4 PUBLIC HOUSING POLICY IN KERALA: EVALUATION OF HOUSEHOLD SURVEYS AND CASE STUDIES

4.1 Introduction

This chapter presents an evaluation of the housing situation in Kerala based on household surveys and case studies from the selected housing schemes. A comparative analysis of the Kerala situation with examples from other parts of the world is also presented in this chapter. The details on household surveys and case studies from selected households are presented in section 4.2 to disclose the real situation of the beneficiary households. This helps in understanding the bottlenecks of poor households on approaching the problem. Section 4.3 deals with the evaluation of household data (Analysis III, section 3.3.2). The Statistical Package for Social Sciences (SPSS) is employed at this stage of analysis to get a comparison of the different aspects of sustainable-affordable housing in different housing schemes from the perspective of the beneficiaries, and to test their interrelations as conceived by the conceptual framework. Section 4.4 presents a few examples of enabling strategies from the UN-habitat's (United National Center for Human Settlements-UNCHS) Global Best Practice database to have a comparative approach and to see how they have tackled the problems of low income housing in similar contexts (UNCHS, 2004). A discussion of the results of the evaluation of the public initiatives in the low income housing of Kerala with respect to different aspects of sustainability is presented in section 4.5. Based on these evaluations, strategies (section 4.6) are formulated for sustainable-affordable housing developments in Kerala. Section 4.7 presents the conclusions.

4.2 Household survey and case studies

The household survey was conducted among the beneficiaries of One Lakh Housing Scheme (OLHS), Indira Awaas Yojana (IAY) and Total Housing Scheme (THS) from Kollam and Alappuzha districts, during the months of May and June 2005. The selection of beneficiaries has been done on a random basis. Out of the total of fifty-six households interviewed, eighteen were from OLHS, twelve from IAY and twenty-six from THS. The surveys were conducted using a structured questionnaire prepared on the basis of the conceptual framework. The original version of the questionnaire is presented in Appendix 4.1 of this chapter. There were 143 main questions and a few general questions (to help the interviewer to write his remarks). Other than the specific questions regarding their personnel details and details on the housing, most of the questions were with multiple answers. The respondent had the freedom for selecting the

answer from the group or writing down his own remarks. Table 4.1 gives a structure of the questionnaire. A scheme of analysis (Appendix 4.2) has also been prepared from this questionnaire for each aspect of sustainability based on the "objectives hierarchy model" (Fig. 2.9) of the conceptual framework and the questions are transformed into measurable criteria.

Table 4.1 Structure of the household survey schedule and purpose

Research questions addressed

Q: What is the real situation of households and how far are the housing schemes successful in achieving sustainable development?

Q: Why does the housing problem of the EWS persist in Kerala despite "active and effective" (according to official records) state intervention?

	Structure of Questionnaire	Purpose	Criteria
1	**General information**, regarding the general details of the household such as their age, marital status, job etc.	The information collected from these questions can be used to assess the **socio-cultural aspects** of the household, educational back- ground and profession.	Inequality and Stigmatization Household size Adaptability
2	**Economic status of the household** - This section deals with the questions concerning the economic status of the household to assess their income, savings, liability and pattern of expenditure.	To assess the financial status or **affordability** of the households and hence to determine the economic sustainability of the housing scheme.	Housing condition Self- dependency Liability for housing Savings and Assets Skills
3	**Housing details** – This section has got two parts. The first part deals with the details of their previous house, its location, type and the basic facilities they had. The second part consists of questions concerning the details of the present house. It includes the details of the building process, technology adopted, sources of funding. Also there are questions concerning the various measures adopted for conservation of resources and neighbourhood	Details of previous housing are collected to assess their social progress and improvement in life. Details of building process helps in understanding the **technology** adopted. It also helps in assessing the feasibility and awareness on innovative options and other resources including finance. To assess the **quality of the surrounding environment** and various conservation measures adopted to protect the environment.	Shelter needs Infrastructure Accessibility to affordable technological options. Accessibility to resources including easy finance. Beneficiary Participation. Community/NGO'S involvement. Unhealthy surroundings. Basic infrastructure facilities like drinking water and sanitation. Waste management.
4	**Needs, Aspirations , Plans** - This final section of questions is mainly concerned with the future plans of the household	To assess their preferences in technology, their attitude towards **CEEF technology** and to assess their needs and aspirations that has to be considered in formulating housing schemes.	Feasibility Availability CEEF technology
5	**General remarks of the interviewer**	To assess the overall situation of the household and their lifestyle.	

A few outstanding cases are selected as case studies from the household surveys for further evaluation based on the criteria specified by the conceptual framework. The succeeding section presents them in detail. This helps in understanding the genuine problems of beneficiary households from their own perspectives.

4.2.1 Case studies from One lakh housing scheme

Households from Thrikkadavoor panchayat (Kollam district) and from a One lakh housing colony of Alappuzha district (North Punnapra panchayat-Ward III) were randomly selected for interviews.

There were eighty-two OLHS beneficiary households, distributed among four colonies (Vettuvila, Neeravil, Melemangadu and Pandaruvila) of Thrikkadavoor Panchayat. Eighteen selected households were interviewed. The general housing conditions of these colonies were satisfactory with basic infrastructure facilities like provision of public water supply, electric connection, motor-able road, nearness to schools, hospital and worship places. But most of the houses were in deplorable conditions due to lack of proper maintenance, requiring urgent attention and repair.

The households from the colony of Punnapra panchayat were selected with a special intention. They were lucky to get an additional financial assistance of Rs. 40,000 (nearly € 800) for reconstructing their twin houses as independent dwellings. At the time of this household survey during early May 2005, all the houses in that colony were in a stage of reconstruction. Three of the households were interviewed. Even though these households were happy with the additional financial assistance for reconstruction, they were complaining about the following things.

- most of the beneficiaries were forced to demolish the extensions or renovations they have added to the original OLHS houses in the fear that, if they do not accept this assistance from the government, they may not able to receive further assistance for renovating their houses in the future;
- they were not given enough time to make a plan on arranging the resources and scheduling the works as they were given a short notice to take decisions, and above all;
- the financial assistance was not sufficient for both demolition and reconstruction.

Among the interviewed households, few of the interesting cases are presented below as case studies from this scheme.

Case study1

Criteria for selection: The insignificance of socio-cultural aspects in this housing programme is clear from this case study. This story tells us that stigmatization and inequality of houses is a major problem questioning the acceptability of a house even though it has enough facilities to cater the present needs.

Identification number 12 - This family with a household size of four is from Vettuvila One Lakh housing colony. Even though the household is satisfied with the present facilities of the house, the head of household wants to sell the property and buy another house outside the colony because of the twin house design and stigmatization of OLHS houses. His father-in-law was the original beneficiary of the scheme and was living in this house since 1972 with his wife and three children. He was a beedi[1] worker for daily wages and was happy with his house. They were maintaining the house regularly with timely repairs and hence even after thirty-three years, the house is in better condition compared to neighbouring houses. The-present inhabitants include a young man, his wife, their two year old daughter and mother-in-law.

Case study 2

Criteria for selection: This case study is a good example for poor significance to socio-cultural aspects like lack of adaptability (household size, varying requirements), increasing self-dependency of the household (Economic sustainability) and shabby surroundings (Environmental sustainability)

Identification number 14 - This is the case study of a family of household size seven from Neeravil One Lakh Housing colony. They are living in that house since 1972. Other than the old man, the head of household (original beneficiary), his wife and younger son; their elder son is also living in the same house with his family of two kids. Both of his sons are earning money through daily labour. One of them is a mason and the other a coconut plucker. Their house has a temporary extension for a kitchen with tar sheet roofing, thatched walls and bare flooring. In addition to this, they have another extension for cattle shed. They have a small shop for tiny things (sweets, cigarettes etc) in front of their house on the open veranda. Their housing condition is very pathetic with the shabby extensions and the poor surrounding environment, with the cracks in the walls, broken flooring and a leaking roof. Even though the family has a comfortable financial situation, without liabilities and with some savings in the bank; they are not at all bothered to spend money for improving their present housing. At the same time they are looking forward for further government support to improve their housing situation.

[1] Beedi is an indigenous cigarette in which tobacco is rolled in a tender leaf and tied

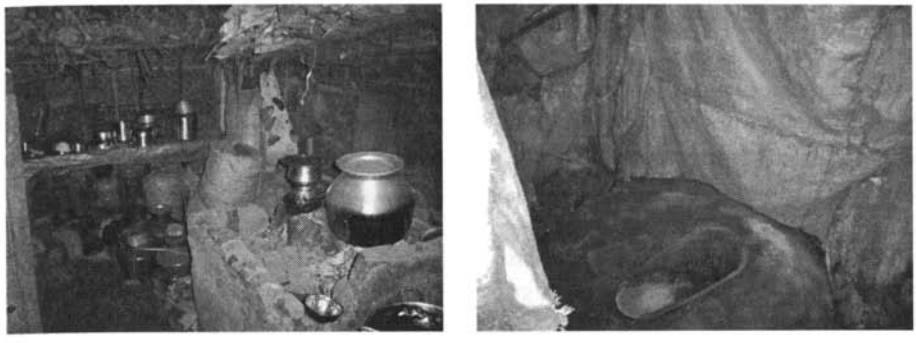

Figure 4.1 Basic facilities of OLHS house of case study-2

Case study 3

Criteria for selection: This case study is an example of the improper assistance of Government without understanding the actual situation in the field and generalising the problem (poor economic sustainability).

Identification number 1 - This is the story of a household from the OLHS colony of Punnapra panchayat, Alappuzha district. They were living in their one lakh house since 1972. The head of the household had a regular employment at that time and was able to cater the timely maintenance and repair works for his house. After eighteen years, in 1990, they renovated their house by adding one more room and providing additional space to kitchen and living room. He could meet these expenses by taking loans and using the savings. They spent nearly an amount of Rs. 30,000 (€ 600) for renovations at that time. But recently during February 2005 the panchayat authorities further provided them a grant (non refundable) of Rs. 40,000 (€ 800) under an up-gradation scheme for OLHS, for separating the twin houses as independent ones. The household was thoroughly confused in receiving this funding as they do not have enough land to reconstruct their house by detaching it from the old one without demolishing the renovations. But finally, they were forced to accept this assistance in the fear of receiving no more funds to separate their twin houses in the future. The household is now worried about the construction of their new house, since the present financial support from the government is not enough for both demolition and reconstruction. Also the head of household is afraid to take further loans in his old age, since he has no regular income and suffering from ill health.

4.2.2 *Case studies from Indira awaas yojana*

IAY is a centrally sponsored scheme implemented in a unique manner through out the whole state. IAY households from Thrikkadavoor, Punnapra and Kanjikuzhy

panchayats were interviewed. These houses were independently constructed by each household according to their own requirements and hence all of them were totally different to each other. The beneficiaries themselves did the whole building process in this scheme. They made their own arrangement for the construction by engaging skilled workmen along with contributing the family labour. Thus a sense of pride could be noticed among the IAY households whereas this was lacking in the case of most of the OLHS beneficiaries. Few of the interesting case studies are presented below.

Case study 4

Criteria for selection:

- *Poor economic sustainability (lack of feasibility to affordable housing finance and poor basic shelter needs)*
- *Insignificance to socio-cultural and technologic aspects (lack of proper guidance and awareness on cost-effective technological alternatives)*
- *Poor consideration on environmental issues (Environmental sustainability)*

Figure 4.2 IAY houses from Murundal, Perinadu, Kollam

IAY houses, Murundal, Perinadu, Kollam - These six IAY houses are constructed on a partially converted agricultural area in the Thrikkadavoor panchayat, near to Thamarappally Jayandi colony and at a distance of about 1.5 km from Anchalummodu junction. Two of them are occupied by the households. Among the rest, one of the houses is in the finishing stage with partial roofing where as the other three are completed up to lintel level only.

Identification Number 68 - This household had occupied their unfinished house in August 2004. The household size is four including an old couple and their young daughters. This household got a financial assistance of Rs. 25,000 (€ 500) for purchasing the house plot under a scheme for the scheduled castes from the Block panchayat other than the housing assistance from IAY. Since the costs of normal house

plots were high, they bought cheap agricultural land and reclaimed it. But the present condition of their house plot is so bad that their house is floating in the middle of a marshy land. The situation of their neighbours is also not different. The household started with their building process in early 2002 but could not finish the house till now. Since they could not manage with the completion of their house in the corresponding financial year, they lost the privilege of getting the full financial assistance from IAY scheme and could only receive the first three instalments. But they occupied the house in 2004 after managing with the minimum essential facilities. Even now, they are not having the basic facilities like toilet, drinking water and need to depend their neighbours.

Identification number 67 - This household including an old mother, her son, daughter-in-law and her young daughter is living in a temporary tent near to their unfinished IAY house for the last three years. They also got the financial assistance for purchasing house plot and have a similar story as their neighbour. But they could not manage to make their house to a liveable one and also find it difficult to repay the existing loans they took for constructing the house. The materials stored near their house site are also getting ruined without being used.

