

# **DEMAND FOR LOW-COST BUILDING MATERIALS IN KERALA**

*By*

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*Thesis Submitted to the University of Calicut  
for the Award of the Degree of*

**DOCTOR OF PHILOSOPHY IN ECONOMICS**



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OCTOBER 2001

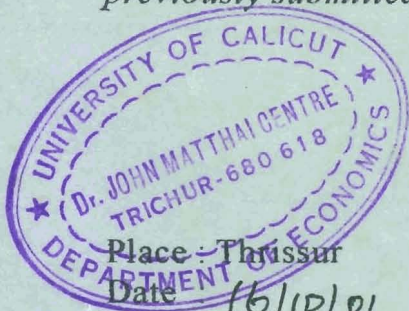
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**CERTIFICATE**

*Certified that this written account on "DEMAND FOR  
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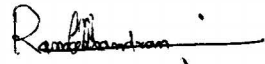
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## **DECLARATION**

I, Ramachandran K.V. do hereby declare that this written account entitled "DEMAND FOR LOW-COST BUILDING MATERIALS IN KERALA" is a bonafide record of research work done by me under the guidance of Dr. U.T. Damayanthi, Reader in Economics, University of Calicut.

I also declare that the thesis has not been submitted by me fully or partly for the award of any degree, diploma, fellowship, any other similar title or recognition before.

Place : Thrissur  
Date : 16-10-2001



RAMACHANDRAN K.V.

## ACKNOWLEDGEMENT

*I am deeply indebted to my supervising teacher **Dr. U.T. Damayanthi** for her sincere help, advice and Invaluable guidance given to me throughout the course of the preparation of this research work.*

*I owe a great deal to **Dr. P.P. Pillai**, Former Head of the Department for his warm encouragement and advice during the earlier stages of the study.*

*I express my heartfelt thanks to **Dr. D.P. Nair**, Professor & Head of the Department for his relentless support and advice rendered to me for the successful completion of this work.*

*I am greatly thankful and obliged to **Dr. Lakshmi Devi**, **Dr. Retnaraj**, **Dr. B.A. Prakash** and **Dr. Kuttikrishnan** for their timely suggestions and recommendations at the various stages of the study. I am also grateful to all other faculty members of this department for all sorts of encouragement they have given me.*

*I extend my sincere thanks to **Dr. Mohammed Rafeeq** and **Dr. K.P. Varkey** (Engineering College, Thrissur), **Smt. Joisy Francis**, Technical Assistant, Department of Horticulture, Kerala Agricultural University for their encouragement and advice given me during the course of this study.*

*May I make use of this occasion to express my deep gratitude to Prof. Chandra Dutt, Director of COSTFORD, and the project engineers, architects, planners and designers of Nirmithi & COSTFORD centres of the state, who have helped me much for collecting necessary data and information.*

*I extend my heartfelt thanks to the Librarians of Dr. John Matthai Centre, Mr. T.M. Balakrishnan and Mrs. Usha Rani and also that of C.D.S. Thiruvananthapuram, Agricultural University Vellanikkara for their sincere co-operation and assistance given to me.*

*I am thankful to all of my colleagues and friends who have helped me in various ways for the preparation of the work. My expression of gratitude will be incomplete unless I have not given any thanks to my spouse who had always encouraged me much for the completion of this work.*

*Finally, I am always indebted to "Almighty", the Super Natural Power, and I believe that without his patronage and blessings nothing could be materialised.*

*With the help of all these I think I have done my level best for the preparation of this thesis. Still, there may be some errors and omissions left for which I am personally responsible to.*

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# INTRODUCTION

Ramachandran. K.V. “Demand for low-cost building materials in Kerala”  
Thesis. Department of Economics, Dr. John Matthai Centre Thrissur,  
University of Calicut, 2001

**CHAPTER - I**  
**INTRODUCTION**

# CHAPTER - I

## INTRODUCTION

Construction dating back to the very existence of man, forms the basis of all developments. It is a vehicle for the growth of culture and civilization. Every rational beings longs to have a shelter to protect their families. Therefore, shelter occupies the most important position among the construction activities.

People want not only mere physical shelter but also a home as part of the total way of life. It is a place where people in general fulfill the basic domestic and personal functions of family life, physical and mental health, working efficiency, emotional security and social status.

Therefore, shelter must be seen in the context of basic needs as critical to living, as food and clothing, hence bound up with individual's right to live and demanding an appropriate social context for its fulfillment. Thus, housing is one of the pressing needs of any country's population.

In India, the building need is very high. The need for housing consists not only the demand for upgradation and renovation of existing housing stock but also the need for construction of new dwelling units. Therefore, to find a shelter for each one at a low-cost is the greatest challenge of all times.

However, the demand for a roof over one's head had been increasing continuously and there has been a persistent gap between the demand for and supply of housing stock in India. This causes an acute shortage of dwelling units in the country. The problem is becoming grave mainly because the house construction has not kept pace with the growing demand. The major factor leading to the housing shortage is the slow increase in housing construction in relation to the population growth.

The pace of housing construction has been extremely slow because of the speculative increase in land price and rising cost of construction. Hence, the achievement of housing is decreasing whereas the need for housing goes on increasing year after year thus bringing about an imbalance between both the demand for and supply of housing. Resultantly, for millions of people in India, the desire of owning a house remains only a long cherished dream unfulfilled so far.

As far as Kerala state is concerned the gap between both the aggregate demand for and aggregate supply of housing is highly relevant. This causes a high level of housing inadequacy in the state. Due to the escalating rise in price of building materials the housing has become totally inaccessible to many. Now, the price of building materials alone contribute to 60-70 percent of the cost of construction.

The predominant use of conventional construction materials like steel, cement, burnt clay bricks and timber clearly shows an increasing trend in the construction costs over the years. The cost of construction is increasing by 13-15 percent each year even when the inflation is less than double digit.

Therefore, the most important subject with immediate interest is the reduction in building costs. The Cost Effective Environment Friendly (CEEF) technology is making sustained efforts to implement advance programming and architectural planning, rational and structural designs, organisation, execution and management of works and using new materials and construction devices. So, the formidable problem of housing is yet to be tackled on a country-wide scale.

### **1.1 RELEVANCE OF THE STUDY**

The cascading effect in the price of building materials stands as a major hurdle in the field of house - building. Therefore, a significant reduction in the construction cost is highly inevitable if any solution to the housing problem is to be sought for. The situation necessitates for a recourse to low-cost housing which itself is a concrete solution to the gigantic shortage of housing in the state at present.

In this context, the service rendered by both Nirmithi and COSTFORD

(the two major low-cost house - building agencies in the state) in housing construction is magnificent as they give much emphasis to the construction of Low - Income Group (LIG) houses especially in the rural areas. Now, a large number of people are opting low cost housing technology as low - cost technology has proved to be liveable, loveable, affordable and even eminently suited to the climatic conditions of the state.

## **1.2 SCOPE OF THE STUDY**

The scope of the study is limited to the examination of the trend and pattern of the demand for low-cost building materials and technology in Kerala. Based upon the local availability the selection of building materials changes from place to place. For example, the building materials employed in Kannur district is entirely different from that of the materials employed in Thrissur district.

It is also seen that the consumption of building materials changes both quantitatively and qualitatively in the various stages of housing construction. Accordingly, the cost of construction also changes between the conventional and cost - effective technologies.

## **1.3 OBJECTIVES OF THE STUDY**

The basic objective of the present study is to focuss attention on the trend and pattern of the demand for low cost building materials in Kerala.

It also intends to examine the economy and the future prospects of the demand for low-cost housing technology in the field of housing as the demand for building materials emerges out of the demand for housing. Against this background the study lays down the following objectives.

- i. To examine the relative cost differences between the conventional and cost effective technologies with special reference to Nirmithi and COSTFORD.
- ii. To examine the preferential differences in building materials employed by both Nirmithi and COSTFORD.
- iii. To analyse the trend and pattern of the demand for low-cost houses built by Nirmithi and COSTFORD in the state and
- iv. To examine the factors influencing the household's demand for low-cost housing.

#### **1.4 SOURCE OF DATA AND METHODOLOGY**

The present study is based on both primary and secondary data. The secondary data has been used to meet the first, second and third objectives while the last objective is based exclusively on primary data.

At first, for the objective of finding out the relative costs and quantity differences between conventional and cost effective technologies, an analysis showing the estimated costs and materials used for the construction

of an 800 sq. feet plinth area house for example, using conventional and cost effective technologies has been made.

Further, for comparing the relative costs and quantity differences between Nirmithi and COSTFORD an analysis has been made which shows the estimated costs and materials required for the construction of a 2000 sq. feet plinth area house, for example, constructed by Nirmithi and COSTFORD both using cost - effective technology.

Next, for analysing the trend and pattern of the demand for low-cost housing and for finding out the intra-district variations in the type of materials used by both Nirmithi and COSTFORD centres the data from five districts of the state has been used as samples. For this purpose data has been collected by making use of questionnaire I.

In order to have a micro- level study of the same, the entire revenue districts of the state (total 14 districts in Kerala) has been divided into five different zones viz. North zone (which includes Kasaragod, Kannur, Kozhikkode and Malappuram districts), North - Eastern zone (which includes Palakkad and Wayanad districts), Middle Zone, (Thrissur district). South zone (which includes Thiruvananthapuram, Kollam, Kottayam, Ernakulam and Alappuzha districts) and the South Eastern zone (which includes Pathanamthitta and Idukki districts).

Out of each zones one district each has been randomly selected as samples for which random sampling (Lottery method) has been used. Thus, the samples obtained are as in the following.

- i. Kannur district from North zone.
- ii. Wayanad district from North - Eastern zone.
- iii. Thrissur district as middle zone.
- iv. Thiruvananthapuram district from south zone and
- v. Idukki district from South-Eastern zone.

Lastly, for examining the factors that determine the household's demand for low-cost housing total 150 households (75 households which opted low-cost technology and 75 households which opted conventional technology) have been selected as samples from five panchayats of the districts.

The households have been selected by using Lottery method while the panchayats have been selected by the means of purposive sampling. Those panchayats which have more number of low-cost houses have been purposively selected. The 75 conventional houses also have been selected from these same panchayats. The necessary data and information has been collected by conducting household surveys and direct personnel consultation with the members of the family by making use of questionnaire II.

For the study the panchayats have been selected in this way that one

panchayat each from each Taluk of the district (total five Taluks in Thrissur district) and from each panchayats 15 (20-21%) households each (both low-cost and conventional) have been selected as samples. The panchayats selected for the study are as shown below.

1. Arimpur panchayat from puzhakkal block of Thrissur Taluk.
2. Chelakkara Panchayat from Pazhayannur Block of Thalappilly Taluk.
3. Porathissery Panchayat from Irinjalakuda Block of Mukundapuram Taluk.
4. Venkitangu Panchayat from Mullassery Block of Chavakkad Taluk and
5. Perinjanam Panchayat from Mathilakam Block of Kodungallur Taluk.

The reasons why Thrissur district has been selected as the focuss of study are the following :-

1. Thrissur COSTFORD is the Main Centre of the entire COSTFORD centres in the state. All other units are the subcentres of it.
2. Thrissur COSTFORD occupies the primary position in undertaking more number of low-cost residential projects than elsewhere in the state and.
3. Thrissur Nirmithi won Sri Viseswarayya National Award of 1999 and the National Award of 2000 and 2001 years as the best building centre all over India.

However, the whole analysis of the study relies on both primary and secondary data. The analysis has been made with the help of some simple statistical tools such as averages, percentages etc. For the purpose of examining the trend growth of low-cost residential projects in the state during 1990-2000 AD, the Trend Line Graph using “Free Hand” or “Graphic Method” has been used. Since the majority of low-cost houses being Low Income Graph (LIG) houses the trend growth of only LIG houses has been projected by the Trend Lime Graph.

In order to find out the factors influencing the household’s demand for low-cost housing chi-square test has been employed. For this purpose, the households have been classified on the basis of some variables viz. annual income status, Family size and availability/ non-availability of grant from the govt. for housing.

