

44. 2. Which Non financial variables are more important for selling the flat?- 11) Malls, Multiplex

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

45. 2. Which Non financial variables are more important for selling the flat?- 12) Surrounding area

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

46. 2. Which Non financial variables are more important for selling the flat?- 13) Availability of facilities

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

47. 2. Which Non financial variables are more important for selling the flat?- 14) Preference Choice

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

48. 2. Which Non financial variables are more important for selling the flat?- 15) Safety Living

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

49. 2. Which Non financial variables are more important for selling the flat?- 16) Lifestyle

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

50. 2. Which Non financial variables are more important for selling the flat?- 17) Standard of living

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

51. 2. Which Non financial variables are more important for selling the flat?- 18) Personality

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

52. 2. Which Non financial variables are more important for selling the flat?- 19) Status

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

53. 2. Which Non financial variables are more important for selling the flat?- 20) Perception

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

54. 2. Which Non financial variables are more important for selling the flat?- 21) Love and affection

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

55. 2. Which Non financial variables are more important for selling the flat?- 22) Work life balance

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

56. 2. Which Non financial variables are more important for selling the flat?- 23) Satisfaction

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

57. 2. Which Non financial variables are more important for selling the flat?- 24) Maintenance

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

58. 3. Which specification are more important for selling the flat?- 1) Entrance Gate

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

59. 3. Which specification are more important for selling the flat?- 2) Designer Entrance Lobby

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

60. 3. Which specification are more important for selling the flat?- 3) Security Gate

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

61. 3. Which specification are more important for selling the flat?- 4) Round the clock security

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

62. 3. Which specification are more important for selling the flat?- 5) Decorative compound Wall

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

63. 3. Which specification are more important for selling the flat?- 6) Building and compound wall

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

64. 3. Which specification are more important for selling the flat?- 7) Grand Entrance gate

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

65. 3. Which specification are more important for selling the flat?- 8) The Internal road

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

66. 3. Which specification are more important for selling the flat?- 9) Internal cement concrete road

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

67. 3. Which specification are more important for selling the flat?- 10) A well illuminated, wide and moisture free internal roads

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

68. 3. Which specification are more important for selling the flat?- 11) Door Frame

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

69. 3. Which specification are more important for selling the flat?- 12) Decorative name plate on main door

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

70. 3. Which specification are more important for selling the flat?- 13) Windows Frame

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

71. 3. Which specification are more important for selling the flat?- 14) Wall tiles

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

72. 3. Which specification are more important for selling the flat?- 15) Granite Kitchen platform

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

73. 3. Which specification are more important for selling the flat?- 16) Tiles in Bath & Toilet

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

74. 3. Which specification are more important for selling the flat?- 17) Bricks

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

75. 3. Which specification are more important for selling the flat?- 18) Earch Quake Resistant

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

76. 3. Which specification are more important for selling the flat?- 19) Electrification

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

77. 3. Which specification are more important for selling the flat?- 20) Lift

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

78. 3. Which specification are more important for selling the flat?- 21) Painting

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

79. 3. Which specification are more important for selling the flat?- 22) Flooring

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

80. 3. Which specification are more important for selling the flat?- 23) Full paved area around

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

81. 3. Which specification are more important for selling the flat?- 24) Sanitation facility for drivers and house maid

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

82. 3. Which specification are more important for selling the flat?- 25) Water pumps

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

83. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 1) Entrance plaza

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

84. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 2) Landscape garden

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

85. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 3) Swimming pool

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

86. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 4) Gymnasium

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

87. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 5) Party Lawn

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

88. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 6) Recreational club house

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

89. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 7) Children's play area

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

90. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 8) Jogging track

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

91. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 9) Senior citizen's park

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

92. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 10) Path way

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

93. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 11) Play area

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

94. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 12) Acupressure path way

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

95. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 13) Aqua park

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

96. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 14) Kid's pool

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

97. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 15) Skating ring

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

98. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 16) Rain water harvesting

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

99. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 17) Yoga/meditation area

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

100. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 18) Badminton court

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

101. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 19) Basketball court

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

102. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 20) Cricket pitch

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

103. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 21) Indoor games room with TT Table

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

104. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 22) Musical instruments

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

105. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 23) Reading room and Library

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

106. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 24) Piped Gas

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

107. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 25) Solar system

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

108. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 26) Steam bath

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

109. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 27) Good quality life

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

110. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 28) Generator Backup

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

111. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 29) Intercom system

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

112. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 30) Wi-Fi connectivity

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

113. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 31) Video door phone

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

114. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 32) Mini Theatre

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

115. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 33) Amphitheatre

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

116. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 34) Gazebos and sit out spaces

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

117. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 35) Stage

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

118. 4. Which amenities buyers prefer while purchasing as the amenity cost is included into selling price?- 36) Temple

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

119. 5. Which factors do you feel are most important for selling the flats to the customers?- 1) Building shape

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

120. 5. Which factors do you feel are most important for selling the flats to the customers?- 2) Exterior design of Building

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

121. 5. Which factors do you feel are most important for selling the flats to the customers?- 3) Colour

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

122. 5. Which factors do you feel are most important for selling the flats to the customers?- 4) Open % area in a project

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

123. 5. Which factors do you feel are most important for selling the flats to the customers?- 5) Wide staircase and parking space

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

124. 5. Which factors do you feel are most important for selling the flats to the customers?- 6) Affirmative Elevation

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

125. 5. Which factors do you feel are most important for selling the flats to the customers?- 7) Sufficient water supply

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

126. 5. Which factors do you feel are most important for selling the flats to the customers?- 8) Interior design in a flat

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

127. 5. Which factors do you feel are most important for selling the flats to the customers?- 9) Size (area) in a flat

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

128. 5. Which factors do you feel are most important for selling the flats to the customers?- 10) Possible number of terrace

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

129. 5. Which factors do you feel are most important for selling the flats to the customers?- 11) Ventilation

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

130. 5. Which factors do you feel are most important for selling the flats to the customers?- 12) Ample light and air to each flat

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

131. 5. Which factors do you feel are most important for selling the flats to the customers?- 13) All main door open East-West

Mark only one oval.

	1	2	3	4	5	
Least Important	◯	◯	◯	◯	◯	Most Important

132. 5. Which factors do you feel are most important for selling the flats to the customers?- 14) All kitchen otta east-west facing

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

133. 5. Which factors do you feel are most important for selling the flats to the customers?- 15) Excellent planning with no wastage in all rooms

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

134. 5. Which factors do you feel are most important for selling the flats to the customers?- 16) Fire fighting system

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

135. 5. Which factors do you feel are most important for selling the flats to the customers?- 17) Gas leak detector

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

136. 5. Which factors do you feel are most important for selling the flats to the customers?- 18) CCTV

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

137. 5. Which factors do you feel are most important for selling the flats to the customers?- 19) Decorative street light

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

138. 5. Which factors do you feel are most important for selling the flats to the customers?- 20) Generator backup for lift

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important

139. 5. Which factors do you feel are most important for selling the flats to the customers?- 21) Generator backup for common area

Mark only one oval.

	1	2	3	4	5	
Least Important						Most Important