Identification number 65 - This household was lucky in finishing their house within the stipulated time (one year) and hence could receive the full privilege of the Scheme. Along with their neighbours, they also received the assistance in 2002, but could manage to occupy their house in 2003 April. For developing the plot and constructing the house they were forced to take loans from private lending agencies at higher rates of interest. Now, even after two years they are not able to repay a single penny towards the capital because of the high interests. This household has only minor pending works for their house. But they are seriously thinking of selling their house in fear of their rising debts.

Case study 5

Criteria for selection: This case study shows that

- *Self-help and mutual help alone could not solve the housing problem.*
- *Importance of general support and empowerment other than financial assistance.*
- *Technological un-sustainability of the scheme; technological innovations not reaching to the poor people.*
- *Economic un-sustainability of housing programmes; difficulties in getting affordable housing finance.*

IAY household from Kanjikuzhy - This household including a mother and nine-year old daughter got their house sanctioned under the 2003 scheme, and could partially finish it

into a liveable one in a period of four months. She lost her husband unexpectedly during this period and could not do the finishing works. According to her, the household and their neighbours contributed most of the labour and never employed any labour from outside. They had also taken a loan (Rs. 10,000) with higher rates of interest from a private bank to meet the excess expenditure. Only conventional methods of construction were employed in the building process, and this poor lady was even unaware of the cost reduction techniques.

4.2.3 Case studies from Total housing scheme

The two earlier schemes discussed (IAY and OLHS) have a uniform implementation pattern and hence are unique throughout the state. But the Total Housing Scheme was implemented only in the three major districts of the state, namely Thiruvananthapuram, Kollam, and Thrissur. Household surveys were conducted among the THS households of Thrikkadavoor panchayat (Kollam). Some of the households were from Sivodayam colony, where the housing programme was implemented through Habitat technology group, an organisation involved in cost-effective construction techniques in the state. The rest of the households constructed their house by their own way. The most interesting finding of the household survey is that neither the households nor the implementing agencies were successful in meeting any of the basic objectives of the scheme. The households other than the inmates of Sivodayam colony constructed the houses as in any other scheme like Mythri or IAY. However, the households of Sivodayam colony had a totally different experience, in some respects similar to the provider approach of OLHS. The case studies explain the real situation.

Case study 6

Criteria for selection:

- *Poor significance given to socio-cultural aspects in this housing programme.*
- *Lack of correlation between socio-cultural aspects and economic aspects in housing leading to the increased dependency of the households towards public support.*
- *Failures in implementing new technology.*
- *Lack of basic facilities.*

Sivodayam colony is located at a distance of about 300 m from the Kadavoor junction (Thevally-Anchalummodu road), behind the Government Ayurveda hospital. This is a colony of scheduled caste households belonging to the vedar• community of Hindu religion. They are living in the same place since 1960. At the time of this survey, there

were twelve households. Initially there were only ten households with each having a land ownership of five cents (equivalent to 200 m^2). They were provided with free houses in 1960 through Kudikidappukar housing scheme (centrally sponsored scheme). Later in 1976 they could electrify their houses with the support from the panchayat. The severe flooding in 1975-76 caused serious damages to their houses. They approached the authorities for repair and maintenance. But they could only get nominal assistance. Again after the flooding in 1986, the government further supported the colony members with a new housing assistance. The households were provided with partial financial assistance and food grains (Rs 6000 + 2 sacks of wheat) as support for reconstructing their houses. They were able to rebuild their houses with this assistance and also by utilizing the materials from the old house. Their second house was provided with the facilities of two rooms, kitchen, toilet and a small open veranda. In 1999, the households of Sivodayam colony again approached the panchayat for the financial assistance for repairing their houses. But this time they were lucky enough to be blessed with their new house -Third house from the Government-under Total Housing Scheme!

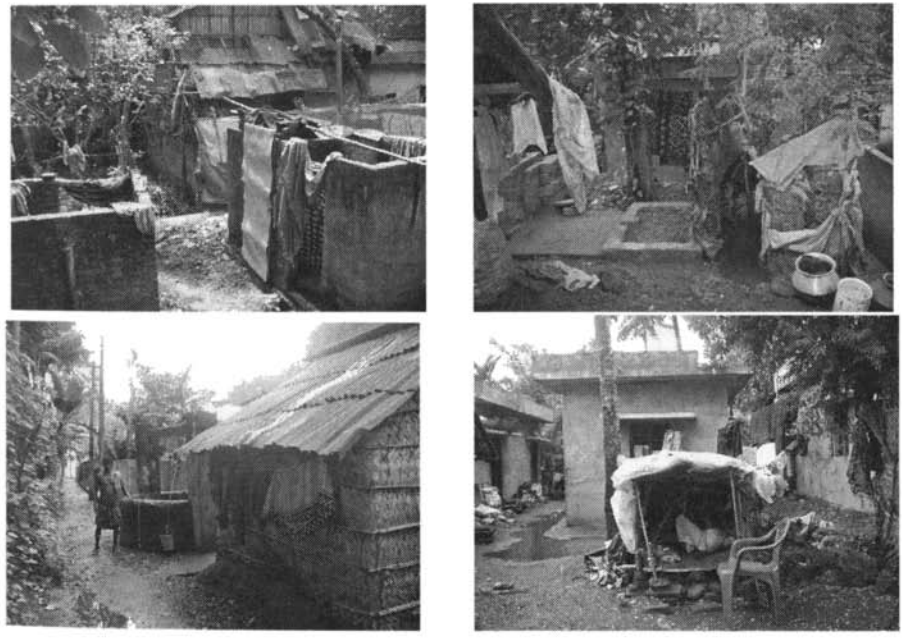

Figure 4.3 Basic infrastructure and surrounding environment; Sivodayam Colony

The implementation of this housing scheme was entrusted to the Habitat technology group, an appropriate technology group in Kerala. Habitat's role was that of a facilitator between the local government and the beneficiaries. As part of the THS programme,

training was given to engineers and masons and they were also involved in the construction of these houses. But according to the beneficiary households they did not receive any effective training in skilled jobs. Also they were not at all involved in material selection or other construction activities other than unskilled jobs.

The same type of designs was employed for all the houses. Initially the house plan was proposed with a living room, bedroom, kitchen and a toilet. Since they had their old toilet from their previous houses, the households opposed the construction of the new one and preferred to use that space in the new house to increase the area of kitchen. The construction of eleven houses was started simultaneously in early 2000 after demolishing the existing houses. The twelfth house was kept as such for keeping construction equipments and materials. All the households were moved to temporary sheds in the premises. Cost effective and environmentally friendly (CEEF) technology (rat trap bond for super structure and filler slab for roofing) was employed for the construction of houses. Engineers and trained masons were involved in this. One of the houses collapsed in the beginning during construction and training. But they continued with the rest. Unfortunately, the Habitat group left the project half way after finishing the roofing of three houses.

The colony members approached the panchayat for completion of houses. And after repeated requests, protests and picketing of authorities, the panchayat authorities were forced to entrust the balance works to another contractor. He managed to finish the roofing of rest of the houses. Altogether the building process continued for long four years and at the end beneficiaries decided to occupy their unfinished houses. Now their houses can be said to be in liveable conditions even though they do not have any front and back doors and essential needs. Also these houses do not have electric connection which, the beneficiaries had in their old houses. These new houses are also without sanitation and drainage facilities, the basic amenities which they had earlier.

Case study 7

Criteria for selection: This case study is a good example for the

- *Mismatch in the perceptions of government and beneficiary household*
- *Poor significance given to socio- cultural factors in housing; problems due to lack of proper guidance and improper utilisation of resources.*
- *Technological un-sustainability of housing scheme; CEEF technology not reaching to the needy.*
- *Economic un-sustainability of housing programmes; difficulties in the feasibility of affordable housing finance.*
- *Poor infrastructure facilities.*

Identification Number 30 - The head of this household is an old lady. She is living together with the families of her two sons and daughter. The household size is ten including four children. Even though there are three earning members in that family, their financial situation is not that better. She took a housing loan for Rs. 70,000 (€1400) in the year 2002 from Kerala state housing board (KSHB) for the construction of her house, but could not pay any of the instalments other than the first. Considering their poor financial situation, KSHB had exempted them from the penalty. Even with these concessions, they find it very difficult to repay the money. She has already invested an amount of Rs. 225,000 (€ 4500) for the construction of her house by spending all their savings. Even after all this investment, the housing situation is also not that good. They are living in that house for the last three years. But till now the house is not completely finished. It is only the structure of a three bed room house having an area not less than seventy square metres. They are not even having the facility of a bath room. Also they do not have any drinking water facility and depend on the public water tap at a distance of about 200 m from their house. Location of the house is also not that satisfactory as they need to walk a distance not less than one kilometre for getting the public transport facility.

4.2.4 Conclusions from the field research

Table 4.2 summarizes the outcomes of the field research.

Table 4.2 Field research observations and relation to different aspects of sustainability

Sustainability aspects	One Lakh Housing Scheme (OLHS)	Indira Awaas Yojana (IAY)	Total Housing Scheme (THS)	References for remarks
Socio – cultural factors	**Twin houses (Flexibility);** All inhabitants were dissatisfied in the twin house arrangement of houses due to privacy problems and other reasons. The common wall in the middle separating two houses is not extended up to the ceiling. So the privacy of the households was very much affected by the noises from the neighbouring house as well as smoke and smell during cooking. They even need the consent from their neighbours for renovating the houses. **Less space to accommodate the household (Adaptability).** There was no enough space for the household members to sleep, children to study and to make prayer. **Increasing self dependency**	No community involvement Poor integration of amenities and services	Poor integration of amenities and services No community involvement	Case study-1 Case study-2 Case study-4 Case study-7
Economic factors	Poor concern on the basic shelter needs	**Financial assistance not sufficient**: All of the household were strongly arguing for increasing the assistance. Improper utilisation of resources	**Financial assistance not sufficient** Inaccessibility to resources including easy finance	Case study-3 Case study-4 Case study-7
Technological factors	**Poor quality** of materials, especially wood used for doors, windows and roofing	**Feasibility of technological innovations** Even though IAY has guide lines to utilise locally available materials and technology, the beneficiary household are not having any know how or getting any assistance for using this.	Lack of proper guidance **Inaccessibility** to affordable technological options	Case study-2 Case study-4 Case study-6 Case study-5 Case study-7
Environmental factors	**Poor sanitation** and drainage facilities	**Poor sanitation** and drainage facilities Improper land management	**Poor sanitation** and drainage facilities	Case study-2 Case study-4 Case study-7
Interviewer's remarks	**Poor Housing conditions**: Most of the houses were overcrowded with more than one potential family. These houses were not able to satisfy their minimum shelter needs like sleeping space, cooking space and even a comfortable moving area and were in unliveable conditions. Cracks developing in the common central wall are a major problem that could be noticed in almost all the houses. Also the building materials used for the houses, especially the wood used for the doors, windows and roof trusses were in severe deteriorating stages. **Sanitation and Drainage**: All the colonies were having very bad sanitation facilities with unhygienic latrines and toilets. No facility was provided for the drainage and waste management.	**Financial assistance**: Since the financial assistance from this scheme was not sufficient for completing the houses, the beneficiaries were compelled to take some external loans from private banks or individuals even though they need to pay high interests in return. Some of the interviewed families were in heavy debt traps due to this. **The sanitary latrine and smokeless Chula** is the integral parts of IAY. But due to the lack of sufficient funding, most of the interviewed households were not able to construct these. **Technical assistance and general awareness:** Inaccessibility to innovative technological options was major problem among the households. The local masons can easily influence the poor beneficiaries. Since the beneficiaries are not having any proper idea regarding the area of the house, the materials required and also the total cost; there are chances of misguidance and failure of programme. **Minimum land ownership criteria of** IAY is a barrier to the poor landless households **Poor sanitation and toilets** – Beneficiaries are only giving secondary importance to these facilities and looking for further support from the government.		

4.3 Analysis III (From the perspective of households)

This section presents an evaluation of the different aspects of sustainable-affordable housing in the selected housing schemes from the perspective of the households. The information collected from the household surveys is evaluated with the help of the Statistical Package for Social Sciences (SPSS). SPSS is a software package used for conducting statistical analysis, manipulating data, and generating tables and graphs that summarize data. SPSS-Version XII is used in this analysis.

This analysis helps in comparing the sustainability aspects of selected housing schemes, their interrelations (Fig. 2.3), and in identifying those factors which contribute to the development of sustainable-affordable housing. The scheme of analysis presented in Appendix II has been employed for comparing the sustainability of selected housing programmes, based on different criteria as specified by the conceptual framework. This analysis has been carried out to achieve the following objectives.

1. To compare different aspects of sustainability between the schemes.
2. To assess the correlation between different sustainability aspects.
3. To compare the total sustainability among the selected schemes.