Lastly, for a detailed analysis of the study secondary data has been collected from various project reports published by both Nirmithi and COSTFORD centres. Statistical information has been collected from various sources such as Indian Economic Journal (IEJ), Economic and Political Weekly (EPW), The Construction Journal of India (CJI), Indian Construction Journal (ICJ), various Survey Reports by National Building Organisation (NBO) and Central Building Research Institute (CBRI), Published and unpublished works of Authors and Researchers, Draft Report

of five year plans, Reports from Global Nirmithi Net (GNN), Data from Ministry of planning and Human Resource Development, Project Reports and Dissertation works of various universities and so on.

## **1.5 STRUCTURE OF THE THESIS**

The text of the thesis is discussed in total eight chapters. The thesis opens with an introduction in which the problem to be investigated is briefly stated. It also covers the relevance, scope, objectives, methodology and limitations of the study. The second chapter is concerned with the review of literature. The third chapter discusses about housing - a multi dimensional concept and a problem in the state at present is briefly explained. The fourth chapter explains some cost-reduction techniques employed by both Nirmithi and COSTFORD centres in house building. The fifth chapter deals with the relative cost variations between conventional and cost effective technologies. It also explains about the relative cost variations between Nirmithi and COSTFORD centres in the state. The sixth chapter is concerned with the trend and pattern of the demand for low-cost housingg constructed by Nirmithi and COSTFORD during 1990-2000 years. The seventh chapter deals with an attempt of finding out the factors influencing the household's demand for low-cost housing technology. And the last chapter gives summary of findings and conclusions thereafter.

## **1.6 LIMITATIONS OF THE STUDY**

The study has been confronted with the limitation of non-availability of some required data and information. However, maximum attempt has been made to enable the study a fruitful pursuit, keeping errors the minimum.

# REVIEW OF LITERATURE

Ramachandran. K.V. “Demand for low-cost building materials in Kerala”  
Thesis. Department of Economics, Dr. John Matthai Centre Thrissur,  
University of Calicut, 2001

**CHAPTER - II**  
**REVIEW OF LITERATURE**

## **CHAPTER - II**

### **REVIEW OF LITERATURE**

The literature on the subject of the demand for low cost building materials and technology is fairly so limited. Infact, it has become a subject of increasing international interest especially since 1950s when the Third world countries have been experiencing population explosion and the resultant problems of high pressure on land and huge inadequacy of housing facilities. Thus, all countries in the world are making sustained efforts to overcome such problems through their national plans.

The increasing priority does not guarantee the total alleviation of the problem. But, it can be solved only by the means of effective management and rational application of building materials and technology on a country-wide scale. So, there is much need for innovating cost effective technology as a strategy for realising the goal of shelter to all.

However, only few studies had been made in this direction. A brief review of the available studies in this field is attempted in the following sections.

Robert M. Buckley and Eugene N. Gurenko studied housing and income distribution in Russia in which they stressed that the inadequacy

of housing and its effect on the quality of life go on a long way toward explaining many aspects of Russian life. According to them the housing allocation had a progressive effects on the distribution of income in Russia. The increase in income inequality that occurred in recent years is significantly reduced. The study brings out the point that the progressive housing allocation enables the equitable income distribution.

Mrs. Gillane Allam, Ambassador of Egypt to India, underscored the need for the use of costeffective and environment friendly technology if the commitment of the global community to provide affordable shelter to all is to become a reality.

Dr. Sankar Dayal Sharma, Erudite scholar and former president of India Said human life would become richer and meaningful if human settlements are in tune with nature. Inaugurating the international colloquium on Habitat for the 21st century, He gave a fervant call for living in harmony with nature.

Dinesh Mohan in his study Three Decades of Building Research in India, pointed out that problems of modern India are, however, of an entirely different genre. We face the staggering shortage of shelters for teeming millions who live either under the sky without any roof or under appalling conditions of abject poverty. To find a shelter for each of them at a

low-cost is the greatest challenge of all times. The study highlights the problem of severe housing inadequacy confronted by the country at present.

In the words of T.K. Majumdar, the inaccessability of low-cost housing and the initial structuring of inequalities whether in land, housing, space standards or in allocation of resources for improving living environment of low-income population are the factors that oblige the rural migrants to built their own shelter on illegallry occupied lands. According to him, the inaccessability of hosing especially to the rural migrants is the resultant effects of inequalities in land and allocation of resources.

Gopikuttan. G, in his study housing boom in Kerala causes and consequences exaines the recent trend in the field of house building and the consequent cause and effects on Kerala economy. He says a construction boom is going on everywhere of the state.

Narayana and M.Ramanjaneyulu in their study rural housing in India, view that rural housing under the employment programme has to satisfy the schematic norm of achieving the minimum of 50 percent of the total cost as wage cost. Therefore, the specification should be labour intensive and cost effective. Besides, the house should be durable. This can be achieved only through such low-cost technologies that can respond to the requirements of housing. Low-cost technology does not mean sacrifice of quality and

durability. It only means avoidance of extravagance and minimising the use of costly materials like cement, steel and wood. The approach is to use locally available materials avoiding long distance transportation.

J.C. Anyanwa in his study housing finance in Nigeria is of the opinion that all housing professional bodies including the Building and Road Research Institute (BRRI) and other research centres should be encouraged to use low-cost local building materials such as bamboo rafias, willos and Palm fronds, stones, lime stones and gravels, laterite soil, clays, timbers and tall grasses and rice husk ash etc. Regrettably, inspite of the availability of these raw materials, imported materials which are too expensive are used. Thus, time has to come for inward-looking and use locally available raw materials to build houses. With adequate designs local materials could produce satisfactory building that will stand the test of time. Judicious use of cement, stabilised laterite brick walling, local raffiamat and polished raffia sticks for ceiling etc., will surely reduce housing cost as evidenced by the proto-type houses recently constructed by the University of Lagos costing Rs. 38,000 each as against Rs. 150,000 if imported materials are used. This study pinpoints the need for using cost-effective technology and locally available building materials for housing.

H.M. Desarda in his study rehabilaitation of earth quake victims, says that there is near unanimity among sceismologist, geologist, earth-

scientist, structural engineers and architects that it is economically and ecologically wise to build houses with the local material with due care of structure, safety and energy efficiency.

In the words of Gurbirsingh and P.K. Das architecturally the cheapest and most friendly model would be the ground + one or ground + two, if necessary. The “horizontal approach” (layout) rather than multi-storey constructions would be most in keeping with the environment slum-dwellers are used to in close neighbourhood and at the same it would avoid the high construction and maintenance costs that highrise buildings involve. In this study they suggest that in order to avoid recurring maintenance costs, better to prefer either ground + one or Ground + two horizontal layout than the multi-storey constructions in housing.

According to the Draft Status Report on housing and construction technology July 1975, the speedier and economical construction play a significant part in industrial development of the country. Most economic planning must be aware of the importance of construction to balanced economic and social development. For housing problems to be tackled in a very effective manner, it is necessary that all the aspects (socio-economic and technological factors) be gone into detail. The gap between demand (requirements) and supply (what is available) at an economic price is so wide and the choice of technology, management for the available resources

and increasing social aspirations so complex and varied that there is a need for the setting up of a housing commission by the Govt. of india. The report focusses on the fact that the gap between both the demand for and supply of housing is so wide which can be reduced by the choice of technology and effective management of resources.

Mr.Bijiani in his study housing problem, said, some immediate steps had to be taken to solve housing problem. He recommended that to keep cost as well as sole price of houses within the paying capacity of the people, to provide more money for housing sector, to reduce construction cost, to avoid delay in implementation and allotment of housing projects and for finally to make best use of available resources.

Charles Correa in his study housing problems in Rural India, Says the materials and skills used for housing should be local and the settlement pattern as per the local needs. He further added that, the houses for the poor will have to be so cheap that masses can afford it. These houses should also have minimum maintenance cost and they must fulfill the basic function of a house.

Indira Hirway in a study housing for the rural poor, focussed on the major problems of the rural houses that such houses have high recurring (maintenance) costs which the poor cannot afford and they are incapable

of giving protection against natural calamities like floods, cyclones and the surroundings of the houses lack the most fundamental requirements for hygiene. Therefore, Hirway stresses that the housing programmes should be socially and culturally valid and should be suitable to the climatic as well as to the economic conditions of the poor. That is, the architecture of the house, the shape, the size, the layout, the materials used etc. should be suitable to the local conditions.

Vinay Lal in a study, budget and housing sector gives a picture about budget and housing and Murthy focusses on Indira Awas Yojana, the construction of low-cost housing.

N. Vijay Jagannathan and Animesh Halder in their study of income - housing linkages, pointed out that the economic perspectives of housing or shelter are being questioned in the third world countries particularly so when the urban poor in the developing countries the concept of shelter has several dimensions. For some it is a valid factor of production in their economic pursuits while for some others it is merely a barricade for privacy in a highly congested urban environment. There is also another category of urban poor who live and earn their living with no form of shelter what so ever.

Kiranwadhva studied the housing programmes for urban poor - shifting

priorities, in which he traces that the ultimate solution to the problem of housing, however, is to treat the cause rather than the symptoms. The real cause is a level of income which is low that at existing prices, even an extremely modest housing acceptable standards is beyond the affordability limit of the poor. Clearly efforts have to be directed both at improving the income status of the poor and at the sametime working for solutions towards reducing the cost of housing.

The census report on housing problem in Kerala 1990, has recorded that in Kerala there were 42.89 lakhs of households and 41.33 lakhs of occupied dwelling units. Any scheme to wipe the backlog and to cope up with the increasing demand every year should include programmes for conservation by repairs and improvement of the existing stock and for putting new houses in place of those which are fit for demolition and replacement, minimum standard of stability and convenience to meet the new demand is also necessary. "A house saved is a house made".

Gopikkuttan. G., analyses the house construction boom in Kerala, its impact on economy and society. House construction activity in Kerala has taken a sudden upturn since the mid seventies. He pinpoints the impact of this boom on factor and material markets, employment, skill mix and technology. The study advocates the formulation of a housing policy along with clear cut programmes for their implementation which are integrated with the general planning process.

Jeethoo and Dipti Bhardwaj in a study, development of mud technology for rural shelterless, highlighted the advantages of mud as a building material and mud technology should be developed for rural shelterless.

Gopalakrishnan in a "notes on our development experience in independence 1950 - 1985, gives a vivid picture on housing and stresses the need for alternative techniques which will reduce the cost of construction.

H.M. Desarda in a study, rehabilitation of earth-quake victims - problems of housing, traces that as the well known architect Laurie Baker suggested after his visit to the earthquake affected area, the houses should be built on existing sites and that too with the maximum local material. Also, there should not be monotony or excessive uniformity in the design. Above all, the people who are going to live there should built it themselves contributing their physical labour and mental concepts.

Richard W. Franke and Barbara Hchasin made a study on Kerala's radical reforms as development in an Indian state. The study stresses on the fact that moving people away from the earth-quake- hit villages is not the right solution. What is needed is a policy which makes it possible for people to participate in building safe structures for themselves.

On september 1993 Lathur in Maharashtra the earth quake took heavy loss of human life. Evidence prove that this is largely because of the construction method, design, and the structure of the existing houses, the mud and loose boulders have simply caved in. The housing stock was very old and for generations very little maintenance was done, nor repair and renewal and hence it simply could not withstand any shock. In such earth quake proven areas, the innovation of cost-effective environment friendly technology is very apt and highly inevitable.

As per an Economic Times Presentation 1995, it is stated that today, design elements, construction techniques and materials have changed drastically from traditional norms. It's the era of new ideas, new technology and means of communication, new geo-political relationships, new value systems, new concepts and new life styles. Our planners and architects are already becoming aware of this change. Modern architecture reflects emerging international styles in function decor and efficient use of new methods and materials.

One such material is float glass, an internationally popular superior quality glass. This can be used for window glacing, partitions, table tops, doors, furniture and curtain walling thus providing more garden, more sky and more natural light. Thus, glass becomes an alternative to conventional building materials for example, cement, bricks, plywood and steel. This

not only saves on floor area and costs of structural and envelope components but also makes glass environment friendly. Therefore, it is noteworthy that technological knowhow is constantly updated and absorbed through a host of international collaboration with world leaders in building materials technology.

Amritha Abraham in a study, housing for the poor, identified that the housing problem is the problem of housing for the poor. When population increases slum population correspondingly increases and so the shelter problem becomes more acute.

According to the Draft Eighth Five year plan (1992-97) of Kerala, shelter is an instrument between man and his environment promoting his safety, protection, privacy and prestige. Kerala's eighth plan has a slightly different emphasis mainly because the state has already achieved relatively a high level of development in social infrastructure as compared to other states. The draft eighth plan of the state while recognising the need for giving top priority for poverty alleviation through increase in employment holds that the industrial and agricultural sectors and activities like housing, tourism, etc. should get the highest priority during eighth plan period.

C.V. Ananda Bose, the former Director of Kerala State Nirmithi Kendra (KESNIK) while analysing the vexed question of housing in the country, keeping the essence of Nirmithi movement in Kerala, underlines

the need for propagating cost - effective environment friendly building technology to tackle the problem of rural housing. He emphasises the need for bringing about a new design and construction culture avoiding unnecessary costs and eliminating wrong notions.

Dr. Neela Mukherjee in a study rural poor and housing issues and approaches, says that the present scenario calls for the formulation of a comprehensive housing policy - Among the measures suggested are, a detailed survey to identify the needy, popularisation of cost-effective technologies, appropriate housing design and involvement of beneficiaries.

Dr. S.C.Lahiry, in a study rural housing an overview, says the rising cost has a dampening effect on the housing sector and the need of the hour is to promote low-cost and environmentally appropriate technology and use of indigenous resources.

Prof. N.N. Chhabra in his study, low-cost rural housing design - a national exposition, views that "GRAMAWAS 95" was an effort at finding out a feasible solution to the rural housing shortage as well as applying innovations involved in the use of locally available building materials.

Dr. K.N. Raj in a study rural housing in India, says that low-cost housing is the answer to the spiralling construction cost. People ought to be convinced and guided not only in adopting new technologies but also

helped in designing and planning their own dwelling units. This calls for a change in the mindset and a new construction culture reducing costs and avoiding over designing and eliminating wrong notions. We should guard against the efforts of the powerful building lobby and the conventionally trained engineers to sabotage the low-cost technology and also put an end to our “West is Best” attitude. Let us enrich further our rich building culture by assimilating only the best practices from the west.

Prof. R.N. Iyengar in his study rural housing a discussion, suggests certain policy issues to overcome the shelter problem. The policy issues he suggests are (1) to remove legal constraints with a view to increase supply of serviced land, (2) to provide stimulus and support for housing through credit finance mobilisation, (3) to promote use of cost-effective and appropriate technologies, and (4) to promote employment generation schemes which directly and/or indirectly help housing activity.

Laurie Baker, the architect of low - cost technology in Kerala, says, the construction techniques and materials need to be good, energy saving, strong, waterproof and so on. We cannot sincerely and effectively plan rural housing from a city office desk. We have to go to the villages and plan for their real needs.

K.R. Nayar in a study housing amenities and health improvement - some findings holds the view that housing is a health promoting factor.

Cities like New York and Boston faced a complexity of problems like housing, water supply etc. In this study he suggests that the improved housing has an influence on health improvement. The influence of housing and amenities on health is inconsistent.

From the available literature on the subject it is seen that only few studies had been made with respect to the problem of housing, its causes and consequences. Further, all these studies highlight the need for innovating cost-effective technology as a right solution to overcome the problem of housing.

Though different studies had been made in this direction none of the studies bring out a pragmatic solution for alleviating the housing problem. But, even now, majority of the people are unaware about its practicability. It is for these people that Laurie Baker says “do not imitate others in house-building. Some people may imitate what other man round the corner of the street has built.

However, by the influence of traditional construction culture and wrong notions towards cost-effective technology, housing would become a colossal task to many. As Dr. K.N. Raj Says “West is Best” attitude should be changed. For this, a clear cut idea regarding the relative cost differences between conventional and cost-effective technology is a must which is being attempted in the present study.

# HOUSING - A MULTI-DIMENSIONAL CONCEPT AND A PROBLEM IN THE STATE

Ramachandran. K.V. "Demand for low-cost building materials in Kerala"  
Thesis. Department of Economics, Dr. John Matthai Centre Thrissur,  
University of Calicut, 2001

**CHAPTER - III**  
**HOUSING -**  
**A MULTI-DIMENSIONAL**  
**CONCEPT AND A**  
**PROBLEM IN THE STATE**

## **CHAPTER - III**

### **HOUSING - A MULTI-DIMENSIONAL CONCEPT AND A PROBLEM IN THE STATE**

In Kerala it is seen that the high cost of housing is caused not only by the escalating rise in the price of building materials but also due to the “insane craze” for the so called “new fashions” in house building.

The housing need is generally considered as a socio-cultural concept and determines the quantity and quality of the accomodation which the households are willing to pay for. But the demand normally varies with the price of dwelling, with household’s income, their accumulated savings and/or financial loans available to them.

The building construction to day has grown in size accelerated in pace and became so highly mechanised that it is nothing but an outdoor assembly plant. It is highly traditional, regionally and locally conditioned activity, bound up by a variety of cultural, social, climatic as well as technical parameters.

In this era of rapidly rising prices of building materials, escalating wages, forced up by inflation and increasing energy costs the initial costs of construction has been rising at an ever increasing rate. Moreover, the

follow on costs such as maintenance and operations have also escalated rapidly.

In such a situation, technology transfer is highly inevitable. There should be a shift from conventional building technology to cost effective technology in housing construction. Technology transfer has been given prominence in introducing innovation and technologies whilst transfer of technology is important in manufacturing and processing industries. That is how, Japan which initially got technology from the west improved upon them and took the lead in manufacturing.

Anyway, the houses built by low-cost technology is eminently suited to Kerala atmosphere and such houses ensure longer life, lesser maintenance, better aesthetic and greater comfort. Thus, low-cost housing is still a hot topic among researchers and planners as the construction costs have gone up over the period of last two decades.

### **3.1 MAGNITUDE OF THE PROBLEM IN THE STATE**

The acute shortage of housing settlements is one of the basic problems confronted by the state at present. The soaring price of building materials is the main factor which causes this problem. It has a cascading effect on the overall cost of construction.

If this trend is followed, the housing scenario since the year 2001 presents a pathetic picture. Housing has been a neglected area. The non-availability of accessible land at reasonable price keeps the poor man away from building apartments.

Just converse to this the need for more and more dwelling units arose on account of the formation of nuclear families caused by the rapid urbanisation and development. It necessitates the construction of a large number of new houses in the state. Anyway, the total requirement of new houses in the state for the period from 1990-2000 year come to nearly 30 lakhs (State Planning Board, TVM).

This calls for the construction of 3 lakh new houses yearly if the housing problem is to be solved completely by the turn of 2000 AD. It indicates the magnitude of the problem and the importance of bringing down the cost per house. So that, with the available resources more number of families can be provided with house. The lowering the cost of construction emphasises the need for adoption of new building materials and construction techniques which are capable of cost reduction.

However, the shortage of dwelling units around 30 lakhs indicates only the quantitative aspect of the housing problem. The poor condition of a large part of the existing housing stock and the over crowding in houses

and tenements shows the qualitative aspect of housing problem which is specially seen everywhere in the state.

The hardest hit by the spiralling cost of construction has always been on the lower, middle class and weaker section of the population. Therefore, the rapid increase in the cost of materials became the main source of concern for the prospective house-owners. Thus, efforts have to be directed at improving the income status of the poor and at the same time working for solution towards reducing the cost of housing.

Low cost housing, no doubt, is the answer to the spiralling cost. The Cost Effective Environment Friendly Technology and building materials developed by Nirmithi and COSTFORD centres have been popularising through the effective dissemination of information and demonstration. People ought to be convinced and guided not only in adopting new technologies but also helped in designing and planning their own dwelling units. This calls for a change in the mindset and a new construction culture-reducing costs and avoiding over designing and eliminating wrong notions.

Cost effective technology can be defined as a “technology that is economically and functionally very appropriate and at the sametime meeting certain minimum criteria of social, environmental and aesthetic norms. Thus, cost effective technology implies that from the given physical

resources of funds, materials, land and skilled workforce, we should be able to build the maximum number of houses of good quality at an affordable cost. The traditional technology and materials of Kerala underwent radical changes with the introduction of modern construction materials and technology on a large scale right from early sixties.

The magnitude of the problem together with resource crunch has necessitated the application of cost reduction in the construction of houses. Cost reduction without sacrificing strength, stability and durability and avoiding wastage in construction is a must.

At present, a number of alternative technique of wall construction, roofing systems, mortar and plaster combinations, new designs etc. have been experimented by Nirmithi and COSTFORD and to a large extent-found socially and economically acceptable. Products like hollow bricks for walls, compacted mud blocks, ferrocement, bamboo-polythene-lime surfiroofs, treated rubber woods for doors and windows were provided to cut the cost of building construction by about 40% (Regikumar.G. 1998). Most of these new designs and techniques are aimed at cutting down the wasteful or excessive use of materials such as cement, steel, sand, timber etc. The Nirmithikendras of Kerala which is the most significant land mark in the field of housing has demonstrated that construction cost can be reduced to 25-30% (Dr. N.A. Karim 1996) if the new materials and technologies are discerningly used.

# VARIOUS COST REDUCTION TECHNIQUES EMPLOYED IN HOUSING CONSTRUCTION

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**CHAPTER -IV**  
**VARIOUS COST**  
**REDUCTION TECHNIQUES**  
**EMPLOYED IN HOUSING**  
**CONSTRUCTION**

## **CHAPTER -IV**

### **VARIOUS COST REDUCTION TECHNIQUES EMPLOYED IN HOUSING CONSTRUCTION**

The main thrust of building research has been to improve upon the conventional practices and develop new prefabricated and cast-in-situ construction methods, mechanical aids, modern management techniques to achieve appreciable reduction in cost and time of construction and to effect maximum possible saving in the consumption of costly and scarce materials like cement and steel as well as improving quality in construction. Techniques for construction of walls and roofs were developed with a view to make an optimum use of local materials such as soil, bricks, lime and timber.

The Central and State Construction Departments, Housing Boards, Development Authorities and other construction agencies either on charitable or voluntary basis have come forward for promoting the innovative techniques in their large scale housing programmes. Some important innovative techniques are used by these agencies for the construction of walls, roofs and building services (eg: drainage) which consume over 50 % of building cost.

Premier R& D institutions engaged in the field of building technology

like central Building Research Institute (CBRI), Roorkee, structural Engineering Research Centre (SERC), Chennai, National for cement and Building materials (NCB) Ballabgarh and the Regional Research Laboratories etc. have played an important role in the development of cost effective construction techniques and materials.

On the other hand, organisations like National Building Organisation (NBO) New Delhi, Building Materials and Technology Promotion Council (BMPTC) New Delhi, Housing and Urban Development Corporation (HUDCO), New Delhi and Housing Development Finance Corporation (HDFC), the National Network of Nirmithikendras under the aegis of HUDCO and COSTFORD centres throughout the state have been playing useful role in the promotion of innovative construction techniques evolved by the afforesaid research institutions in the country. NBO had experimented with 60 innovative cost reducing techniques in as many experimental projects.

Amongst 60 types of construction techniques only two dozen techniques found wider application in large scale housing programmes. Emphasis was laid on partial prefabrication instead of total prefabrication in the construction of NBO experimental buildings. Such a system leads to saving in cost and speed in construction.

Out of these precast components successfully employed in the experimental buildings precast roofing units viz, reinforced concrete (RC) channel units, precast RC solid plants and joists, precast- RCC lintels, stone block masonry are note worthy. Other popular technologies emerging out of successful field trial of the innovative techniques include the concept of construction of 4-5 storeyed buildings having single-brick (23 cm) load bearing walls, in all the storeys, double storeyed construction with 19 cm load bearing masonry walls use of 11 cm (half brick) thick load bearing masonry construction having Z-shape in cross section for the urban poor and single slack system of plumbing.

The adoption of chemical specification for mortars and plasters, as tried out in several experimental projects, is by now a routine affair in the construction of buildings under the large scale housing programmes taken up by several housing agencies across the country for the Economically Weaker Sections (EWS) and Low Income Group (LIG), categories of the population.