4.3.1 Comparison of different aspects of sustainability between the schemes

The T-test used in this analysis helps to compare different aspects of sustainability on the corresponding housing schemes. The T-value for each aspect is calculated as the ratio of the difference between the corresponding means of two selected schemes to the square root of the sum of the variance of the two groups. When the T-value is larger than the critical value, the result is considered to be significant. A level of 5% significance is adopted for this analysis to ensure a chance of 95% on the reliability of the results.

The T-test can compare only two housing schemes at a time. Since we have three schemes, the comparison has been done through three stages. Tables 4.3, 4.4 and 4.5 present the significance of different aspects of sustainability between OLHS and IAY, OLHS and THS, IAY and THS, respectively.

Between OLHS and IAY, a significant variation (Fig. 4.4 and Fig. 4.2) can be seen only in the aspects of economic sustainability ($2.439>1.701$, significance $0.021<0.05$) and environmental sustainability ($2.350>1.753$, significance $0.034<0.05$). The accessibility of the households to their basic shelter needs very much depends on the economic sustainability of that particular housing scheme. The case studies of IAY households (case study No.4) point towards the economic un-sustainability of this scheme. Even after availing the so-called facilitative environment from the Government and owing an

additional financial burden, the households were not able to satisfy their basic shelter needs. However, in the case of OLHS the beneficiary households were able to meet these basic needs as the houses were provided by the government for free of cost. The provider approach of OLHS helped in ensuring the minimum basic infrastructure facilities to the households. These can be counted as the reasons for the significant variations in economic as well as environmental sustainability for both these schemes. However the other two aspects of sustainability, namely socio-cultural sustainability and technological sustainability (Fig. 4.4 and Fig. 4.6), do not show much variation between these two schemes.

Table 4.4 Significance of different aspects of sustainability between OLHS and THS

Sustainability aspects	**T value**	**Critical value of T**	**Significance of 'T' value between the schemes (5% level is indicated by a value less than 0.05)**
Socio-cultural sustainability (SCS)	1.631	1.684	0.110
Economic sustainability (ECS)	0.052	1.684	0.959
Technological sustainability (TCS)	0.368	1.684	0.715
Environmental sustainability (ENVS)	3.485	1.684	0.001
Total Sustainability	0.650	1.684	0.519

Table 4.4 shows the results of the T-test for comparing the different sustainability aspects between OLHS and THS. Only the values for environmental sustainability ($3.485>1.684$, significance $0.034<0.05$) showed a significant variation between these two schemes.

Table 4.5 Significance of different aspects of sustainability between IAY and THS

Sustainability aspects	**T value**	**Critical value of T**	**Significance of 'T' value between the schemes (5% level is indicated by a value less than 0.05)**
Socio-cultural sustainability (SCS)	1.461	1.697	0.153
Economic sustainability (ECS)	2.168	1.697	0.037
Technological sustainability (TCS)	0.335	1.697	0.740
Environmental sustainability (ENVS)	0.179	1.697	0.859
Total Sustainability	0.707	1.697	0.484

Comparison of sustainability aspects between IAY and THS show significant variation only in the case of economic sustainability (Table 4.5). The case study (No. 6) of households from Sivodayam colony (THS) is somewhat similar to the case of OLHS households with regard to the aspect of economic sustainability. The variation of different aspects of sustainability between the schemes is also clear from Fig. 4.1 to Fig. 4.4.

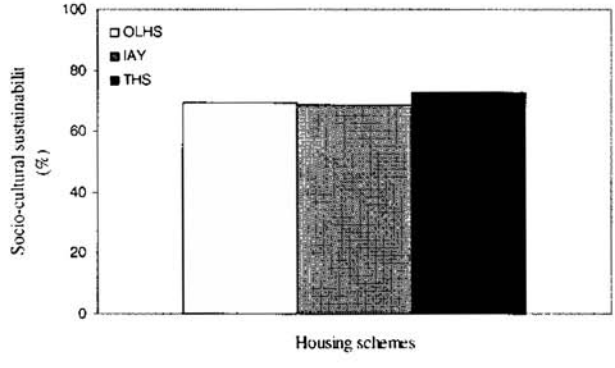

Figure 4.1 Socio-cultural sustainability

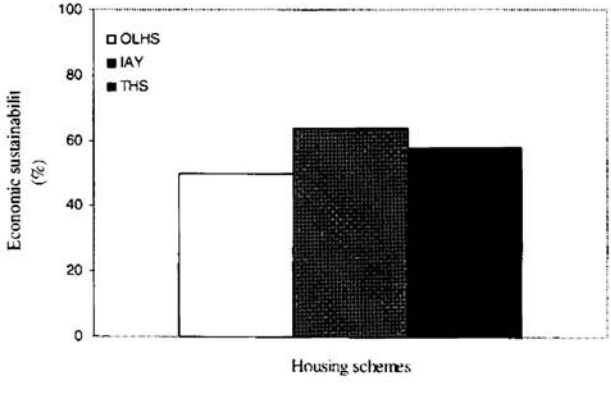

Figure 4.2 Economic sustainability

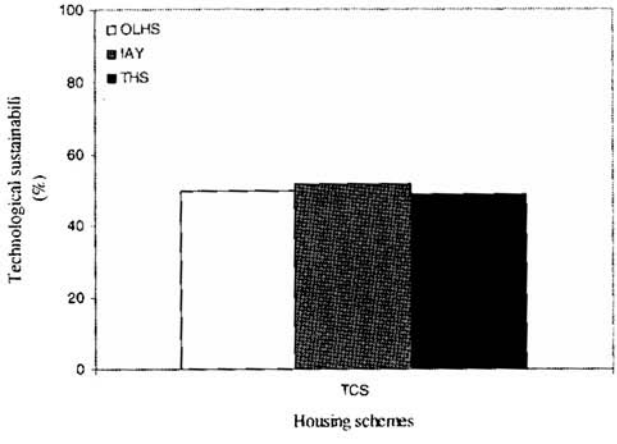

Figure 4.3 Technological sustainability

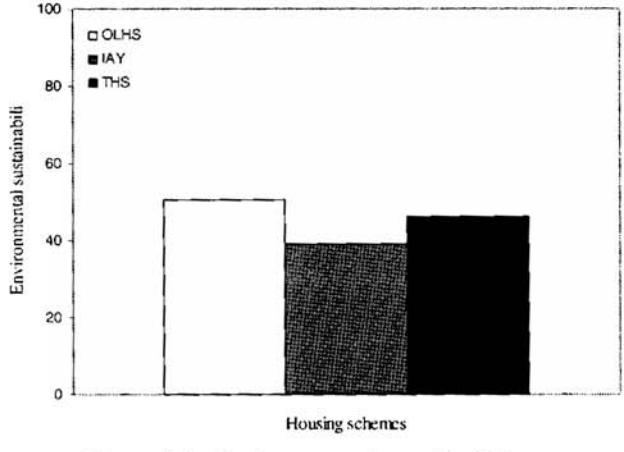

Figure 4.4 Environmental sustainability

A significant variation can be seen only in the case of environmental sustainability and economic sustainability (Fig. 4.4 and Fig. 4.2) between the selected schemes. However, the other two aspects of sustainability, socio-cultural sustainability and technological sustainability do not show much variation between the schemes (Fig. 4.1 and Fig. 4.3).

4.3.2 Correlation between different aspects of sustainability within the schemes

According to the concepts of sustainable-affordable housing (Fig. 2.3, Chapter 2), all the four aspects of sustainability should be correlated to each other. The strength of the

correlation between the aspects is considered as an important factor on the sustainability of housing schemes.

A correlation analysis has been performed to quantify the strength of association between the different aspects of sustainability. The Pearson's correlation (r) is used to find the degree of linear relationship between two variables. It can have a value anywhere between -1 and 1. The value for r = 0.00 (no correlation) implies that there is no relationship between the two variables and ±1.00 indicates strong correlation. The larger the absolute value of r, the association (positive or negative) between the variables is considered as stronger. Generally, correlation above 0.80 is considered high. Different colours are used here to indicate the strength of correlation between variables. The interrelation between different aspects of sustainability within each scheme can be assessed from this analysis.

Table 4.6 Significance of correlation between different aspects of sustainability within OLHS

Aspects of sustainability	Socio-cultural sustainability SCS		Economic Sustainability ECS		Technological Sustainability TCS		Environmental sustainability ENVS		Total sustainability	
	r	s	r	s	r	s	r	s	r	s
SCS			0.524	0.026	0.197	0.433	0.476	0.046	0.652	0.003
ECS	0.524	0.026			0.646	0.044	0.658	0.003	0.923	0.000
TCS	0.197	0.433	0.646	0.004		-	0.557	0.016	0.759	0.000
ENVS	0.476	0.046	0.658	0.003	0.557	0.016		-	0.835	0.000
Total sustainability	0.652	0.003	0.923	0.000	0.759	0.000	0.835	0.000		

'r' refers to Pearson's correlation and 's' refers to significance.

■ Strong correlation, r value above 0.80, ■ Good correlation, r value between 0.6 and 0.80,

□ Poor correlation, r value less than 0.60

It can be seen that the total sustainability of the One Lakh housing scheme has rather higher significance to economic and environmental aspects than the other two aspects. This can be attributed to the provider approach of this scheme in ensuring the minimum housing needs (through free houses) and basic infrastructure facilities. However the

socio-cultural sustainability has the lowest correlation to the total sustainability (significance-0.003 and r-0.652) of this scheme. This indicates the low acceptability of this housing programme (with regard to socio-cultural aspects) among the users. The case studies (No.1 and 2) of households from Vettuvila and Neeravil housing colony are examples to explain this. The stigmatization of OLHS houses in the first case and factors like increased dependency to government support and less adaptability of the type design in the second case has contributed in the lowest significance of socio-cultural sustainability in the total sustainability of this scheme.

Relation between the sustainability aspects within OLHS

- The poor correlation of socio-cultural sustainability with economic sustainability (significance-0.026, r-0.524) and environmental sustainability (significance-0.046, r-0.476) gives an indication of the poor living conditions of the households and lack of basic infrastructure facilities (a criterion for environmental sustainability). Different case studies of OLHS support these findings.
- Economic sustainability of One Lakh housing scheme has significant correlation to technologic sustainability (significance-0.044, r-0.646) and environmental sustainability (significance- 0.003, r-0.658). The insignificant correlation between technologic sustainability and socio-cultural sustainability (significance-0.433, r-0.197) indicates the poor involvement of households in the building process and the significant correlation between technologic and economic sustainability indicates the role of the affordability of the household in maintaining the sustainability of building process.

Indira Awaas Yojana (IAY)

Table 4.7 gives the significance of correlation between different aspects of sustainability within IAY. The socio-cultural sustainability of this scheme has only very little significance in the total sustainability indicating the poor acceptance of this scheme. Similar to OLHS, economic sustainability is the most influential aspect in this scheme. In IAY also there is no correlation between technologic sustainability and socio-cultural sustainability.

Relation between the sustainability aspects within IAY

- Socio-cultural sustainability is only related to environmental sustainability. The significant correlation of socio-cultural sustainability with environmental sustainability (significance-0.010 and r-0.708) indicates fulfilment of the basic infrastructure facilities. Also the poor correlation of environmental sustainability and economic sustainability (significance - 0.042 and r - 0.592) indicates the role of the economic capacity of the households in providing the basic infrastructure. At

the same time there is no correlation between socio-cultural sustainability and economic sustainability (significance-0.142 and r-0.661). This shows the poor affordability of the housing schemes especially in providing the basic shelter needs.

- Economic sustainability of this scheme has correlations to all the other aspects of sustainability except socio-cultural sustainability. The case study (No. 4) of households from Murundal is an example to this and indicates the failure of enabling strategies in this scheme. This also shows the dominant role of the affordability of households in providing basic housing facilities over the policy initiatives. The insignificant correlation between the socio-cultural factors and technology (significance-0.457 and r-0.238) reveals the lesser feasibility and awareness of the households on innovative technological options. Hence the correlation between economic sustainability and technologic sustainability (significance-0.001 and r-0.845) indicates the dependence of technological sustainability on the purchasing power of the households.

Table 4.7 Significance of correlation between different aspects of sustainability within IAY

Aspects of Sustainability	Socio-cultural sustainability SCS		Economic Sustainability ECS		Technological Sustainability TCS		Environmental sustainability ENVS		Total sustainability	
	r	s	r	s	r	s	r	s	r	s
SCS		-	0.142	0.661	0.238	0.457	0.708	0.010	0.544	0.067
ECS	0.142	0.661		-	0.845	0.001	0.592	0.042	0.880	0.000
TCS	0.238	0.457	0.845	0.001		-	0.532	0.075	0.871	0.000
ENVS	0.708	0.010	0.592	0.042	0.532	0.075		-	0.854	0.000
Total sustainability	0.544	0.067	0.880	0.000	0.871	0.000	0.854	0.000		-

Total Housing scheme (THS)

In THS, all the sustainability aspects except technological sustainability have significant influence on the total sustainability. Their strength varies in the order of ECS >ENVS >SCS>TCS. Unlike the other schemes, socio-cultural sustainability has a better significance (r -0.728) in the total sustainability of THS. This can be explained by the comparatively better acceptance of Total Housing Scheme compared to the other schemes. Case study (No. 7) of THS household reveals the difficulties of the household in accessing finance, feasible technological options and problems due to the lack of

proper guidance. These factors lead to the lack of correlation between different aspects of sustainability and also to the un-sustainability of this scheme.