Several alternative building materials like secondary species of timber, dry-hydrated lime, flyash and plastics had been successfully tried out under several NBO experimental projects. Flyash, an industrial waste from thermal plants, has been experimented in a bigway under several such NBO projects sponsored by the Neyveli Lignite Corporation (NLC) Military Engineering

service (MES), Haryana Housing Board and Tamilnadu Housing Board etc. It was tried out as partial replacement of cement in plaster and mortar and in the production of bricks and blocks. The results of such experimentation have been quite encouraging.

The Building Materials Technology Promotion Council (BMTPC) under the ministry of Urban Affairs and Employment has undertaken identification of potential technologies which could help in larger utilisation of industrial wastes like flyash, phosphogypsum and blast furnace slag in construction industry. The council has prepared technical profiles in respect of clay-flyash burnt bricks, fly-ash-sand-lime bricks, cellular concrete components, alumina red mud bricks and phosphogypsum based building components for their larger exploitation in building activities.

The popular cost-effective construction techniques promoted by Nirmithi Kendra and COSTFORD include Rat-Trap Bond, Filler Slab, Brick Arches and Waffle Shell system for roofing. Now, burnt clay bricks are being replaced by factory - produced concrete blocks. Similarly, newer construction techniques are also being used.

In the private sector, shirke - siporex consortium, pune has relied on the concept of total prefabrication for mass housing programmes. The firm manufactures pre-cast hollow columns and beams, lightweight concrete

slabs and blocks and wall panels with swedish know-how which has been extensively used in construction of over 100,000 dwelling units of all categories both in India and abroad.

The Tunnel Form System of Prefabrication for mass housing programmes promoted by ECC construction Group of L & T (Larson and Tubro), Bangalore, is yet another construction techniques which deserves mention in the context of technological options for housing for the masses. Under this system, the walls and floor slabs are cast in a continuous pour of concrete using room - size structural steel framework called "Tunnel Form". This technique of construction has been successfully employed in construction of 1,500 dwelling units measuring 75 m<sup>2</sup> each for the employees of Tata Iron and Steel Company Ltd. (TISCO) at Jamshadpur. The entire construction, which was based on the knowhow acquired from a French Firm "SPECTRA" was completed within a period of only 32 months.

Very recently the largest cement manufacturer in the country "The Associated Cement Companies Ltd" has also acquired "Tunnel Form" construction techniques from a Danish Firm "Scan Form Building System Ltd". The company is contemplating in the use of this system for mass-housing constructions.

Thus, there is enormous potential in terms of technical capabilities

available in the country which could be Judiciously exploited for providing affordable housing to the masses. Thus, before embarking upon a particular technology it is important to work out the “Cost Effectiveness”. In case of thin precast flooring/roofing units, due attention should be given to the proper detailing of Joints and for ensuring diaphragm action of such roof/floor.

Therefore, while undertaking any mass housing programme, due consideration is required to be given to the holistic approach to the various issues related to it such as financial resources, land availability, provision of necessary infrastructural services, selection of suitable cost effective construction techniques and materials etc.

#### **4.1 SOME COST REDUCTION TECHNIQUES NOW IN PRACTICE**

For cutting down the construction cost various cost reducing devices have been introduced by Nirmithi at National level and COSTFORD Centres in the state for their large scale housing construction. Some of them are the following.

##### **4.1.1 Thinner walls or single brick thick walls**

Using thinner walls in construction and single brick thick walls, enhance the structural safety of buildings.

#### **4.1.2 Load bearing brick work**

It is now possible to construct 4-5 storey buildings in load bearing brick-work. By the adoption of this technique 5 - 15 percent saving in cost is achieved depending upon the structural requirements, type and strength of bricks etc. Over 1,60,000 houses have so far been constructed with this technique by the major construction agencies like central PWD (CPWD), Delhi Development Authority (DDA), Military Engineering Service (MES), Tamil Nadu Housing Board, Tamil Nadu Slum Clearance Board, PWD West Bengal and Uttarpradesh etc.

It is recommended by CBRI that due to the adoption of thinner section of wall and newer type of bonding, the load carrying capacity of walls subjected to axial and eccentric loads should be reduced by 15 percent. By the adoption of 19 cm thick walls 17 percent saving in construction of bricks and mortar is achieved. As both the faces of the walls are even, only 10 mm thick plaster is required. An additional advantage by the use of this technique is the increase in floor area for the same plinth area. Using this techniques several LIG and EWS houses were completed at Ludhiana under NBO Experimental Housing Scheme. Some houses were constructed in Tamil Nadu also.

#### **4.1.3 Brick-on-Edge Cavity Wall**

The Central Building Research Institute (CBRI) Roorkee has

developed a technique of construction of brick-on-edge 20 cm thick cavity wall (CBRI Data Sheet 1972) which consists of two masonry leaves each of 7.5 cm thickness with a continuous air gap of 5 cm between them. The leaves are tied together either by corrosion proof metal ties or brick or concrete blocks. Two storey residential buildings could be constructed with such cavity of bricks having crushing strength not less than  $100 \text{ N/mm}^2$  and mortar not leaner than 1 : 3 in cement or 1 : 1 : 6 in cement and lime.

The adoption of brick cavity walls result in a saving of upto 30 percent in bricks and mortars, 15 percent in overall cost as compared to 23 cm thick brick walls and the inner leaves remains dry. This technique was used for the construction of middle school buildings in shantinagar, Roorkee and by University of Roorkee for lecturer's residences. It was also used under NBO Experimental Housing Scheme for Assistant Professor quarters at Thapar Institute of Technology, Patiala and Several double storey quarters in Gandhi Nagar Township, Gujarat, and a large number of both institutional and residential buildings in Tamil Nadu and Kerala.

#### **4.1.4 Precast stone masonry block**

Stone masonry wall is 15-20 percent cheaper in cost as compared to random rubble masonry where bricks are costly. A large number of houses have been constructed with stone masonry blocks in different parts of the country by different construction organisations. In the Northern districts

of Kerala, majority of the houses are constructing by using precast stone masonry block. In Andrapradesh and west Bengal Prefab factories have come up which supply these blocks.

#### **4.1.5 Modular Brick Masonry Walls**

To introduce and achieve the benefits of modular planning in building construction it is necessary to produce bricks in a module of 10 cm. The nominal size of modular brick is 20 cm x 10 cm and so it has some advantages over the conventional bricks viz, (i) it gives more floor area (ii) results in upto 10% saving in the quantity of bricks and 24% in the consumption of mortar and (iii) consumes less clay and coal.

#### **4.1.6 Hollow Clay Blocks For Shell Type Houses**

Hollow clay blocks are arranged in a category profile and supported over a foundation of random rubble or brick masonry. The shell serves both as wall and roof for the house. There is considerable saving in cement and no steel is used. About 15% saving in cost could be achieved. A large number of houses have been constructed with hollow clay blocks in the states of Kerala and Tamil nadu.

#### **4.1.7 Sundried Brickwalls with Waterproof Treatment**

The use of mud walls is still a predominant feature in villages. Such walls require continuous attention and repair every year as the rain erode

them. CBRI Roorkee has developed a non-erodable mud plaster which makes the walls water repellent. When the mud plaster is partially dry a leaping of cowdung and soil (1:1) is applied. When it is dry, the surface can be white or colour washed if desired.

#### **4.1.8 Precast Hyperbolic shell for roofing**

By adoption of Hyperbolic shell roofing system (NBO 1980) beams and columns could be avoided and long spans such as stores, halls, etc. could be covered in an economical way. The use of such type of shells require less maintenance and are aesthetically pleasing.

Anyway, the proper handling of man-power and materials requirement is very necessary to reduce the construction cost. An estimate of man power and materials is generally required prior to the start of actual construction for seeking technical and other administrative sanction, calculating the requirement of various materials and labour, planning and budgeting purposes, calling and Justification of tenders etc.

## **4.2 TYPE OF CONSTRUCTIONS IN KERALA**

There are various types of building constructions generally applied by the low-cost housing agencies in Kerala. Some of them are viz, (i) modular constructions (ii) Wood - Frame Modular Constructions (iii) Masonry Modular Constructions, (iv) Plant and Beam Constructions, etc... A brief description about each of them is given below.

#### **4.2.1 Modular constructions**

Modular construction is a method of designing and building a house in which the component parts sized according to some agreed upon basic unit of length or module.

#### **4.2.2 Wood-Frame Modular Construction**

The National Forest Products Association has developed what it calls the Unicom method of house construction that seeks to fit traditional lumber sizes and building products into the 4 - in-module. The object is to maximise the use of modular components and minimise the cost of construction.

#### **4.2.3 Masonry Modular Construction**

Modular masonry construction is also in the 4-in-module, although the individual bricks and concrete blocks are not. A masonry wall, is ofcourse, constructed with mortar joints between the masonry units and in modular construction the thickness of these mortar joints is considered part of the modular dimension.

#### **4.2.4 Plank-and-Beam construction**

Also known as “post and beam construction”. It is a method of building the framework of a house in which fewer but much heavier timbers are used instead of the light or and more closely spaced joists, studs and rafters of more traditional wood frame construction.

However, innovations and their application keep society growing, dynamic and competitive and help in improving peoples welfare overtime, We need to train our manpower resources in such a way that we can reach international levels of technology and quality in some fields and gain a reputation and self- reliance at international level. In every major fields today, machine tools, electronics, chemicals, technology and so on we are dependent on foreign collaboration. This is not to say we must not have foreign collaboration but to stress that we must learn from it and build on it on the basis of a clearly understood strategy.

Further, in areas where we have no access to foreign scientific and technological knowledge and we decide that the ends are important enough, there are proven instances of success. Nuclear energy and space applications are outstanding examples where although we are not fully self-sufficient we have made phenominal progress (Vinod Vyasulu 1993).

THE RELATIVE COST VARIATIONS  
BETWEEN CONVENTIONAL AND COST-  
EFFECTIVE TECHNOLOGIES WITH  
SPECIAL REFERENCE TO NIRMITHI AND  
COSTFORD

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**CHAPTER - V**

**THE RELATIVE COST  
VARIATIONS BETWEEN  
CONVENTIONAL AND  
COST-EFFECTIVE  
TECHNOLOGIES WITH  
SPECIAL REFERENCE TO  
NIRMITHI AND COSTFORD**

**CHAPTER - V**  
**THE RELATIVE COST VARIATIONS BETWEEN**  
**CONVENTIONAL AND COST-EFFECTIVE**  
**TECHNOLOGIES WITH SPECIAL REFERENCE TO**  
**NIRMITHI AND COSTFORD**

At present both conventional and cost effective technologies are available in the field of house-building. Among these technological options the most apt one ought to be selected. But the selection of technology should be done only after having a comparative cost evaluation between the two. Then only we can ascertain the economy in construction and of the optimum use of materials.

Awasvikas Sansthan, Jaipur, has developed a relative cost variations between conventional and cost-effective specifications with respect to a residential building of 500 sq. feet plinth area. According to it, the cost for a residential project by using conventional specification is Rs. 1,98,504 while that of a new specification is Rs. 1,60,343. When compared to the cost of conventional specification the total saving by new specification is Rs.38,161. So, the percentage saving is 19.15. Again, the average sq. feet cost for conventional specification is Rs. 397 while that of new specification is Rs. 321. The average sq. feet saving by new specification is Rs. 76. (Survey by Awasvikas Sansthan, Jaipur).

NTIONAL AND COST EFFECTIVE

**5.1 RELATIVE COST VARIATIONS BETWEEN CONVENTIONAL AND COST EFFECTIVE TECHNOLOGIES (BASED ON MARKET PRICE OF BUILDING MATERIALS OF THE YEAR 2000-2001.)**

With regard to the present study a survey has been conducted at Nirmithi Kendra, Thrissur an April 2000 in which an attempt has been made to find out the relative cost variations between conventional and cost effective technologies with respect to an 800 sq. feet plinth area residential building as shown in the tables 5.1 and 5.1. (i).

**Table 5.1**  
**Cost Estimation of an 800 sq. feet plinth area, Residential Building**  
**using conventional technology**

Sl. No.	Materials	Quantity	Price in Rupees based on 1998 market price	Total Expenditure	
				Rs.	Ps.
(1)	(2)	(3)	(4)		
1.	Rubble	11 Load	at Rs.825 per load	9,075.00	
2.	Sand	32 m <sup>3</sup>	at Rs.400 per m <sup>3</sup>	12,800.00	
3.	Cement	265 bags	at Rs.170 per bag	45,050.00	
4.	Metal (20 mm)	16m <sup>3</sup>	at Rs.600 per m <sup>3</sup>	9,600.00	
5.	Metal (40 mm)	5 <sup>3</sup>	at Rs.350 per m <sup>3</sup>	1,750.00	
6.	Bricks	20,000Nos.	at Rs.1,600 per 1000	32,000.00	
7.	Wooden framed door with wooden shutter	-	-	41,600.00	
8.	Wooden framed window with glazed shutters	-	-	35,100.00	
9.	Steel	1275 Kg	at Rs.1,700 per	21,675.00	
10.	Red Oxide	16 kg	at 85 per kg	1,360.00	
11.	White cement	180 kg	at Rs.16 per kg	2,880.00	
12.	Paint	13 Litre	at Rs.130 per litre	1,690.00	
13.	Labour charge	-	-	90,000.00	
14.	Electrification	-	-	8,000.00	
15.	Water Supply	-	-	15,000.00	
16.	Miscellaneous	-	-	420.00	
	<b>Total cost</b>	-	-	<b>3,28,000.00</b>	

Source :- Data collected by survey conducted at Nirmithi Kendra Thrissur on April 2000.

**Table 5.1 (i)**  
**Cost Estimation of an 800 sq. feet plinth area, Residential Building**  
**using cost effective technology**

Sl. No.	Materials	Quantity	Price in Rupees based on 1998 market price	Total Expenditure	
				Rs.	Ps.
(1)	(2)	(3)	(4)		
1.	Rubble	11 Load	at Rs.825 per load	9,075.00	
2.	Sand	27 m <sup>3</sup>	at Rs.400 per m <sup>3</sup>	10,800.00	
3.	Metal (20 mm)	11.5 m <sup>3</sup>	at Rs.600 per m <sup>3</sup>	6,900.00	
4.	Cement	176 bags	at Rs.170 per bag	29,920.00	
5.	Bricks	16,000Nos.	at Rs.1,600 per 1000	25,600.00	
6.	Concrete door with wooden shutters	13 m <sup>2</sup>	at Rs.2,100per m <sup>2</sup>	27,300.00	
7.	Concrete window frame with glazed shutter	13 m <sup>2</sup>	at Rs.1,900 per m <sup>2</sup>	24,700.00	
8.	Mud-locally available at free cost	-	-	-	
9.	Steel	480 Kg	at Rs.1,700 per quintal	8,160.00	
10.	IV <sup>th</sup> Quality M.P. Tiles	1200 kg	at Rs.1,100 per 1000	1,320.00	
11.	Lime	25 kg	at Rs.7 per kg	175.00	
12.	Red Oxide	16 Kg	at Rs.85 per kg	1,360.00	
13.	White cement	160 kg	at Rs. 16 per kg	2,560.00	
14.	Paint	13 Litre	at Rs. 130 per Litre	1,690.00	
15.	Labour Charge	-	-	90,000.00	
16.	Electrification	-	-	8,000.00	
17.	Water supply	-	-	10,000.00	
18.	Miscellaneous	-	-	440.00	
	<b>Total cost</b>	-	-	<b>2,58,000.00</b>	

Source :- Data collected by survey conducted at Nirmithi Kendra Thrissur on April 2000.

From the tables 5.1 and 5.1 (i) it is clear that the total cost of any 800 sq. feet residential project by using conventional technology is Rs. 3,28,000 while by using new specification is Rs. 2,58,000. Thus, the total saving by cost-effective specification over conventional specification is Rs. 70,000.00 (Rs.3,28,000 - Rs.2,58,000). Again, the average sq. feet cost by conventional specification is Rs. 410 while that of new specification is Rs. 322.50. Therefore, the average sq. feet saving by cost-effective technology when compared to the conventional technology is Rs 87.50.

Both survey results (survey conducted by Awas vikas sansthan Jaipur and the survey conducted at Nirmithi Kendra as a part of the present study) point out the same fact that there is much economy in laying out the cost effective technology and so it can be definitely opted as a remedy to overcome the severe housing inadequacy in the country. Thus, a housing project designed to satisfy residential need and improve living conditions in a depressed area will probably increase the number of individuals housed among the target populations”.

Therefore, the main aspect of cost effectiveness is architectural planning and structural designing. This includes grouping of functional space, judiciously in a compact manner to reduce the service cost. Selection of structural system, load-bearing walls or framed structure is another aspect of planning.

The major reason for the change in the construction costs between conventional and cost-effective specification is due to the change in the methods of construction and types of building materials used. So, an analysis showing the change in the types of materials employed by each technologies is a must.

## **5.2 RELATIVE VARIATIONS IN THE TYPES OF MATERIALS USED BY CONVENTIONAL AND COST-EFFECTIVE TECHNOLOGIES**

As far as the types of building materials are employed, there is striking differences between conventional and cost -effective technologies which can be evident from the following table 5.2.

**Table 5.2.**  
**The relative variations in Material consumption between**  
**conventional and new specifications.**

Sl. No.	Work	General Specification (conventional technology)	New Specification (cost-effective technology)
1.	Foundation	1. Spread floorings Isolated or combined	1. Under-Teemed piles (where weak soils like black colour or filled up areas. 2. Lean concrete
2.	Super structure	1. RCC framed structure with filler brick walls 2. Load bearing construction in bricks/stone masonry with intermediate columns where found necessary. 3. Brick masonry partitions 4. RCC lintels, Chajjas fins, Jails 5. Mud walls	1. Hollow concrete blocks 2. solid concrete blocks 3. Flyash bricks. 4. Precast stone bloc masonry 5. Precast thin RC lintel with or without chajjas. 6. Sun-dried bricks/stablised soil block.
3.	Roofing	1. Cast-in-situ RCC slab 2. CGI sheets on gable roof with wooden steel truss. 3. Thatch/country lits/stone pillar slates	1. Precast RC channel unit. 2. Precast RC waffle sheets 3. Precast RC plant and joist 4. Prefabricated brick panels 5. Precast RCL panel Roofing 6. Fire Retardant thatch.
4.	Joinery	1. Wodden shutters with wooden frames 2. Wooden shutters flush shutters with steel frames. 3. Steel shutters with steel frames 4. Country wood	1. Medium density fibre boards. 2. Ferrocement shutters with wood/steel frames 3. Red mud polymer shutters with wood/steel frames 4. PVC shutter for wet areas 5. Local wood
5.	Flooring	1. In-situ mosaic for entrance hall, staircase, toilet etc. 2. Cement concrete flooring in circulation areas. 3. Mud	1. Prefabrication saves in time scarce materials and involves less cost.
6.	Services	1. GI/piping for water supply 2. CI for soil waste and stone wared glazed for drainage. 3. Water storage tanks in MS/RCC	1. PVC Piping system for water supply/ Soil wastage/rain water and drainage 2. Single Stach system for plumbing 3. Polytheline/GPP water storage tank 4. Sanitary latrines.

Source : Nirmithi Kendra, Thrissur.

From the table 5.2. it is clear that there is vital differences between conventional and cost effective technologies with regard to the types of materials used.

### **5.3. RELATIVE COST VARIATIONS BETWEEN NIRMITHI AND COSTFORD (BOTH USING COST-EFFECTIVE TECHNOLOGY)**

Next, an attempt has been made in this section to find out the relative variations in construction costs and types of materials used by both Nirmithi and COSTFORD centres in the state.

From the survey it is revealed that there is some variations between Nirmithi and COSTFORD with regard to the types of materials employed at their various stages of housing construction thus bringing a slight variation in construction costs between the two.

Accordingly, both Nirmithi and COSTFORD can undertake a residential project having 2000 sq. feet plinth area, for example, at an estimated cost of Rs. 5,90,000 and Rs. 5,80,000 respectively (based on 2000 year market price of building materials) which can be further evident from the tables 5.3 and 5.3 (1) as shown below.



**Table 5.3 (1)**

**A 2000 sq. feet low cost residential building (by COSTFORD) it's material consumption and estimated cost (Based on 2000 year market price of Building materials)**

Sl. No.	Various Stages of construction	Construction pattern used	Types of material used	Quantity	Sl. No.	Various Stages of construction	Construction pattern used	Types of material used	Quantity	Estimated cost.
1.	Foundation	Dry pack	Rubble	14 Load	7.	Plastering (Roof and ceiling plus toilet)		Cement Sand	57 bags 285 cft (1.5 load)	
2.	Basement		Rubble Cement Sand	8 load 23 bags 1.35load						
3.	Brick work	Ratrap bond in combination mortar 1:2:12	Brick Cement Lime Sand	44500 Nos 45 bags 2400 kg 675 cft (4 load)	8.	Flooring		Cement Sand Redoxide White cement Paint	31 bags 1 load 17 kgs. 50 kgs 30 kgs.	
4.	Roofing	Filler Slab Roofing	Cement Sand Metal(20mm) Tiles Steel	120 bags 340 cft (2 load) 600 cft (3.50 load) 2200 nos. 830 kg	9. 10. 11.	Electrification Plumping Labour charges				Rs. 20,000 Rs. 30,000 Rs.1,15,000
								Total estimated cost		Rs.5,80,000
5.	Doors and Windows									
	a. Doors	Wooden frame and shutter	Wood	16.80 m <sup>2</sup>						
	b. Winows	Wooden frame and glass shutter	Wood	17.80 m <sup>2</sup>						
								* Average sq. feet cost Rs. 5,80,000 - 20000)		Rs... 280.

Source : Data collected from Nirmithi, Thrissur by Survey conducted on 27th Feb. 2000.

The Tables 5.3 and 5.3 (1) reveal that a residential building with 2000 sq. feet plinth area could be completed by Nirmithi at an average sq. feet cost of Rs. 295 while by the COSTFORD at an average sq. feet cost of Rs. 290. This type of slight variations in average sq. feet cost between Nirmithi and COSTFORD is due to the variations in material combinations.

Though Nirmithi and COSTFORD procure majority of building materials locally, they have to import certain materials like bricks and tiles from some other places. For example, since the Kannur district lies at the coastal area the building centres in this district are not producing bricks domestically since the salty sand is not good for brick-making. So, the importation of bricks from other places involves huge transportation cost. Therefore, the building centres in this district mainly depending upon the locally available laterite stones which are relatively cheap when compared to the cost of imported bricks.

Like wise, in Idukki and wayanad district also because of the vast stretch of high ranges the cost of importing the building materials from neighbouring districts is very high. Therefore, the building centres here heavily rely on locally made cheap building materials like sundried bricks, asbetoes and galvanised iron sheets for walling and roofing purposes.

## 5.4 DIFFERENTIAL PREFERENCES IN BUILDING MATERIALS EMPLOYED BY NIRMITHI AND COSTFORD IN THE STATE

It is seen that the building centres in different districts prefer different types of building materials for their construction purposes. The local availability is the main reason for this differential preferability to materials. Thus, we can see that there is not only an inter-district variations but also an intra-unit variations (Nirmithi and COSTFORD) in the use of building materials in the state which will be evident from the following sections.

### 5.4.1 Building Materials Employed by Nirmithi and COSTFORD in Thrissur District.

In Thrissur district both Nirmithi and COSTFORD use different types of building materials for their housing construction which is shown in the table 5.4 (1).

**Table 5.4 (1)**  
**Building Materials employed by Nirmithi and COSTFORD in Thrissur**

Various Stages of Housing construction	Nirmithi	COSTFORD
Foundation and basement	Rubles	Rubles
Walling	Hollow concrete blocks/ Terracota/Burnt clay bricks	Burnt Clay Bricks
Roofing	Mangalore pattern roofing tiles/terracota roofing tiles	Concrete roofing / roofing tiles
Flooring	Flooring Tiles/Redoxide/Cement	Redoxide/Terracota Tiles
Doors and Windows	Timber/concrete doors and window frames	Timber/glassed shutters
Bonding and finishing	Cement/mud/combination mortar (cement, lime and sand mixing 1:2:12 ratio.	Cement mortar/ combination mortar.

Source : Survey conducted at Nirmithi and COSTFORD Thrissur on  
on 20<sup>th</sup> March 2000.