Relation between the sustainability aspects within THS

- The poor correlation of socio-cultural sustainability with environmental sustainability (significance-0.094, r-0.448) and economic sustainability (significance-0.125 and r-0.414) indicates the lack of the basic infrastructure facilities poor affordability of this housing scheme. The insignificant correlation of environmental sustainability with economic sustainability (significance-0.075, r-0.473) also shows the importance of the affordability of the households in providing the basic shelter needs. Case study (No. 7) of THS household is an example for the economic un-sustainability of this scheme and explains the insignificance of socio-cultural sustainability with economic sustainability.
- The insignificance of correlation between technological sustainability with socio-cultural sustainability (significance-0.275, r-0.301) reveals the lesser feasibility and awareness of the households on innovative technological options and proves the lesser affordability of technological options. The insignificant correlation of technological sustainability with environmental sustainability indicates limited utilization of environmentally friendly technology in the building process of THS.

Table 4.8 Significance of correlation between different aspects of sustainability within THS

Aspects of sustainability	Socio-cultural sustainability SCS		Economic Sustainability ECS		Technological Sustainability TCS		Environmental sustainability ENVS		Total sustainability	
	r	s	r	s	r	s	r	s	r	s
SCS			0.414	0.125	0.301	0.275	0.448	0.094	0.728	0.002
ECS	0.414	0.125			0.247	0.374	0.473	0.075	0.843	0.000
TCS	0.301	0.275	0.247	0.374			0.243	0.383	0.501	0.057
ENVS	0.448	0.094	0.473	0.075	0.243	0.383			0.750	0.001
Total sustainability	0.728	0.002	0.843	0.000	0.501	0.057	0.750	0.001		

4.3.3 Correlation between different aspects of sustainability between the schemes

Table 4.9 shows the significance of correlations between different sustainability aspects between the selected schemes.

Table 4.9 Significance of correlation between different aspects of sustainability between the schemes

Aspects of Sustainability	Socio-cultural sustainability SCS		Economic Sustainability ECS		Technological Sustainability TCS		Environmental sustainability ENVS		Total sustainability	
	r	s	r	s	r	s	r	s	r	s
SCS			0.320	0.032	0.201	0.187	0.505	0.000	0.620	0.000
ECS	0.320	0.032			0.596	0.000	0.354	0.017	0.832	0.000
TCS	0.201	0.187	0.596	0.000			0.396	0.007	0.747	0.000
ENVS	0.505	0.000	0.354	0.017	0.396	0.007			0.737	0.000
Total sustainability	0.620	0.000	0.832	0.000	0.747	0.000	0.737	0.000		

Among the different aspects, socio-cultural sustainability has the lowest and economic sustainability has the strongest significance in the total sustainability of these schemes. The influence of different aspects of sustainability on total sustainability varies in the order of ECS > TCS > ENVS > SCS.

Relation between the sustainability aspects between the schemes

- The insignificance in correlation of socio-cultural sustainability with environmental sustainability (significance-0.000 and r-0.505) gives an indication of the insufficient basic infrastructure facilities.
- Socio-cultural sustainability has correlations to all the other aspects of sustainability (though not strong) except technological sustainability. Case study of IAY households (No. 4) and THS households could be suggested as examples to explain this. However, all other aspects are significantly correlated to one another. The insignificance of this correlation between the socio-cultural factors and technology (significance-0.187 and r-0.201) reveals the lesser feasibility and unawareness of the households on innovative technological options. At the same time, there is a significant correlation between economic sustainability and technologic sustainability (significance-0.000 and r-0.596). This indicates the influence of the economic capacity of the households over the policy initiatives in accessing different technological options.
- The highest significance of economic sustainability and least significance of socio-cultural sustainability in the total sustainability of these schemes also verify the excessive dependence of housing schemes on the affordability of the household.

4.3.4 *Comparison of total sustainability among the schemes.*

The total sustainability of different schemes is calculated as the sum of the four aspects of sustainability and their mean values are taken for comparison. A comparison of the results of A I, A II (refer section 3.3.2) and A III can be seen in fig. 4.5. The total sustainability values of the schemes from the viewpoints of governments (AI, represented by white columns in the figure) show a clear upward trend towards the concept of sustainable-affordable housing.

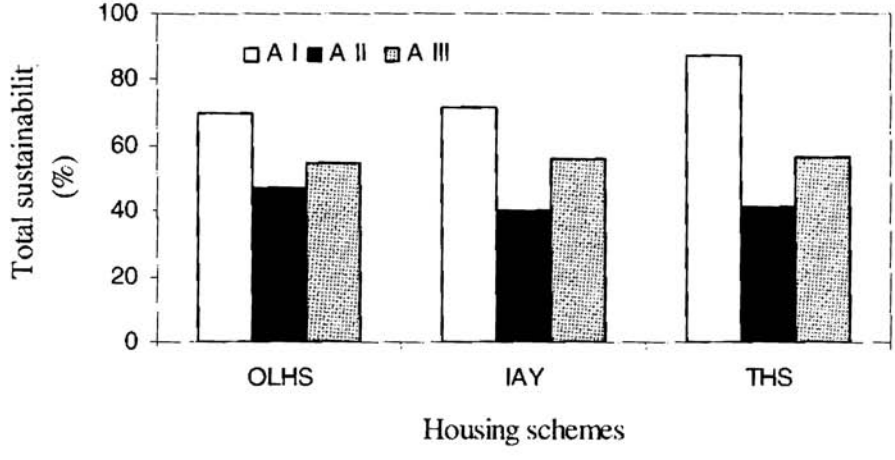

Figure 4.5 Comparison of total sustainability in One Lakh Housing Scheme (OLHS), Indira Awas Yojana (IAY) and Total Housing Scheme (THS) from the perspective of government (AI), perspective of an observer (AII) and from the perspectives of the households (AIII)

However, the evaluation based on the observer's perspective (AII, represented by black columns in the figure) and the beneficiaries' viewpoint (AIII, represented by grey columns in the figure), present nearly invariant results, and very different as compared to the perspective of the government, with much lower values of sustainability and also with only small variations between the three schemes.

4.3.5 *Conclusions from the statistical analysis*

The evaluation of public housing schemes in Kerala points towards the failure of implementation strategies, because of the lack of integration of the four main aspects of sustainable-affordable housing, namely socio-cultural, economic, technological, and environment factors. The SPSS analysis of the selected schemes leads to the following conclusions:

- The socio-cultural sustainability of housing programmes always showed an insignificant role in the total sustainability. This indicates the poor acceptance of these housing programmes among the users.
- The economic factors of housing schemes in all the cases had a vital role in the total sustainability of the schemes than compared to other aspects. This shows the importance of both the affordability of the household as well as the housing schemes in sustainable housing development.
- The evaluation of different housing programmes reveals the excessive dependence of the sustainability of housing programmes on the economic status of the households (to afford and maintain the houses) over the policy initiatives of the government. This confirms the failure of enabling strategies and shows the poor correlation between socio-cultural factors and economic factors in housing.
- The low correlation between socio-cultural sustainability and technological sustainability in the selected housing schemes verifies the un-sustainability of the present building process in Kerala. It points towards the ignorance of the households on the building process, the proper utilization of resources, and their difficulties in accessing innovative technology.
- The comparatively lower significant role of technological factors in the total sustainability of schemes reveals the failure of innovative technological options in making housing affordable.
- The technological sustainability in all the cases had a strong correlation with economic sustainability. This indicates the importance of the affordability of technological options.

4.4 Examples of housing programmes from other countries

This section presents three examples of enabling strategies taken from the Global Best Practise data base of the United Nations Center for Human Settlements. This comparative perspective of housing strategies is helpful in evaluating the case studies and in formulating effective implementation strategies. However, affordable housing solutions should be based on region-specific approaches and requirements, these strategies cannot be replicated as such.

4.4.1 The People's Housing Process (PHP), South Africa (Department of Housing, South Africa, 2003, 2004, 2005)

The People's Housing Process (PHP) in South Africa has been initiated to assist people who are poor and homeless or inadequately housed. The rationale for the policy is based on a growing awareness that the majority of homes within South Africa, as well as in other developing countries, were built by the people themselves. On this basis, the

government concluded that the activities of people in housing themselves deserve formal recognition and concrete support from the state. The objective of the project is to develop support mechanisms for building capacity at all levels to enable people to address their own housing needs. The policy aims to support the poorest of the poor families who usually only have access to housing subsidies and who wish to enhance their subsidies by building or organizing the building of their homes themselves. Usually these families cannot access credit or accumulate significant savings to enhance their subsidies. The People's Housing Process supports the creation of Support Organizations to secure subsidies, to provide land to build, to provide technical, financial, logistical and administrative support to the beneficiaries (envisaged through Housing Support Centres). The People's Housing Partnership Trust (PHPT) is established by the South African government to support the People's Housing Process through capacity building and engaging with national, provincial and local governments, and civil society. Since its inception, PHPT has been able to train people in construction skills, housing design and safety; to train community facilitators; and to establish project implementation systems and housing support centres. At national government level a joint United Nations Development Programme (UNDP) and United Nations Centre for Human Settlements (UNCHS) project assists the People's Housing Partnership Trust which is to drive the support programme to the Support Organizations.

Examples from People's Housing Process

Cape Town PHP (UNCHS, 2004)

The Development Action Group's (DAG's) People's Housing Process consisted of three housing consolidation projects formed by the communities living in these areas. The projects: Masithembane, Homeless and Squatters Housing Project (HOSHOP) and Sinako Ukuzenzele were initiated in 1997 and implemented in 1999-2002. DAG provided technical advice and support to community organizations and training to community members. Partnerships between the People's Housing Partnership Trust (PHPT), the Western Cape Provincial Housing Development Board, and the Tygerberg Administration within the City of Cape Town together with the community-based organizations were the key to successful implementation of the projects. A total of 638 houses were built and occupants took part in training and capacity building workshops. Over seventy people were employed as builders in the projects and another twelve people were employed in the three housing support centers. Material suppliers in the low cost housing market have subsequently employed community members who worked in the support centers. Approximately twenty people (Housing support centre staff and committee members) received ten days training on the management of housing projects followed by ten days of practical construction training. In addition, ten builders

in the HOSHOP project and thirty builders in the Masithembane project received in-depth on-site construction skills training over a period of a few months.

According to UNCHS report, this program fully meets the basic criteria of impact, partnership and sustainability as well as the additional considerations of leadership and community empowerment, gender equality and social inclusion, and innovation within local context and transferability.

Thabong PHP (Stewart et al., 1999)

The New Housing Company was responsible for the implementation of the project. They came into agreement with other stakeholders such as (i) the Provincial Housing Board (PHB) for the funding, (ii) a firm of quantity surveyors, for verifying the delivery of materials and administering the accounts, (iii) a material supplier for on-site delivery of materials, (iv) a community representative committee (steering committee) for the interaction with the beneficiaries, (v) the Basic Employment Skills Training (BEST) project for the rendering of technical advice and (vi) each beneficiary as the private client for the completion of application forms and the placing of orders. A steering committee was also established and had community representation from political parties, community organizations, churches, businesses, women and youth organizations, and the health and education fraternity. Regular meetings were held with the steering committee to report on the progress made. This was also the forum where minor practical, political and administrative problems were discussed and usually resolved.

According to Stewart et al. (1999), the diversity of design and assumed quality of life as opposed to the monotony and uninviting lifestyle projected by mass housing projects, stand out as a key feature of Thabong people's housing process. Table 4.10 gives a quick review of the different strategies adopted in the People's Housing Process of South Africa for sustainable housing development.