The table shows that in Thrissur district, rubbles is the common building material used by both Nirmithi and COSTFORD for the foundation and basement purposes. Further, for walling, while COSTFORD prefer burnt clay bricks, the Nirmithi prefer hollow concrete blocks, terracota and burnt clay bricks. For doors and windows, in addition to timber, the COSTFORD uses the glazed shutters also. Likewise, for finishing and bonding, the Nirmithi prefer to mud also. Except these for all other stages of construction, both Nirmithi and COSTFORD demand same materials.

#### **5.4.2 Building materials Employed by Nirmithi and COSTFORD in Kannur District**

The building materials employed by Nirmithi and COSTFORD in centres in Kannur District is shown in the table 5.4. (2)

**Table 5.4 (2)**  
**Building Materials employed by Nirmithi COSTFORD in Kannur**

Various Stages of Housing construction	Nirmithi	COSTFORD
Foundation and basement	Rubbles	Laterite bolders (i.e., a black coloured hard stone pieces locally available)
Walling	Hollow bricks/Burnt clay bricks Building stones (generally known as laterite stone)	Wire cut bricks (i.e., a smooth and uniform sized sundried bricks)
Roofing	Tiled roofing/concreted roofing	Tiled roofing/concreted roofing
Flooring	Flooring Tiles/Redoxide/Cement	Redoxide/Terracota Tiles
Doors and windows	Concrete door and window frames	Bamboo ply doors and framed widows
Bonding and finishing	Cement/Lime mortar/Mud	Cement mortar.

Source : Survey conducted at Nirmithi and COSTFORD in Kannur district on 3<sup>rd</sup> May 2000.

From the table it is evident that in Kannur district for the foundation and basement purposes, the Nirmithi uses Rubbles but the COSTFORD uses laterite bolders as the building material. Further, for walling while the Nirmithi uses hollow bricks, burnt clay bricks and building stones, the COSTFORD uses the wirecut bricks which is an exclusive feature of this building centre in the district. Likewise, for doors and windows while the Nirmithi uses concrete doors and window frames, the COSTFORD uses bamboo ply woods and framed windows which is also another striking feature of the COSTFORD.

Moreover, in Kannur district people at large find their jobs by the means of slicing, sizing, collecting and transporting the laterite stones from the production centres to the building sites. Therefore, if they import bricks from out side sources it may not only reduce the job opportunities domestically but also adversely affect the economy. The people in this district do not embark upon producing bricks because the bricks so made will not last long by the influence of salt in the soil.

#### **5.4.3. Building Materials employed Nirmithi in Wayanad district**

In the case of utilization of building materials wayanad district has its own specialities. Because of the absence of sufficient transportation facilities, the importation of building materials from nearby districts is rather a costly affair. So, the building centres has to depend much on local materials.

The types of building materials demanded by Nirmithi in Wayanad district is shown in the table 5.4.3 given below. The COSTFORD unit in the district has been recently started and it undertakes institutional projects only.

**Table 5.4 (3)**  
**Building Materials employed by Nirmithi in Wayanad**

Various Stages of Housing construction	Nirmithi	COSTFORD
Foundation and Walling	Rubbles Hollow bricks/Burnt clay bricks	Not undertaking residential projects.
Roofing	Roofing tiles/concreted/asbetoes	
Flooring	Tiles/Mosaic/Red Oxide/Cement	
Doors and windows	Timber/concrete door and window frames/aluminium sheets	
Bonding and finishing	Cement/Mud	

Source : Survey conducted at Nirmithi and COSTFORD in Wayanad district on Nov. 2000.

The table shows that for the basement and foundation the Nirmithi prefer to random rubbles. Again, hollow blocks and burnt clay bricks are used for walling while roofing tiles, concrete and asbetoes are for roofing purposes. Tiles, mosaic, redoxide, cement etc. are used for flooring. It is also seen that Nirmithi employs aluminium sheets for doors and windows while for bonding and finishing it employs cement and mud.

Anyway, in Wayanad district, the Nirmithi and COSTFORD are in their relentless effort in promoting the use of low-cost materials and technologies within a short span of time.

#### **5.4.4 Building materials employed by Nirmithi and COSTFORD in Idukki district**

Just like Wayanad, the Idukki district also has been confronting with several problems such as vast stretch of high ranges, lack of adequate transportation facilities, high transportation costs etc. Therefore, the pursuit of housing construction is adversely affected by these problems. Moreover, in this district, Nirmithi is the only low-cost building centre and there is no COSTFORD unit here. The types of building materials demanded by Nirmithi in this district is shown by the table 5.4.4.

**Table 5.4 (4)**  
**Building Materials employed by Nirmithi in Idukki**

Various Stages of Housing construction	Nirmithi	COSTFORD
Foundation and Walling	Rubles Burnt clay bricks/concrete wall frames	No COSTFORD unit in Idukki
Roofing	Concrete Roofing /Asbetoes sheets	
Flooring	Cement/Red Oxide	
Doors and windows	Timber/concrete doors and window frames	
Bonding and finishing	Cement Mortar	

Source : Survey conducted at Nirmithi, Idukki district on 31st Dec. 2000.

The table shows that the asbetoes sheet is the main roofing material employed by Nirmithi in Idukki district. When compared to the concreted and tiled roofing, asbetoes is the locally made cheap building material extensively applying for housing construction. This causes for a substantial reduction in the cost of construction. Since there is the vast stretch of high

ranges and by the influence of mist asbestos sheets are extensively using as the covering (roofing) material for housing.

**5.4.5. Building Materials Employed by Nirmithi and COSTFORD centres in Thiruvananthapuram District**

Lastly, in Thiruvananthapuram district, both the Nirmithi and COSTFORD has been embarking upon a wide range of activities like, construction of a large number of residential buildings, school buildings, community halls, shopping complexes etc. For these entire constructions, the building centres mainly depend on locally available cheap building materials which is shown in table 5.4 (5)

**Table 5.4 (5)  
Building Materials employed by Nirmithi and COSTFORD in  
Thiruvananthapuram**

Various Stages of Housing construction	Nirmithi	COSTFORD
Foundation and basement	Rubles	Rubles/building stones
Walling	Hollow concrete blocks/ Country burnt bricks/Hard boards/glazed shutters for walling and partition.	Burnt Clay Bricks/ sundried bricks/ building stones
Roofing	MP roofing tiles/concreted roofing/Galvanised Iron (GI)/ sheets/Asbestos sheets.	MP roofing tiles/ concreted roofing
Flooring	Flooring Tiles/Mosaic/Redoxide/Black Cement	Flooring tiles/Redoxide cement
Doors and Windows	Timber/concrete doors and windows frames/Aluminium sheets/glazed shutters	Timber/glazed shutters
Bonding and finishing	Cement/mud	Cement /Lime mortar/ Mud.

Source : Survey conducted at Nirmithi and COSTFORD in Thiruvananthapuram district on 17-7-2000.

The table shows that in Thiruvananthapuram district both Nirmithi and COSTFORD employ same building materials commonly for housing. In addition to these, the Nirmithi employs the materials like hard boards, Galvanised Iron (GI) sheets, Asbetoes sheets, Aluminium sheets, Mosaic etc. for housing construction.

### **5.5 BUILDING MATERIALS EMPLOYED BY NIRMITHI AND COSTFORD CENTRES IN KERALA IN A NUTSHELL**

When we look into the types of building materials employed by both Nirmithi and COSTFORD in the state we will be able to understand that the Nirmithi has been experiencing a different options when compared to the COSTFORD. The table 5.5 present a clear picture about the types of building materials employed by Nirmithi and COSTFORD centres (taken together) of some districts selected as samples from the state.

**Table 5.5**  
**Building Materials Employed by Nirmithi and COSTFORD centres in Kerala - (An overall view)**

Various stages of construction	Thrissur		Kannur		Wayanad		Idukki		Thiruvananthapuram	
	Nirmithi	COSTFORD	Nirmithi	COSTFORD	Nirmithi	COSTFORD	Nirmithi	COSTFORD	Nirmithi	COSTFORD
Foundation & Basement Walling	Rubbles	Rubbles	Rubbles	Laterite Bolders Wire cut Bricks	Rubbles		Rubbles		Rubbles	Rubbles or Building stones
	Hollow concrete blocks/ Terracota/ Burnt clay bricks.	Burnt clay bricks	Hollow bricks/Burnt clay bricks/ Building stones (i.e) laterite stones)		Hollow blocks/ burnt clay bricks		Burnt clay bricks/ concrete wall frames		Hollow concrete blocks/ country burnt bricks/ Hard board/ board/glazed shutters	Burnt clay bricks/sundried bricks/ building stones
Roofing	MP tiles/ Terracota roofing tiles	Concrete roofing/ roofing tiles	Tiled roofing/ concreted roofing	Tiled roofing/ concreted roofing	Roofing tiles/ concreted/ asbetoes		Concreted roofing/Asbetoes sheets		MP tiles/ concreted roofing/ GI sheets/ Asbetoes sheets	MP roofing tiles/ concreted roofing.
Flooring	Flooring tiles/red oxide	Red oxide/ Terroacota tiles	Flooring tiles/ red oxide/ cement	Redoxide/ Terracota Tiles	Tiles/mosaic/ redoxide/ cement		Cement/ Red oxide		Tiles/mosaic/ redoxide/ black cement	Tiles/ Red oxide/ cement
Doors and windows	Timber concreted doors and window frames	Timber/glazzed shutters	Concreted doors and window frames	Bamboo plydoors and framed windows	Timber/ concrete doors and window frames/Aluminium Sheets		Timber/ concrete doors and window frames		Timber/ concrete doors & window frames/aluminium sheets /glazzed shutters	Timber/ glazzed shutters
Finishing & Bonding	Cement/mud combination mortar	Cement mortar/ combination mortar	Cement/ Lime mortar/ Mud	Cement Mortar	Cement/ Mud		Cement Mortar		Cement/ Mud	Cement/ lime mortar/ mud

Source : Reproduced from tables 5.4 (1), 5.4(2), 5.4(3), 5.4(4) & 5.4(5).

THE TREND AND PATTERN OF LOW COST  
RESIDENTIAL PROJECTS UNDERTAKEN  
BY NIRMITHI AND COSTFORD IN THE  
STATE

Ramachandran. K.V. “Demand for low-cost building materials in Kerala”  
Thesis. Department of Economics, Dr. John Matthai Centre Thrissur,  
University of Calicut, 2001

**CHAPTER - VI**  
**THE TREND AND PATTERN**  
**OF LOW COST**  
**RESIDENTIAL PROJECTS**  
**UNDERTAKEN BY**  
**NIRMITHI AND COSTFORD**  
**IN THE STATE**

## **CHAPTER-VI**

### **THE TREND AND PATTERN OF LOW COST RESIDENTIAL PROJECTS UNDERTAKEN BY NIRMITHI AND COSTFORD IN THE STATE**

In this section an analysis is made with the trend and pattern of low -cost residential projects undertaken by nirmithi and COSTFORD in the state during 1990-2000 AD. For this, the low cost housing projects of the districts such as Kannur,Wayanad, Thrissur,Thiruvananthapuram and Idukki, have been selected and a brief description about each is given as follows.

#### **6.1 NIRMITHIKENDRA IN KANNUR DISTRICT**

The Nirmithi unit in Kannur district is locating at subcollectors office building Thalassery. It was started its functioning in 1990. A large number of residential as well as institutional projects have been completed by the unit since it's inception.

Nirmithi, one of the leading low-cost building centres in the district has been enjoying a phenomenal progress in the construction of the residential projects right from the very beginning. This can be evident from the table (6.1) as below.

**Table (6.1)**  
**Residential projects constructed by the Nirmithi in**  
**Kannur(1990-2000AD)**

Years	No:of LIG Houses	No:of MIG Houses	No:of HIG Houses	Total no:of Houses	% of LIG Houses	% of MIG Houses	% of HIG Houses	Total Percentage Achieve- ments
1990-91 March	19	6	1	26	73	23	4	100
1991-92 April	30	8	2	40	75	20	5	”
92-93	18	4	2	24	75	17	8	”
93-94	14	3	2	19	74	16	10	”
94-95	9	2	1	12	75	17	8	”
95-96	21	5	2	28	75	18	7	”
96-97	17	4	1	22	77	18	5	”
97-98	13	3	2	18	72	17	11	”
98-99	35	10	5	50	70	20	10	”
99-2000	420	0	0	420	100	0	0	”
<b>Total</b>	<b>596</b>	<b>45</b>	<b>18</b>	<b>659</b>				

Source : Data Collected by survey conducted at Nirmithi, Kannur on May 2000.