Table 4.10 Sustainability Analysis: People's Housing Process (PHP), South Africa

Sustainability Aspects	Strategies
Socio-cultural Factors Adaptability	Beneficiaries were given freedom of choice for their houses from a list of housing packages to suit their requirements (e.g.: Thabong PHP)
Equality	The diversity of design as opposed to the common feature of mass housing projects was a positive factor in Thabong PHP
Beneficiary participation	People built houses for themselves
Community participation	The People's Housing Partnership Trust (PHPT) established by the South African government supported the People's Housing Process through capacity building and engaging with national, provincial and local governments, and civil society.
Integration of amenities	No specific information on this criteria
Economic factors **Pre-requisites**	Housing support organizations are meant to ensure: securing housing subsidies for the families Facilitating the acquisition of land on the basis of secure tenure; and Providing technical, financial, logistical and administrative support regarding the building of their homes.
Affordability	This policy aims in supporting the poorest of the poor families who usually only have access to housing subsidies and who wish to enhance their subsidies by building or organizing the building of their homes by themselves. The People's Housing Partnership Trust (PHPT) supported the People's Housing Process through capacity building by training people in construction skills, housing design and safety etc.
Shelter needs	No specific information on this criteria
Technological Factors	Technical support was ensured and innovative technology was made feasible with the help of support organizations
Environmental Factors	No specific information on this criteria

4.4.2 The Grameen Bank (GB) low-cost housing programme, Bangladesh (Ahmed, 1998)

The Grameen Bank concept was originated in 1976 on recognizing that it is poor people's lack of access to capital rather than their capacity to repay that perpetuates their poverty. This project started with the provision of credit facilities to the rural poor without formal collateral, with the intension of creating a stable income through income generating activities and protecting them from the exploitation of money lenders. The basic concept is to form groups of five members and loans disbursed through peer guarantee. The formation of the groups - the key unit in this credit programme - is the

first necessary step to receive credit. Loans are initially made to two individuals in the group, who are then under pressure from the rest of the members to repay in good time. If the borrowers default, the other members of the group may forfeit their chance of a loan. The loan repayment is in weekly installments spread over a year and simple interest of 20% is charged once at the year end. The collateral system of peer support means that families help each other out with payments if necessary to ensure that all repayments are made on time. This project was quite effective in terms of loan recovery, proved successful and was institutionalized as the Grameen Bank in 1983.

The Bank extended its support to house-building in 1984, by acknowledging that the diminishing supply of building materials, their spiraling prices, and the beneficiaries' inability in raising the substantially high capital for housing as the main stumbling blocks of the poor in housing themselves. The house loans are available only to existing Grameen Bank borrowers who have a hundred per cent repayment record and who have completely repaid their first two loans for income generation activities. The loans have to be repaid over a period of five years in weekly installments with an interest rate of eight percent. Together with the housing loans, each borrower receives also some pre-cast building components. The structural system is based on a standard module, and the pre-cast building materials are mass produced off-site and made available to the self-helpers at low prices.

The Grameen Bank has developed two standard house designs. However, the houses vary in appearance throughout the country even though they have the same basic structural components. There are four reinforced concrete pillars on brick foundations at the corners of the house and six intermediary bamboo or concrete posts, with bamboo tie beams, wooden rafters and purlins supporting corrugated iron roofing sheets. This provides stability in the flood and strong monsoon wind, and protection from the heavy rain during the monsoon season. In cases of severe flooding the house can be dismantled and the components stored and reassembled later. A sanitary latrine is also proposed with each house. Families can build the houses themselves, with the help of friends and neighbours. Local skilled carpenters carry out the roof construction for many families. Loans are also available to purchase homestead land for landless households.

Table 4.11 presents an overview of the strategies adopted in Grameen Bank Housing Programme with respect to different aspects of sustainable-affordable housing.

Table 4.11 Sustainability Analysis: Grameen Bank Low-Cost Housing Programme, Bangladesh

Sustainability Aspects	Strategies
Socio-cultural Factors Adaptability Equality	The Grameen Bank has developed two standard house designs. But the houses varied in appearance throughout the country even though they have the same basic structural components
Beneficiary participation	Families built houses themselves with the help of friends and neighbours.
Community participation	Community participation was ensured through group lending approach and mutual help
Integration of amenities	No specific information on this criteria
Economic factors **Pre-requisites**	Loans were made available to purchase homestead land for landless households. Provided credit facilities to the rural poor without formal collateral with the intension of creating a stable income through income generating activities and protecting them from the exploitation of money lenders.
Affordability	The housing loans were available only to existing Grameen Bank borrowers who have a 100 per cent repayment record and have completely repaid their first two loans for income generation activities.
Shelter needs	No specific information on this criteria
Technological Factors	Pre-cast building materials were mass produced off site and made available to the self-helpers at low prices.
Environmental Factors	No specific information on this criteria

4.4.3 Million Houses Programme (MHP), Sri Lanka (Lankatilleke, 1986)

In 1985 the Government of Sri Lanka launched the Million Houses Programme, the objective of which was to provide basic shelter for the entire population by 1989. Through this programme, the Government changed their role to an enabler in housing development and encouraged low income households in both urban and rural areas to build their houses and settlements by providing assistance to resolve land tenure problems, to obtain housing loans at low interest rates and to provide basic environmental services such as water, sanitation, access to roads, electricity and community centres. A variety of loan packages were made available depending on the needs of the household and their ability to make repayments.

The National Housing Development Authority (NHDA) was responsible for the implementation of both urban and rural sub-programmes. The approach was evidently characterized by community participation through enabling strategies. The Community Action Plan and Management approach (CAP) sees people as the main resource for development rather than as an object of the development efforts or as mere recipients of benefits. The role of the Government through the National Housing Development

Authority and the Urban Local Authorities is to support this process whenever necessary. A Community Development Council (CDC) had to be established in the beginning with the involvement of urban and rural low-income settlements. These councils are considered to have a central role in the community action planning approach. They were supposed to act as intermediaries between the population of low-income settlements and the external agencies, articulating the needs and the problems felt by residents to the external organizations, taking decisions, formulating plans, executing projects and monitoring the implementation of a multitude of undertakings. Technical and financial assistance were given by the UNICEF under its Urban Basic Services Program (UBSP) through the CMC and the NHDA. United State Agency for Intentional Development (USAID) supported the NHDA for housing loan program.

Table 4.12 Sustainability Analysis: Million Houses Programme, Sri Lanka

Sustainability Aspects	Strategies
Socio-cultural Factors Adaptability	No specific information on this criteria
Equality	No specific information on this criteria
Beneficiary participation	People built their own houses.
Community participation	A Community Development Council (CDC) was established with the involvement of urban and rural low-income settlements. These councils were supposed to act as intermediaries between the population of low-income settlements and the external agencies, articulating the needs and the problems felt by residents to the external organizations, taking decisions, formulating plans, executing projects and monitoring the implementation of a multitude of undertakings.
Integration of amenities	Social infrastructure was identified through issue specific workshops and provided solutions
Economic factors Pre-requisites	A variety of loan packages were made available depending on the needs of the household and their ability to make repayments
Affordability	No specific information on this criteria
Shelter needs	No specific information on this criteria
Technological Factors	Technical assistance was provided in the building process
Environmental Factors	Basic infrastructure facilities were ensured.

The CAP method consists of a structured series of workshops organized for community members who have expressed interests in improving their shanty settlement. At such workshops, community members interact as partners with the staff of the National Housing Development Authority, the local authority and the non-governmental organizations. They discuss the problems of the community, identify solutions and

formulate plans of action. The community takes responsibility for implementing these action plans in collaboration with the NHDA and other organizations, and for maintaining and managing the built environment after the completion of the project. Normally, an initial two-day workshop is held at a community centre within the settlement, for (about 30) representatives of the community, to identify their socio-economic and physical issues and plan strategies to tackle. These were followed by a variety of one or half-day issue-specific workshops, depending upon the needs of the community and the stage of implementation. Examples of issue-specific workshops are planning principles and technical guidelines, community building guidelines and rules orientation to housing information services. According to Lankatilleke (1986), official from National Housing Development Authority, the experience of two years of implementation of the MHP, clearly demonstrated that it is a generative process; generative in the form of strategy development, planning techniques, operation, consciousness raising and most importantly in learning. The self-realization of the potentials inherent in the actors leads to a great degree of satisfaction and also to self-confidence. According to UNCHS (1996), Sri Lanka's Million Houses Programme represents one of the best urban examples of action planning to date. Table 4.12 gives the list of strategies adopted in this scheme.

The Million Houses Programme of Sri Lanka with the CAP method resembles the People's planning campaign of Kerala and could act as an effective tool in ensuring the basic infrastructure facilities, accessing resources or prerequisites for sustainable housing through community participation. People's housing process (South Africa) and Grameen Bank housing scheme (Bangladesh) are good examples in enabling strategies.

4.5 Discussions and Evaluation

The evaluation of the public housing schemes in Kerala reveals a totally different side of the housing situation of the state than projected by the official documents. It proves that the real situation cannot be evaluated based on numerical data alone. Instead, it also requires the viewpoint of beneficiaries. The succeeding text gives a discussion of these outcomes based on the different aspects of sustainable-affordable housing.

4.5.1 Socio-cultural sustainability (SCS)

The case studies of different households conclude the following shortcomings as the primary failure of housing programmes in terms of socio-cultural sustainability in housing.

- Lack of flexibility or little adaptability of OLHS houses to the future requirements

- Increased dependency of households on Government support.
- Poor involvement of OLHS beneficiaries in the building process.
- Poor involvement of the community in the building process of IAY and THS.
- Poor integration of amenities and services for IAY and THS.

Incremental transformations and extensions can improve the original housing facilities and make it adaptable to the changing needs of households. However, the case studies of OLHS reveal that only very few of the households were able to make their homes adaptable through transformations and extensions. Others found the houses unsuitable to their present needs mainly because of the peculiar design of the twin houses. The willingness of people to invest their energy, initiative and their savings or other material resources depends on the satisfaction they experience or expect as a result (Turner, 1976; Tipple, 1996). According to the latter the quality and the transformations on the houses in the course of time reflect the attitude of the inhabitants towards their houses. Also the maintenance of existing housing areas and their continued improvement over time through local initiatives can enhance long-term social relationships, which are essential for socio-cultural sustainability of housing development.

The ownership of houses under one lakh housing scheme was conferred to the households purely as a gift from the government. Beneficiary involvement was meagre or rather nil in the housing process and has had to accustom to the facilities given. It seems that this provider approach could only diminish their self-reliance and they became more dependent on public support. Along with this, the type design of OLHS houses was turned out as a sign of their identity stigmatizing the inhabitants as belonging to lower income category. The mass housing feature of this scheme also contributed to the segregation of a specific group of people into a particular locality or colony. The majority of the interviewed households were oppressed by this and had a feeling of being inferior to others in society. The case study of the household (case study No.1) from Vettuvila OLHS is a typical example of this stigmatisation. With the same reason of stigmatization of OLHS, some of the IAY/THS households seemed to be more satisfied with their houses than their OLHS neighbours, even though they had a poor housing condition as compared to their neighbours. On the basis of this, the abysmal housing conditions in OLHS houses can be understood as the result of poor beneficiary involvement and the stigmatization of houses. The case study of Sivodayam colony (THS) is also an example to poor beneficiary involvement and stigmatization. On the other hand the quality of houses from the case studies of other households from THS and IAY show the importance of beneficiary involvement in the building process.

Community involvement was a major supporting factor in the case of OLHS houses. The significance of OLHS even now is mainly because of this. According to Tomkins (1999), community development is a key to unlock higher levels of mutual advantage as well as more effectively and equitably accessing state and economic resources. For the

lower income population, communal action, whether in the political, social or economic realm, permits a scale of activity impossible as individuals. This is rather true in the case of OLHS houses. But the houses constructed under THS and IAY could not gain any benefits from community involvement and were implemented only with the beneficiary involvement under partial government support. Although the underlying concept of THS was one similar to that of People's Housing Project, South Africa, the case studies from THS reveal that there was hardly any community participation in the houses constructed under this scheme, other than the Sivodayam colony case study. But even in this case, the technical agency employed for facilitating the building process became like a contractor and the houses degraded to the status of conventional contractor-built type designs. Community resources can bridge the gap but only if the community is committed to, and feels responsibility for, the programme. The community must therefore be fully involved in decision-making on programme direction and priorities and should be assigned responsibility for tasks where there is a clear connection between input effort and output benefit (UNCHS, 1988).

The provision of physical infrastructure must be seen as a prerequisite for the sustainability of human settlements and for achieving of basic human needs. This was a positive factor of OLHS since their colony was provided with motorable road, facilities like schools, worship places, hospitals and markets in the near by area. However in IAY and THS, houses were constructed by the households individually in their own plots and hence the situation was different for each of the households. Planned development is needed for the development of a locality as a good residential neighbourhood and this is an advantage of mass housing schemes.

4.5.2 Economic sustainability or Affordability (ECS)

Affordability or economic sustainability of the housing schemes in Kerala was always a deep concern among the households as well as the authorities. The case studies also support this because of the following issues.

- Poor housing conditions
- Problems connected with land ownership
- Incomplete houses
- Additional financial burden
- Insufficient housing facilities and
- Lack of access to basic resources for housing

Poor housing condition often exposes the poverty of the household and reflects their economic status. The accessibility of the households to their basic shelter needs depends on the economic sustainability of that particular housing scheme. The case studies of different households points towards the inaccessibility in achieving these basic means.

The story of IAY households (Case study No. 4) tells us their difficulties in accessing the basic resources for housing. One of the households (Identification Number 68) from this case study fully relied upon a contractor as they did not have any idea of the building process. However their neighbour's family (Identification Number 67) utilized daily labourers in skilled activities and contributed the household labour in unskilled jobs. Unfortunately, both the households were not able to finish the house in the stipulated time frame of the project due to the scarcity of materials, necessary finance and skilled masons. Thus they could not avail the full support from the scheme and ended up with an incomplete house and a financial burden. Also, in the third case, though the household could manage with the procurement of materials at higher price and arranging skilled workers to complete the building process in the time frame of the project, they now seriously face a financial crisis. The case study of THS (case study No. 7) also reveals the ignorance of the household in the building process, cost reduction techniques and above all in the proper utilization of resources. In spite of owing a big liability for housing and draining out all their assets and savings, they could not meet their basic shelter needs. Although the household built their house also considering their future requirements, it failed to serve even their primary housing needs. The accessibility to basic resources including affordable technological options and proper guidance are thus inevitable for economic sustainability and the above case studies reveal the disability of the poor in accessing this.

The affordability by a household is also based on the relationship between monthly household income and repayment of housing loans (Dewit et al., 1989). The Grameen Bank housing loan programme needs special mention in this context. The basic intention of Grameen bank programme was to create a stable income through income generating activities by the initial loans. Once this has been achieved, a long term loan for housing is provided. Also the peculiarity of this programme is its greater flexibility in accessing a variety of loans for housing according to the needs of the households. Although there are a few shortcomings in Grameen Bank housing programmes such as lack of trained technical supervision, difficulties in the transportation and installing of building components, usage of energy-intensive imported materials (corrugated iron sheets, cement) and lack of satisfactory guidelines for settlement design and planning, this housing programme shows that enabling people to build better housing for themselves through institutional intervention has potential for promising results (Ahmed, 1998). This is also evident from Thabong case study. This project was initially met with objections from beneficiaries since it was difficult to convince people that through quality building material and technical advice, they would be able to build houses that would satisfy more of their needs than with contractor built houses of typical specifications. But later it turned out to be a great success with the involvement of beneficiaries and community participation (Stewart et al., 1999). Enabling the poor to build and maintain their houses can be indeed helpful rather than providing the houses free. The case study of Sivodayam colony households also confirms this. It

shows that all the help from the government was only helping them in increasing their dependence rather than improving their self-reliance. This was also confirmed by case study (No. 2) of the household from the Neeravil OLHS. Even after long years of occupancy in that house, they still do not feel the house as their own and looking forward for further government support for minor repairs.

A study conducted by Shiferaw (1998) on the self-initiated transformations of public-provided dwellings in Addis Ababa, Ethiopia shows that the quality of the extensions to the original core houses were found depending very much on the security of tenure, their command over resources and feasibility to technological options. According to him the extensions to government-provided dwellings can turn to a valuable resource for improving the housing conditions of the low-income group only if these spontaneous and individual actions are technically, logistically and legally supported by the formal sector. The negligence of household from Neeravil OLHS colony (No. 1) to their pathetic housing condition could be either due to their increased dependence of the public support for further improvement of their house and their less accessibility to affordable building processes. It can also be due to the security of tenure since most of the households from the OLHS were not provided with the ownership documents.

The case study of OLHS households (Case study 3) from Punnapra panchayat tells us the irrationality in the Governmental support. In this case study, financial assistance was provided to the OLHS households for detaching their house from their neighbour's, without considering the present situation of any of the houses. Hence the poor household was forced to demolish his original house along with the modifications made in the due course of time. The Thabong case study can be cited as an example in this context to show the significance of beneficiary involvement in decision making especially in a project which deals with the modification or renovation of the existing houses. In such situations, the project has to address individual needs rather than perceived mass needs. In the Thabong project the beneficiaries were given freedom of choice for their houses from a list of housing packages to select the appropriate option to suit their requirements. A similar kind of approach considering the needs of households and specific situations of present houses would be helpful in improving the OLHS houses rather generalising the solution. Otherwise public assistance may be a burden to the household than being a support as in the case of this particular case study. Home ownership in developing countries has a tremendous social value - arguably more than in advanced countries, but largely fails to perform its economic functions. Housing delivery can be harnessed as a vehicle for job creation through strategically designed settlements and construction programmes. Identifying and promoting housing activities as a development programme rather than a welfare activity can indeed lead to economic sustainability.

4.5.3 Technological sustainability (TCS)

The household surveys and case studies endorse the concern over the following factors on the technological sustainability of housing programmes in Kerala.

- Scarcity of affordable materials and availability of skilled labour
- Feasibility and affordability of technological options
- Lack of technical guidance or supervision in the building process
- Poor know-how on the building process
- Poor know-how on the cost effective alternatives
- Excessive use of energy-intensive materials

The houses under OLHS were constructed by utilizing local materials, local labour and adopting cost reduction techniques in all stages of construction. The provider approach in this housing scheme and the uniformity in implementation throughout the state helped in ensuring proper technology and maintaining standards. Owing to this, the situation of majority of OLHS houses even after thirty years is passable, despite the fact that most of the households did not pay any attention in proper maintenance and repair for their houses. But the main problem that could be noticed in most of the houses under this scheme is the development of cracks in the long central wall which separates the two adjacent houses, which could be attributed to the peculiar design of twin houses. In addition to this, the design and technology adopted for these houses also showed very little flexibility for further modifications. The case study of the household from Punnapra panchayat (Case study No. 3) can be cited as an example. This household was very concerned to improve their housing facilities and could also modify their house. But they could not retain these modifications and were compelled to demolish the entire building when there was a demand for detaching their house from their neighbour's house.

The case studies of IAY and THS reveal that none of the houses under these schemes were successful in utilizing cost-effective technological options in their building process as anticipated by the government and were only adopting the conventional technological solutions. Even though IAY has specific guidelines for empowering and involving the beneficiaries in skilled jobs, utilization of local materials and self building, discouraging the involvement of contractors and excessive utilization of energy intensive materials like bricks, cement and steel in the building process, none of the beneficiaries were even aware of these requirements of the scheme. And also they had an inferior attitude towards local materials. The case study of IAY beneficiaries (case study No. 4) can be quoted as an example to disclose the difficulties of the beneficiaries in accessing technological options, affordable materials and getting proper guidance on the building process. All three households in this case study were extremely poor and were solely depending on government support. In spite of their financial disability, they were forced

to entrust a contractor (Identification Number 68) primarily due to their incapability in the building process. Their only involvement was that of a mediator between the panchayat and the building contractor in transferring the money. The household fully relied upon the contractor as they did not have any idea about the technology used, materials and even the expenses incurred for the construction. Two other households under this case study were also ignorant on the cost reduction techniques, utilization of local materials and were blindly depending on the advice of local masons. These case studies show the difficulties of the beneficiaries in accessing suitable technology and affordable alternatives. Although, the Grameen Bank housing loan programme could help the poor households to certain extent in solving these types of problems, lack of trained technical supervision together with transportation and installing of pre fabricated building components was a major draw back. These examples point towards the need for timely guidance or supervision, technical training and familiarity of building process as the key factors of sustainable technology. The Thabong case study from South Africa can be cited as a best example in such a situation to show the importance of technical supervision and training. On-site advice and training was given for the beneficiary households during the building process. This was necessary as the houses were all at different stages of completion and had different house plans. It also became necessary to advice people on the materials and quantities required especially to those having plans of their own. This advice was given at a centrally located site-office from where all activities were co-ordinated. The households (women in particular) set the trend by requesting training and soon also started assisting neighbours, friends and people incapable of building. According to Stewart et al. (1999) some of the beneficiaries who acquired building skills through training could make it as an income generating opportunity after the completion of this project. This case study also explains the significance of beneficiary involvement in building process especially in the selection of technology and materials.

Even though Total Housing Scheme was implemented with a similar concept of employment generation through housing and whole sector development, case studies and field surveys reveal the failure of policies. A series of training camps were said to be organised for masons, engineers and government officials to achieve 'Habitat Literacy'. The training was given mainly in the application of appropriate technologies, which are cost-effective, environmental friendly, using locally available and affordable materials responding to physical, social and climatic needs of the region. According to the concept of the Government, the main aim of this programme was to unmask the technology and to break the gap between architect, builder and the common man to develop a friendly change in the building sector. It was intended to enable the common man to build and maintain his house by his own efforts. But the real picture sketched out through the household surveys is really alarming. Whatever told, read and heard was a different story than the actual situation. The case study of Sivodayam colony is a better example. One of the major appropriate technology groups were involved in the

construction. They signed an agreement with government officials for the implementation of the housing programme. As part of habitat literacy and empowerment of the common man, training camps were also said to be conducted for the households of this colony. But their present housing situation is not that satisfactory. According to the beneficiaries, they could not receive any skilled training in technology or production of building materials. Also they are still not aware of any of the cost effective technological options and not convinced on its strength and durability.

The case studies and household surveys also reveal the inefficiency of cost effective and environmentally friendly technology innovations in reaching the poor. It could not gain that popularity and acceptance especially among the poor households due to lack of proper awareness. The study of Gopikuttan (2004) on technology options in housing for the economically weaker sections in Kerala supports this. He argues that CEEF technology actually meant for helping the weaker section seems to have failed to reach the expected beneficiaries. Irrespective of the housing schemes, the majority of the interviewed households have not even heard of the CEEF technology. Those few who responded positively to this question were also not interested in using it or convinced of the strength. The main reasons they told to support their arguments were the unavailability of skilled labour and lack of confidence on strength and durability. Hence they are forced to depend on the available modern or conventional technological alternatives even though those were not affordable to them. Since the public housing schemes in Kerala were formulated with a presumption of using cost effective technology, the choice of conventional energy intensive building process is basically against this concept and contribute up to the failure of housing schemes. The difficulties in feasibility, acceptability, non-awareness and as well as the lack of confidence in the new technological options aggravate the housing problem along with other aspects of sustainability. These factors urge the necessity of a detailed evaluation of the prevailing building process in Kerala. The succeeding chapter deals with this analysis and present suitable guidelines for the selection of sustainable building process under the context of Kerala.

4.5.4 Environmental sustainability (ENVS)

Environmental sustainability of housing schemes in Kerala raises greater concern on the sustainability of housing development activities in Kerala since it is not getting the desired attention both in the conceptualization stage and as well as in the perception of beneficiaries in real situations. The following objectives which need immediate attention are:

- Insufficient basic services
- Excessive conversion of agricultural land for housing
- Poor concern over the utilization of non renewable resources

- Utilization of energy intensive building materials

Environmental Sustainability is an equally important aspect of sustainable housing as the other three and it deals with the needs of future generations along with satisfying the present needs. The former part is the most ignored sector. It deals with the conservation and protection of resources, both renewable as well as non-renewable. None of the housing schemes was seriously concerned with this objective, and the actual situation in the beneficiary households was not so different. Poor households who are sweating even for their daily bread are more concerned with their immediate needs rather than with their future. The case study of IAY households (case study No. 4) is a good example. They purchased cheap agricultural land and developed as house plot since they could not manage to get any other affordable housing plot. They were not at all bothered by the environmental implications and even not aware of that. Changes in land use patterns, the exploitation of paddy fields and haphazard growth of housing development activities have created severe problems such as water logging, non-availability of drinking water and ultimately the degradation of the natural resources and changes in the micro climate of Kerala. Conserving and protecting resources needs crucial attention to achieve environmental sustainability. None of the schemes could take any positive step towards this aspect.

Needs of present generation is also a prime objective of environmental sustainability. It deals with the quality of environment and infrastructure facilities. Development of an adequate infrastructure base is inevitable for sustainable habitat. In the case of OLHS, the houses were constructed in a clustered manner fixing a density of twenty houses to an acre (approximately 4047 m^2) of land with twenty percent of area utilized for roads and open spaces. Even in this case, government intervention failed to provide the essential infrastructure facilities like proper sanitation and drainage. Also most of the OLHS households had only poor toilet facilities and literally no permanent bathing facilities. A temporary open shed either with a thatched wall or with a protection of polyethylene sheets is a unique feature of their toilets or bath rooms. The case study (No. 2) of OLHS households from Neeravil colony is a good example of their poor surroundings.

Even though IAY guidelines were giving importance to healthy surroundings and infrastructure development, the real situation of the households is pathetic (Case study No. 4). Two of the households from this case study (Identification No. 67 and 68) do not have any type of toilet facility and need to rely on their neighbours for this basic need. The situation of THS households is also not different. The households of Sivodayam colony also had no toilets with their new houses as they denied the facility to increase the area of their houses. Most surprisingly, it is interesting to notice that none of the households are bothered on providing the basic facilities like toilets and drinking water utilizing their housing assistance and looking for further support from

the Government for satisfying their needs. The new houses without toilets are a common feature of the public housing schemes in Kerala and also an indication of the increased dependence of households on governmental support.

The evaluation of the public housing schemes in Kerala advocates the reform of Government policies towards practical solutions for sustainable housing development. Housing statistics confirms that quantitative housing deficits are relatively small in Kerala. But the evaluation of public housing initiatives in Kerala begs immediate attention on the gravity of other shelter related problems. Based on these analysis and discussions, the succeeding section presents a few strategies for sustainable-affordable housing in Kerala.