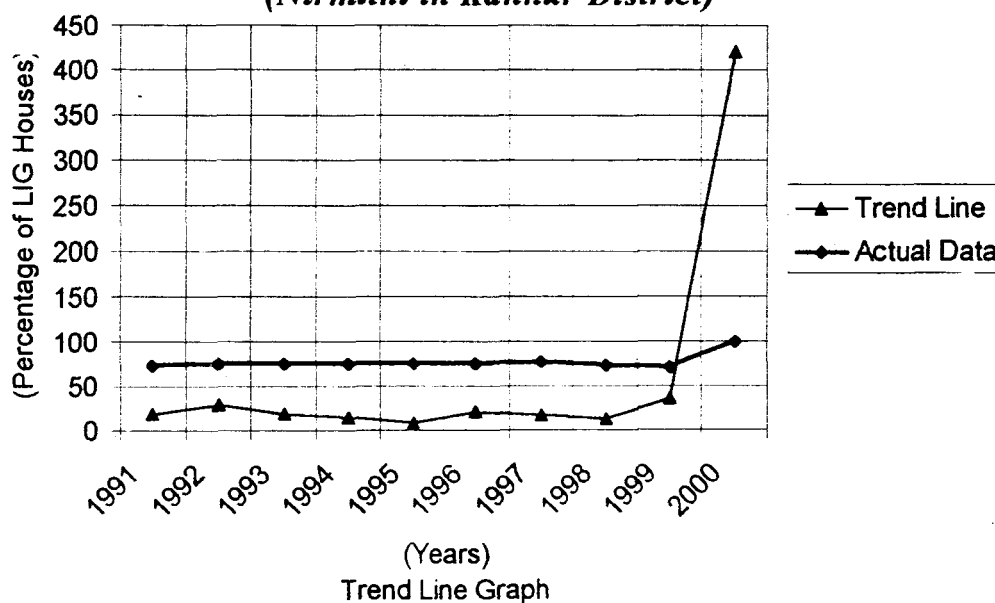
The table shows that the percentage achievement of LIG houses is much greater than that of both the MIG and HIG houses. That is out of the total projects (659) completed, 596 projects being the LIG constituting

82.5% of the total. Thus, the unit, no doubt, has been embarking upon the efforts of reducing the magnitude of rural housing problem in the district.

Since only the LIG housing projects which can help solve the rural housing shortage in the state and also out of the total residential projects constructed by Nirmithi and COSTFORD during 1999-2000 majority being LIG Projects, the trend growth of only LIG housing projects are being projected throughout the analysis.

Accordingly, at first the trend growth of LIG projects constructed by Nirmithi in Kannur district is shown by the figure (6.1) based on the table 6.1

**Figure 6.1. Trend Growth of LIG Houses  
(Nirmithi in Kannur District)**



The figure shows that though the percentage achievement of LIG residential projects decreased during 1998&99, there has been a sudden leapforward in the achievement of LIG projects by the year 2000.

## 6.2 COSTFORD IN KANNUR DISTRICT

The COSTFORD unit Kannur district is locating at Kairaly Nagar Thottada ( 8 kms away from district Head quarters). It was started as a voluntary charitable organisation in 1990. The unit has been undertaking a large number of residential projects since 1990. The table 6.2 given below shows a clear picture about it.

**Table (6.2)**  
**Residential projects constructed by COSTFORD**  
**Kannur(1990-2000)**

Years	No:of LIG Houses	No:of MIG Houses	No:of HIG Houses	Total no:of Houses	% of LIG Houses	% of MIG Houses	% of HIG Houses	Total Percentage Achieve- ments
1990-91 March	18	2	13	33	55	6	39	100
1991-92 April	3	0	0	3	100	0	0	”
92-93	3	0	0	3	100	0	0	”
93-94	20	3	2	25	80	12	8	”
94-95	25	4	1	30	83	13	4	”
95-96	18	5	2	25	72	20	8	”
96-97	20	3	3	28	71	18	11	”
97-98	30	3	5	38	80	8	12	”
98-99	40	0	0	40	100	0	0	”
99-2000	360	0	0	360	100	0	0	”
<b>Total</b>	<b>527</b>	<b>22</b>	<b>26</b>	<b>585</b>				

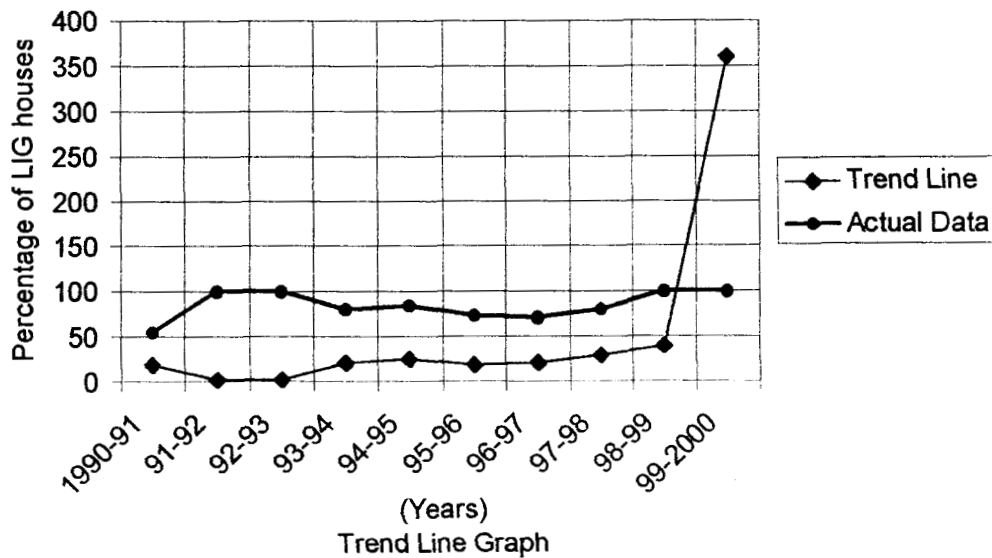
Source : Data Collected by survey conducted at COSTOFRD, Kannur on May 2000.

The table reveals that the COSTFORD in kannur district has gained a phenomenal progress in the construction of LIG residential projects and so there is a significant achievement in the same by the year 2000. That is out of the total 585 projects completed by the unit, 527(88%) being LIG projects only.

Further, the unit has already accepted the orders of 500 LIG residential projects at an estimated cost of Rs. 22,000 each financed by HUDCO and Kannur municipality.

However, the trend growth of LIG projects by COSTFORD, Kannur during 1990-2000 is shown by the figure given below.

**Figure 6.2. Trend Growth of LIG Houses (COSTFORD Kannur District)**



The figure shows that during the years 1992,93,99 and 2000 there

has been cent percent achievement in the construction of the LIG projects while there was a shortfall in the same during the years 1994,95,96,97 & 98.

### 6.3 NIRMITHI IN WAYANAD DISTRICT

The Nirmithi unit in Wayanad district was started its functioning on 1989 as a registered charitable organisation. It is locating at panamaram (20 kms away from District Head quarters at Kalpatta) . The unit has been embarking upon a large number of residential and institutional projects since its inception. The table (6.3) shows a clear picture about the residential projects by the unit.

**Table (6.3)**  
**Residential projects constructed by Nirmithi**  
**Wayanad (1990-2000)**

Years	No:of LIG Houses	No:of MIG Houses	No:of HIG Houses	Total no:of Houses	% of LIG Houses	% of MIG Houses	% of HIG Houses	Total Percentage Achievements
1990-91	13	0	0	13	100	0	0	100
March								
1991-92	23	0	0	23	100	0	0	”
April								
92-93	29	0	0	29	100	0	0	”
93-94	40	0	0	40	100	0	0	”
94-95	62	0	1	63	98	0	2	”
95-96	0	0	0	0	0	0	0	”
96-97	0	0	0	0	0	0	0	”
97-98	66	0	0	66	100	0	0	”
98-99	170	0	0	170	100	0	0	”
99-2000	200	0	0	200	100	0	0	”
Total	603	0	1	604				

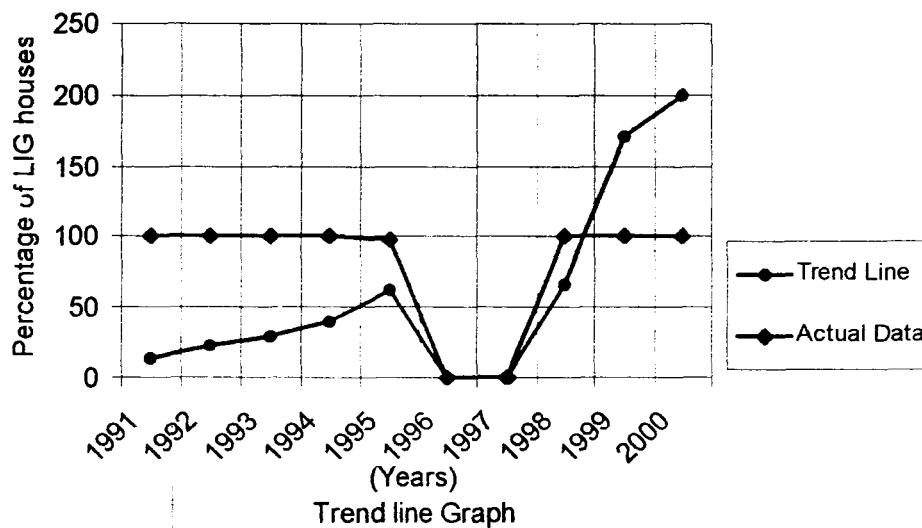
Source : Data Collected by survey conducted at Nirmithi,Wayanad on May 2000.

The table shows that out of the total 604 residential projects completed by the Nirmithi in the district, 603 (99.7%) being LIG projects only. Since there is a large number of tribal communities in the district, the low cost housing projects under LIG category has been increasing persistently.

In addition to the residential projects the unit has undertaken 367 institutional projects which consist of school buildings, community halls shopping complexes, Co-op. Societies, arch bridges, churches, T.V sheds etc.

Any how, it is seen that the percentage achievement of LIG housing projects in the district is very high during 1990-2000 except in the years of 1996 & 1997 which is shown by the figure given below.

**Figure 6.3. Trend Growth of LIG Houses  
(Nirmithi in Wayanad District)**



The figure reveals that the unit got cent percentage achievements of LIG housing projects throughout the whole years except in 1996 & 1997. It is seen that in 1996 & 97 the unit does not got any orders of housing projects.

#### **6.4 COSTFORD IN WAYANAD DISTRICT**

In the district the unit is functioning at DPEP office, just adjacent to the district head quarters at Kalpatta. It was started in 1997 as a voluntary organisation to promote the low cost housing technology in the district.

The COSTFORD unit in the district is functioning only as a Technical -cum- Guidance centre which gives technical guidelines to those who wish to construct low-cost housing and does not undertake the construction of housing projects. But, it undertakes the construction of institutional projects viz, school buildings under DPEP, aided by the govt. As a part of it the unit has undertaken 24 new school buildings, 3 rental replacements, 10 multi-grade learning centres for tribals in different parts of the district.

#### **6.5 NIRNITHI IN THRISSUR DISTRICT**

Nirmithi unit in Thrissur, one of the best building centres in south india, since its inception as a registered charitable organisation on 1992

had developed to become the pioneer in building construction in the district.

The unit is locating at Ayyanthole, just near to the District Head quarters. It undertakes a large number of housing activities with a view to overcome the backlog of severe housing inadequacy in the district.

The Nirmithi had a progressive achievement since it was started in 1992. By the end of the financial year 1997-98, it had completed the total projects of Rs 2.75 crores (Malayala Manorama Newspaper, 18<sup>th</sup> May 1998, Cochin Edn.)