4.6 Strategies for sustainable-affordable housing in Kerala

Housing policy for people living in poverty has multi-objective and multi-institutional relevance. This section comes up with a few strategies for the development of sustainable-affordable housing. They are identified as: Policy measures for socio-cultural sustainability (PSCS), Policy measures for economic sustainability or Affordability (PES), Policy measures for technological sustainability (PTS), Policy measures for environmental sustainability (PEVS).

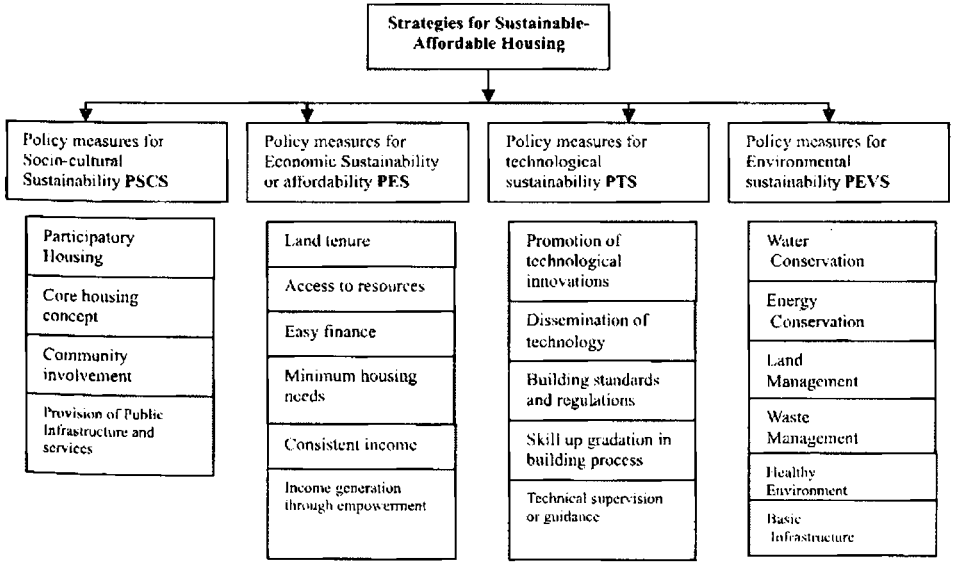

Figure 4.6 CF_2 - Strategies for sustainable-affordable housing

This modified (based on evaluation) framework (CF_2)-Strategies for sustainable-affordable housing (Fig. 4.6) can be considered as a mechanism for achieving the objectives as derived from the analysis of case studies and evaluation of housing surveys using CF_1.

4.6.1 Policy measures for socio-cultural sustainability (PSCS)

The evaluation of public housing schemes in Kerala highlights the un-sustainability in socio-cultural factors as one of the main pitfalls of the housing programmes. Since housing has got more personal significance than social interests in the perception of an individual, socio-cultural sustainability in housing primarily depends on the attitude of the inhabitants towards their houses. Therefore policies for sustainable housing should give importance in ensuring household participation in all the levels (from planning to finish) of the building process. This could help in considerably improve their self-reliance and lead to better living standards. Ensuring community participation is the next important milestone in this aspect of sustainable housing. Community involvement can accelerate the social significance of housing development by ensuring, integrating and maintaining infrastructure facilities and rescuing the low income households from the evils of social exclusion.

Policy measures for achieving socio-cultural sustainability in housing can be listed as follows.

- Stimulate participatory housing through involvement of households and with the support of community. Community action plan approaches in the Million Houses Programme in Sri Lanka and People's Housing Process from South Africa are good examples in ensuring both community participation and beneficiary involvement. Refining and improving the concept of People's Planning campaign in Kerala could be suggested as a recommendation.
- Promotion of core housing concepts with flexibility for future expansion should be considered on the planning stage itself and ensured with the provision of vacant plots, infrastructure facilities and formative designs.
- Households should be given the freedom of choice for their house from a list of housing programmes to select the appropriate option to suit their requirements.
- Careful neighbourhood planning of the houses should be taken by mixing different income levels of the society in the same locality and ensuring adequate infrastructure facilities and community services to -
    - ensure the inhabitants to take part in community activities, improving social relations and intermingling with others.
    - avoid the segregation of a community based on income, religion or other social criteria.

- discourage the stigmatization of houses either through type design, material usage or any other methods.

4.6.2 Policy measures for economic sustainability or affordability (PES)

The ability of the households to own as well as maintain their houses plays an equally important role in the sustainability of housing development as the economic sustainability of the housing programmes. Government support for housing could help the poor households in supplementing their efforts, only if they are self-reliant to meet their immediate daily needs. Improving and maintaining consistent income should be the prior step in satisfying their housing needs. The next step is facilitating or empowering the poor through enabling strategies to improve their access or command over various resources, necessary for housing. Strategies and housing policies at this stage should be able to tackle the problems connected with land tenure, subsidies, accessibility to easy loans, resources and other obstacles connected with building process. Effective policy measures should be taken for implementing the different objectives of economic sustainability in housing. It can be listed as follows.

- Ensuring consistent income: Grameen Bank Housing Loan programme is an excellent example. It can also be done by-
  - Empowering the poor in the different activities of building process like production of building materials and other skilled labour training,
  - Housing schemes for the economically weaker sections should be coordinated and integrated with poverty alleviation programmes.
- Accessibility of resources: This is a prerequisite for affordable housing. The priorities of different households and problems connected with ensuring different resources such as land tenure, supplementary loans, building materials, labour and other infrastructure facilities needed for housing activities may vary. The Community action plan approach of Sri Lanka could be a better solution. Issue-specific workshops and gatherings organized among the group of households together with the involvement of community and programme officials could sort out the problems and come up with more efficient solutions. The concept of People's Housing Process of Kerala also needs special mention at this context. Improving the accessibility of the households to loans and subsidies could help in further strengthening their ability to afford housing.
- Feasible loans: Promoting micro finance institutions in the model of Grameen Bank is a sustainable solution. A variety of loan packages should be made available depending on the needs of the household and their ability to make repayments.
- Minimum housing needs: Since the sustainability of affordable housing depends on the fulfilment of basic shelter needs, proper monitoring and controlling of housing development activities should be done to ensure it. Organizations or small groups of beneficiary households together with the involvement of community and

programme officials like the Support organizations (South Africa) or Community development councils (Sri Lanka) should be able to fix a minimum specification for ensuring the basic shelter needs and regulate the house building process.

4.6.3 Policy measures for technological sustainability (PTS)

Feasibility to sustainable technological options is one of the main stumbling blocks of the poor in providing their housing. This is aggravated by the exorbitant prices of building materials and inaccessibility to common property resources. Evaluation of the present building process in Kerala pleads for effective dissemination of cost effective and environmentally friendly technology through convincing examples and post-delivery services. Technology promotion activities, awareness programmes and skill upgrading or training programmes should be promoted through policy initiatives. Building regulations and standards also need important consideration. Policy measures for technological sustainability should include following strategies for guaranteeing technological sustainability of housing programmes.

- Timely guidance and technical supervision should be ensured in the building process by intervening technology institutions or organizations as in the case of People's housing Process in South Africa. Strengthening the activities of Building Centres and making them responsible for ensuring the quality of houses could also be a sustainable solution. Their intervention could also help in solving the problems related to material scarcity, unavailability of skilled labour and also in maintaining the technical standards.
- Technology promotion activities and awareness programmes should be accelerated to make the technologies more accessible and affordable to the users.
- Stimulate research activities in appropriate technology by :
  - utilizing locally available or waste materials, which are cost efficient, abundant in supply.
  - utilizing renewable, reusable and recyclable materials.
  - utilizing environment friendly methods to provide affordable housing solutions suitable to the requirements of Kerala.
  - demanding the usage of less energy intensive materials and methods
  - demanding unskilled labour, renewable resources and decentralised production
- Regularise building standards and regulations to ensure and maintain normal construction standards and quality for sustainable housing.
- Building rules and standards should be revised to incorporate the technological innovations.
- Environment friendly construction techniques could be promoted by providing tax exemptions or additional incentives to buildings utilizing this technology.

4.6.4 Policy measures for environmental sustainability (PEVS)

The case study of households from different housing schemes reveals the appalling housing situation of the poor with insufficient basic facilities like provision of drinking water, sanitation and drainage. Even though both the present and the future needs of the household with regard to environmental sustainability do not seem to get any attention in the housing programmes of Kerala, the urgent basic needs of the household has to be fulfilled with due priority. Provision of basic infrastructure facilities, conservation of natural resources, efficient usage of water and energy are integral parts of sustainable housing. Policies should be formulated considering these requirements.

- Policy measures should be able to ensure basic infrastructure facilities (drinking water, drainage and sanitation, waste disposal) to the households.
- Policy measures should ensure energy efficiency in household activities by integrating alternate solutions for renewable energy and conservation of resources.
- Rainwater harvesting methods should be integrated with housing projects.
- Proper regulatory measures should be taken for conservation of agricultural land and against uncontrolled land reclamation for clay mining, housing and other development activities.

4.7 Conclusion

The evaluation of public housing schemes in Kerala verified the mismatch between the aims of government policies and the real situation of beneficiary households. It underlines the failure of different housing policies with respect to sustainable housing development and identifies that though there were different policies over the years (1970 to 2000), they could not lead to significantly different outcomes. The results of the evaluation urges the integration of different aspects of sustainability through efficient implementation strategies, suitable for the socio-economic and cultural specifications of the state co-ordinating the involvement of beneficiary households, local communities, non-governmental organizations, and local government. The policy measures for sustainable-affordable housing should give prime concerns in improving the self-reliance of households through consistent income and their accessibility to resources together with proper utilization of resources. Ensuring infrastructure facilities is also vital in sustainable housing development.

Appendix 4.1

This is the original version of the questionnaire used for the household surveys. The interviewer was asking the questions to the households in the local language (Malayalam) and writing down their responses by herself.

Sustainable- Affordable housing for rural Kerala

Household survey schedule

I. General information

1. Identification number ☐ 2. Name of the Scheme IAY/ THS

3. Name of the Panchayat

4. Ward ☐ 5. House number ☐

6. Name and address of the head of the household

7. Caste/Religion

Details of household members

Household size (8)	Relationship with the head (9)	Age (10)	Sex (11)	Educational qualification (12)	Activity status/ Occupation (13)	Approximate monthly Income (14)	Marital Status (15)	Place of work (16)
Total								

- Place of work code: Within the Panchayat - 1, Outside, but within 5km-2, with in 5 to 10- 3, Outside district- 4, outside state - 5, Gulf countries - 6, Other countries - 7
- Married - 0, Unmarried - 1, widow - 2, widower - 3, Divorcee - 4
- Activity status code: Employed - 1, Unemployed - 2, Ex service - 3, Retired- 4, Housewife - 5, Student - 6, Child - 7, Old age - 8, Gulf returned - 9, Working in foreign countries -10

I. Economic status of household

18. Average monthly income of the household in total

Land ownership

19. Land ownership (in cents) House plot

20. Land owned other than house plot Agriculture land ☐ other ☐

21. Total area in cents

22. Approximate plinth area of the house in Sq.m

23. Are there any domestic animals in your house? Yes [1] No [0]

24. If yes.

Item	Number	Giving milk/egg/ meat	Approximate daily earning	Approximate daily expense

Cow [1] Goat [2] Pig [3] Buffalo [4] Hen [5] Duck [6] Others

Furniture

25. Chair	☐	26.Bench	☐	27. Stool	☐	28.Table	☐
29. Desk	☐	30. Coat	☐	31.Bed.	☐	32. Almirah	☐
33. Mixi	☐	32. TV	☐	33. Radio	☐	34. Music system	☐
35. Telephone	☐	36. Electric fan	☐	38. Electric iron	☐	39. Cycle	☐
40 Motor bike/scooter	☐	41. Any other vehicle	☐	42. Approximate gold	☐		

Montly Expenditure		Monthly Savings	
Item	Amount	Item	Amount
43. Food		52. Chitty	
44. Medicine		53. Savings bank	
45. Education		54. Post office savings	
46. Electricity		55. Insurance	
47. Water		56. Any other	
48. Cooking gas/ fuel			
49. Periodicals			
50. Any other			

51. Total expenditure

57. Total savings

Liabilities

58. Do you have any liabilities? Yes [1] No [0]

59. If yes,

Loan Source	Amount	Rate of interest	Monthly instalments	Purpose	Remarks

Purpose code Marriage of children [1] House construction [2]

House repair/ maintenance [3] Vehicle purchase/Repair [4] Education [5]

Medical / health purpose [6] any other [7]

Source code Nationalised Banks [1] Private banks [2] Individuals [3]

Co- operative banks [4] Relatives & friends [5] other source [6]

60. Approximate debt amount

61. Repayment of debt: Promptly [1] Not repaying the instalments regularly [2]

Has to repay the last 5 instalments [3] 5 to 12 months [4] More than 1 year [5]

62. Do you able to repay the existing loan Yes [1] No [0]

63. If not, why?

III. Housing details

Previous house

64 From where do you migrate to the new house? The same place [1]
Same panchayat, parental house [2] same panchayat, not parental house [3]
Outside panchayat, but same district [4] Different location than above [6]

65 Why did you migrate to this new house? Old house not liveable [1]
Not enough facilities [2] destroyed by natural calamities [3]
was staying in rented house [4] Other reasons (Specify) [5]

66 Did you satisfy with the location? Yes [1] No [0]

67 Specify reason

68 Type of old house
Foundation
Walls
Roof
Flooring

69. Facilities Living room + Kitchen [1]
Living room + Kitchen+veranda [2] Living room + Kitchen+bedroom [3]
Living room + Kitchen+bed room+ veranda [4] Other than above (specify) [5]
Single multi purpose room [6]

70. Did you have toilet? Yes [1] No [0]

71. If yes, type Single pit [1] Two pit [2] With septic tank [3] Other types [4]

72 Bath rooms Temporary shed [1] Permanent room [2] Public well/ pond [3] Public water tap [4]

73. Drinking water
Own Well [1] Neighbour's well [2] Pond [3]
Public well [4] Public water tap [5] Other (specify) [6]

74 Was the house electrified? Yes [1] No [0]

75. Cooking fuel used? Wood [1] Kerosene [2]
Others (specify) [3]

Present house

76 Year of Sanction
77 Year of construction
78 Year of occupation
79 Duration of building process
80 Are you the original beneficiary of the scheme? Yes [1] No [0]

81 Present situation of the house Completed, good condition [1] Completed, but needs repair [2]
Uncompleted with minor works remaining [3] uncompleted, needs major works to finish [4]
Unliveable condition, major repairs to be done [5] demolished [6] other than this (specify) [7]

82 Did you follow type design? Yes [1] No [0]

83 If not, what additional facilities added? Purpose?

84. Do you have latrine? Yes No

85. If yes, Type Single pit [1] Two pit [1] With septic tank [1] Other types [1]

86 Latrine Integrated with H.S [1] Another Scheme [2] Provided by owner [3]

87 Bath rooms Temporary shed [1] Permanent room [2]
Public well/ pond [3] Public water tap [4]

88 Drinking water Own Well [1] Neighbour's well [2]
Pond [3] Public well [4]
Public water tap [5] Other than this [6]

89 Drinking water Integrated with H.S [1] Another Scheme [2]
Provided by owner [3] Sharing with neighbour [4]

90 Any water/ energy conservation methods adopted? Yes [1] No [0]

91. If yes, what are the measures adopted?

92 Is the house electrified? Yes [1] No [0]

93. If yes, by whom?

Integrated with H.S [1] by the owner [2] by another scheme [3]

94 Any methods adopted for drainage and waste disposal? Yes [1] No [0]

95 If yes, what are they?

[ ] Electricity [ ]

Location of the house

97. Are you satisfied with the location of the house? Yes [1] No [0]

98 If not why?

Work place away [1] Educational facilities away [2] environmental problems [3]

Bad neighbourhood [4] No hospital facility [5] other reasons (specify) [6]

99. Environment Air pollution [1] Dusty [2]

Healthy [3] Unhygienic [4]

100. Neighbourhood Good residential area [1] Industrial area [2]

Slum like area [3] Low-income settlement [4]

other (specify) [5]

101. Type and nature of land of house plot

Developed agricultural land [1] Ordinary plot [2]

102. Distance to nearest motor able road

103 Distance to nearest worship place

104. Distance to nearest health centre

Building Process

105. What was the total cost of construction?

106. Source of Funds

Source	Amount	Rate of interest	Monthly instalment	Paid instalments	How many left unpaid	Number of instalments to pay

107 Any form of community involvement in the building process? Yes [1] No [0]

108 Involvement in:
Material contribution [1] Labour contribution [2] both [3]
Financial assistance [4] All the above [5]

109. Any involvement of NGO'S/ CGO's Yes [1] No [0]

110 If yes, who was involved?

111 Involvement in:
Material contribution [1] Labour contribution [2] both [3]
Financial assistance [4] Technical assistance [5] All the above [6]

112 Beneficiary involvement Yes [1] No [0]

113 If yes, involvement in
Financial contribution [1] Material contribution [2]
Labour contribution [3] Planning [4] All the above [5]

114 Material contribution of beneficiary
Produced by beneficiary [1] purchased [2] materials from old house [3]

115. Labour contribution: skilled [1] unskilled [2] both [3]

116 Involvement of local masons skilled [1] unskilled [2] both [3]

117 Involvement of CEEF technology institutions / Building centres Yes [1] No [0]

118 If yes, their involvement in:
Material supply [1] Labour supply [2]
Training [3] Technical advice [4] All the above [5]

119. Who were the implementing agency/ officer?

120. Role of implementing agency
Financial contribution [1] material supply [2] training/ technical advice [3]
Limited to giving stage certificates [4] All [5] Any other support [6]

Materials used

Structure	Materials	Source	Difficulties encountered
121. Foundation			
122. Walls			
123. Roof			
124. Flooring			

Material code

Laterite [1] Rubble [2]

Bricks [3] Hollow blocks [4]

Stabilized mud block [5] others (specify) [6]

Roof code

R.C.C [1] Filler slab [2]

Shell roofing [3] M.P tiles [4]

A.C Sheet [5] Tin sheet [6]

Al sheet [7] Thatch [8] other (specify) [9]

Flooring code

not finished [1] Cement plastered [2]

Red/ black oxide [3] Others (specify) [4]

125. Do you find any progress in your quality of life since you moved to your new house?

Yes [1] No [0]

126. If yes, what are they?

Improvement in: the studies of children [1] health condition [2]

Better value/status in the society [3] All [4]

127 Are you satisfied with the facilities provided by the government?

Yes [1] No [0]

128. If not, what else you expect from the government?

To construct the houses completely according to their type design [1]

To provide partial financial support and provide technical assistance, training and facilitate the construction [2]

To give full financial support [3] other than this (specify) [4]

Repair/ Renovation

129. Have you ever renovated your house since occupation?

Yes [1] No [0]

130. If, yes, what additional facilities added?

One more room [1] 2rooms [2]

one room + Veranda [3] Toilet facilities added [4]

Other than this (specify) [5]

131. Source of money for renovation

Source	Amount	Rate of interest	Monthly instalments	Remarks

Any repair works done after occupation? Yes [1] No [0]

132. If yes, what are they and frequency of repair?

133. Source of money for repair

Source	Amount	Rate of interest	Monthly instalments	Remarks

134. Are you satisfied with the present facilities in the house? Yes [1] No [0]

135. If not, what else facilities you need?

136. What is the source of money you are looking forward?

Needs, Aspirations, Plans

137. Do you have any plans to construct a new house? Yes [1] No [0]

138. If yes, what facilities you want to provide as additional to your existing house?

139. What materials would you prefer to use?

Structure	Materials	What are the advantages of these than the present materials
Foundation		
Rubble		
Walls		
Roof		
Flooring		

140. What source of resources you are looking forward to realize your dream house?

Savings selling out the assets

more government support Others (specify)

141. Would you prefer to use the innovative materials developed by yourself (after getting training) for your new house?

Yes [1] No [0]

142. If not, why?

143 Are you interested to get trained on CEEF technology?

Yes [1] No [0]

144. If not why?

145. Are you interested in using CEEF Technology for constructing your house?

Yes [1] No [0]

146. If not why?

147. Your opinion on using Locally available materials such as:

Mud

Laterite

Treated wood

Agricultural wastes

Industrial waste

148. Your opinion in using:

Exposed brickwork

Filler slabs

Cavity walls

Prefabricated construction

Any special comments?

Interviewer's Remarks

Present condition of the house & household

Living environment

Water management

Waste disposal

Location

A rough plan

Living room	Veranda	Bed room	Kitchen	Remarks

Area of the house

Indirect questions to beneficiary

- Do you have any inferior feeling to live in this house? (Any form of stigmatisation or grouping of people)
- *Do you consider this house as an asset? If not why?*

Specific remarks and suggestions for improvement

Appendix 4.2
Sustainability Analysis (OLHS/IAY/THS)

Scheme of Analysis

Socio-cultural sustainability		
Adaptability		
Household Size	Number of potential families = 1	20
	A single family with young children and household size 4-6	16
	Potential family.>1, but additional rooms	12
	2 potential family including old parents size 4-6	8
	A family of 4 -grown children/PF>1 with insufficient additional rooms	4
	Number of potential families >1	0
Equality		
Segregation or grouping of a people of a particular category based on income or caste(feeling inferior)	No	10
	Yes	0
Integration of amenities and services		
Motor able road	Within 100m	20
	100m to 200m	10
	> 200m	0
Nearest bus stop	Within 500m	20
	500 to 1km	10
	> 1km	0
School Hospital Worship place	Within 2km	20
	2km to 5km	10
	>5km	0
Work place	Within the Panchayat	20
	Outside but within 5km	10
	>5km	0
Beneficiary Participation		
Planning Finance Material contribution Labour	Total building process	20
	Planning, material, labour	16
	both material and skilled labour	12
	Any two from labour/ material/finance	8
	Partial material / labour/ financial contribution	4
	No involvement	0
Community/NGO'S Involvement		
Planning Finance Material contribution Labour	Total building process	20
	Planning, material, labour	16
	both material and skilled labour	12
	Any two from labour/ material/finance	8
	Partial material / labour/ financial contribution	4
	No involvement	0

Economic sustainability (ECS- 1AY/THS)		
Pre requisites		
Savings	50 to 75%	20
	25 t0 50% of income	15
	10 to 25% only	10
	less than 10%	5
	No savings	0
Affordability		
Liability for housing	No/ yes, but paid already	20
	Yes, but paying back regularly	15
	yes, not so regular in payments, but can pay	10
	yes, paying back the interest only	5
	yes, not yet repaid the instalments	0
Housing condition	Completed, good condition	20
	Completed, but minor works in pending	15
	liveable, but needs major works to finish	10
	liveable, but only minimum facilities, major works pending	5
	Not liveable, incomplete or poor condition	0
Shelter Needs		
Bathing space	Permanent space with latrine/ independent space(good condition with door and roof)	20
	permanent room without roof or proper door	10
	Temporary shed or pond	5
	No facility	0
Sleeping space	Enough privacy for couples and adults	20
	Can adjust	10
	Not enough space, but no one sleeps outside	5
	Some one has to sleep outside	0
kitchen space	Enough	20
	Moderate	15
	Small, but can manage	10
	Part of another room using as kitchen	5
	Cooking in temporary kitchen outside the house	0

Technological sustainability(TCS)		
Feasibility		
Technology for Roof and Wall Simple, Easy maintenance and unskilled labour	R.C.C , filler slab Rat- trap bond	0
	Flemish bond and ordinary brick/cement block masonry	10
	Tile roofing/ sheets	20
Labour availability	Plenty	20
	Fairly	10
	Rare	0
Quality of labour (Strength)	Good	20
	Moderate	10
	poor	0
Functionality (Further changes in design)	Easy	20
	Fair	10
	Not possible	0
Comfort	Good	20
	Fair	5
	Poor	0
Safety from thieves , natural calamities, fire hazards etc	Good	10
	Fair	5
	Poor	0
	Moderate	5
	Intensive	0
Materials for Roof and Wall Availability	Locally available/produced	20
	Locally purchased	10
	No local availability	0
Reusability	Good	20
	Fair	10
	Poor	0
Energy Requirement	Zero	20
	Moderate	10
	Intensive	0

Environmental Sustainability (ENVS)		
Renewable and Non renewable resources		
Energy Any energy conservation measures adopted?	Yes	20
	No	0
Water Any water conservation (reuse) measures adopted?	Yes	20
	No	0
Land conservation and proper planning		
Land	Natural plot	20
	low lying / hilly area	10
	Developed agricultural land	0
Healthy Environment		
Quality of surroundings	Good	10
	Moderate	5
	Poor	0
Neighbour hood	Good residential area	10
	Low income settlement	5
	Slum like settlement	0
Basic Infrastructure		
Toilets Is the latrine facility integrated with scheme?	yes, constructed with this house	20
	Using the same latrine with the old house	10
	later constructed by the owner/ through another scheme	5
	No	0
Latrine type	septic tank, permanent room good condition	20
	Single / two pit ,permanent room	16
	Single / two pit ,permanent room, no roof/door	12
	Two Pit with temporary shed	8
	Single pit -temporary shed	4
	no latrine	0
Water supply Is the drinking water facility integrated with scheme?	yes	20
	integrated, but not sufficient	10
	no	0
[2]Drinking water source	Own facility	20
	Public facility within 200m	16
	Neighbour's facility within 200m	12
	Public facility at a distance greater than 200m	8
	Neighbour's well at a distance greater than 200	4
	scarcity of drinking water	0

[2] Access to water refers to drinking is defined as having water located within 200 meters of the dwelling (UNCHS,2000)