The completed projects are consisting of Kairaligramam of Sahithya Accademy Thrissur, Bio-control Laboratory in Mannuthy under agricultural department, Puzhakkal block office, Krishi bhavans, Village offices, primary health centres , school buildings etc at various places in the district . Paralam panchayat community Hall, Alagappa Panchayat Homoeo Hospital, Cherpu govt Hospital Labour Room etc also have been completed.

The unit had started its production centres at pananchery and Ayyanthole for making building components like hollow concrete blocks, concrete doors and window frames, ferrocement products etc. An amount

of Rs 10.8 lakhs on HUDCO grant was utilised for the development of these production centres. The production was started since 1996.

Further, the unit has planned to start five subcentres in different parts of the district. 50 cents of land each is already in possession at pananchery, kadangod, Kondazhi, Pazhayannur and pudukkad in Thrissur district. A Research and Development programme for the Resource Mapping and energy consumption of houses for the homeless in the district is also under planning. The rural technology for constructing houses in rural areas is also planned to be analysed and documented. (Nirmithi Kendra -An overview, a booklet published by Thrissur Nirmithi, 1997.)

If we go through the past and present activities of Nirmithi, we will be able to understand that total 690 residential projects have been completed in the district during October 1992 to March 2000.

Moreover, it is seen that out of the total 690 residential projects completed by the unit 639 (nearly 93%) being LIG, 37 MIG and 14 HIG projects respectively. The following table depicts it further.

**Table (6.5)**  
**Residential projects constructed by Nirmithi**  
**Thrissur (1992-2000)**

Years	No:of LIG Houses	No:of MIG Houses	No:of HIG Houses	Total no:of Houses	% of LIG Houses	% of MIG Houses	% of HIG Houses	Total Percentage Achieve- ments
1992-93	2	0	0	2	100	0	0	”
March								
Apl.93-94	10	4	2	16	63	25	12	”
94-95	8	3	1	12	67	25	8	”
95-96	4	1	0	5	80	20	0	”
96-97	40	10	2	52	77	19	4	”
97-98	90	9	4	103	87	9	4	”
98-99	135	10	5	150	90	7	3	”
99-2000	350	0	0	350	100	0	0	”
Total	639	37	14	690				

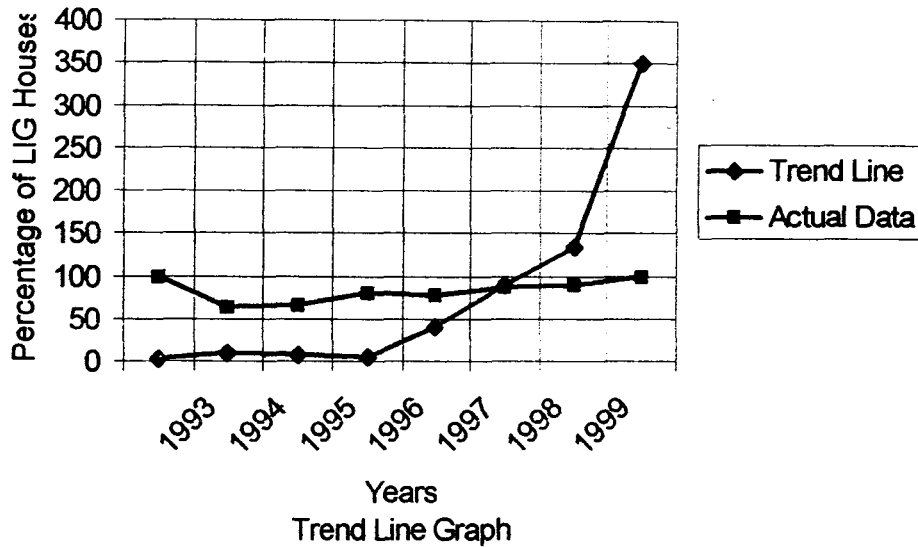
Source : Data Collected by survey conducted at Nirmithi, Thrissur on May 2000.

The table reveals that the percentage achievement of LIG houses goes on increasing in a greater speed tending towards the alleviation of rural housing shortages in the district.

In addition to the residential projects 250 general projects consisting of institutional and industrial buildings have been undertaken by the unit

during 1992-2000. But, it is seen that out of total residential projects completed majority being LIG projects which is represented by the figure below.

**Figure 6.5. Trend Growth of LIG Houses  
(Nirmithi in Thrissur District)**



The figure shows that during the years of 1993 and 2000, the unit got cent percentage achievement of LIG' residential projects. While, there was a shortfall in the percentage achievement of the projects during the years 1994, 95, 96 & 97.

### 6.6 COSTFORD IN THRISSUR DISTRICT

The Thrissur based Centre of Science and Technology For Rural Development ( COSTFORD) is a registered non-Profit making voluntary organisation of scientists, technologists, educationalists, professionals, social workers etc. It was formed by Sri. C . Achutha Menon, the former chief minister of Kerala.

There has been a phenomenal progress for the COSTFORD in the state and now there are a large number of its sub-centres locating at various places, such as Thiruvananthapuram, Kollam, Mavelikkara, Aluva, Thriprayar, Kannur, Anakkatty ( Tamil Nadu Boarder ), Kalpatta etc. Mavelikkara sub centre is a bio-technology unit and not undertaking housing projects.

The COSTFORD aims at tackling the housing problem especially of the rural poor. It tries to generate employment by using traditional materials and ideas in a contemporary and scientific manner. HUDCO & COSTFORD join hands in their efforts to give a general guidance for the construction of low-cost houses.

The COSTFORD in Thrissur district was started its functioning in 1990. It is locating at Ayyanthole in Thrissur . Right from the very inception it had a phenomenal achievement in the housing construction. Now, it is one of the best building centres in the state.

Several residential projects have been undertaken by COSTFORD with a view to overcome the problem of severe housing inadequacy in the district within a short span of time. The table shows the low-cost housing projects constructed by COSTFORD, Thrissur.

**Table (6.6)**  
**Residential projects constructed by COSTFORD**  
**Thrissur (1990-2000)**

Years	No:of LIG Houses	No:of MIG Houses	No:of HIG Houses	Total no:of Houses	% of LIG Houses	% of MIG Houses	% of HIG Houses	Total Percentage Achieve- ments
1990-91	4	0	0	4	100	0	0	100
March								
Apl.1-92	7	1	1	9	78	11	11	”
92-93	45	5	1	51	88	10	2	”
93-94	48	4	2	54	89	7	4	”
94-95	12	4	2	18	67	22	11	”
95-96	9	1	1	11	82	9	9	”
96-97	3	0	0	3	100	0	0	”
97-98	50	8	2	60	83	13	4	”
98-99	160	12	8	180	89	7	4	”
99-2000	1972	0	0	1972	100	0	0	”
Total	2310	35	17	2362				

Source : Data Collected by survey conducted at COSTFORD, Thrissur on April and March 2000.

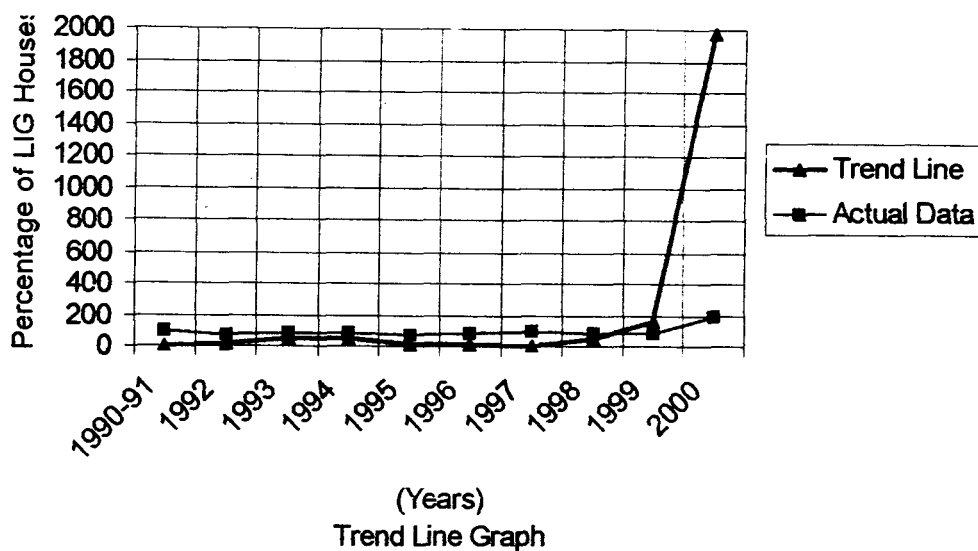
From the table it is clear that there has been a very high leap forward in the achievement of LIG housing projects in the district during 1990 - 2000. In addition to this, 1200 LIG houses are under construction expecting to be completed by the turn of this century. Each houses cost at Rs.35,000 and having 230 sq.foot size plinth area. These housing projects are ongoing at various panchayats in the district viz, Pananchery (for tribals only) Varantharappilly, Vatanappilly, Mattathur, Pazhayannur,

Arimpur, Perinjanam, Kodassery ( for tribals only ), Mullassery, Methala and also at Thrissur corporation.

Further, the HUDCO and Jilla Panchayat Sanctioned loan facility to the poor people for the construction of 900 LIG houses in the district under “swabhiman parpida samithi” under CAPART scheme ( a central govt housing scheme specially meant for people at southern India). A grant of about Rs.17,150 each for 10,000 LIG houses have been sanctioned allover south India. Thrissur COSTFORD being the main centre of the entire COSTFORD centres in the state, exercises a predominant role in the implementation of this particular scheme throughout the state.

Thus, the COSTFORD Thrissur has undertaken a large number of low-cost residential projects with a view to improve the housing scenario in the district. The figure below shows the percentage achievement of LIG residential projects during 1990 - 2000

**Figure 6.6. Trend Growth of LIG Houses  
(COSTFORD Thrissur District)**



The figure shows that the LIG housing projects attained 100 percent achievement during the years 1990, 97 and 2000. While during 1995, 96, there was a shortfall in the percentage achievement of LIG projects in the district.

## 6.7 NIRMITHI IN IDUKKI DISTRICT.

In Idukki district, Nirmithi was established on 1990 as a registered charitable organisation. It is functioning just adjacent to the District Head quarters at painavu.

In the district the unit has undertaken only few residential projects during 1990 - 2000 as it gets more orders of institutional projects . Anyhow , the residential projects undertaken by Nirmithi in Idukki district are shown in the following table.

**Table (6.7)**  
**Residential projects constructed by Nirmithi**  
**Idukki (1992-2000)**

Years	No:of LIG Houses	No:of MIG Houses	No:of HIG Houses	Total no:of Houses	% of LIG Houses	% of MIG Houses	% of HIG Houses	Total percentage Achieve- ments
1990-91 March	2	0	0	2	100	0	0	100
Apl.91-92	4	0	0	4	100	0	0	”
92-93	3	0	0	3	100	0	0	”
93-94	3	0	0	3	100	0	0	”
94-95	0	0	0	0	0	0	0	”
95-96	5	1	0	6	83	17	0	”
96-97	8	0	0	8	100	0	0	”
97-98	10	1	0	11	91	9	0	”
98-99	12	0	0	12	100	0	0	”
99-2000	50	3	1	54	92	6	2	”
Total	97	5	1	103				

Source : Data Collected by survey conducted at Nirmithi, Idukki district on December 1999 and May 2000.

The table reveals that out of total 103 residential projects constructed by the unit during 1990 - 2000, 97 ( 94 % ) being LIG projects showing a bias towards rural housing problem.

In addition to the housing construction activities, the unit undertakes some other functions too as follows.

- i) Estamblished a Micro Electric project which supplies power to 75 houses at Kadavary and 30 houses at venmani panchayats in the district.
- ii) The unit supplies drinking water to a large number of houses at Thavalappara, Rajamala, Kanthallur and as such high ranges where the drinking water is the problem. Such activities are performed by the unit by the large scale community participation.

While the unit has completed less number of residential projects it has already undertaken 251 general projects consisting of several school buildings, Shopping complexes, community halls, Panchayat offices etc in various places of the district. However, the percentage achievement of LIG projects by Nirmithi Idukki has been represented by the figure given below.

**Figure 6.7. Trend Growth of LIG Houses  
(Nirmithi in Idukki District)**

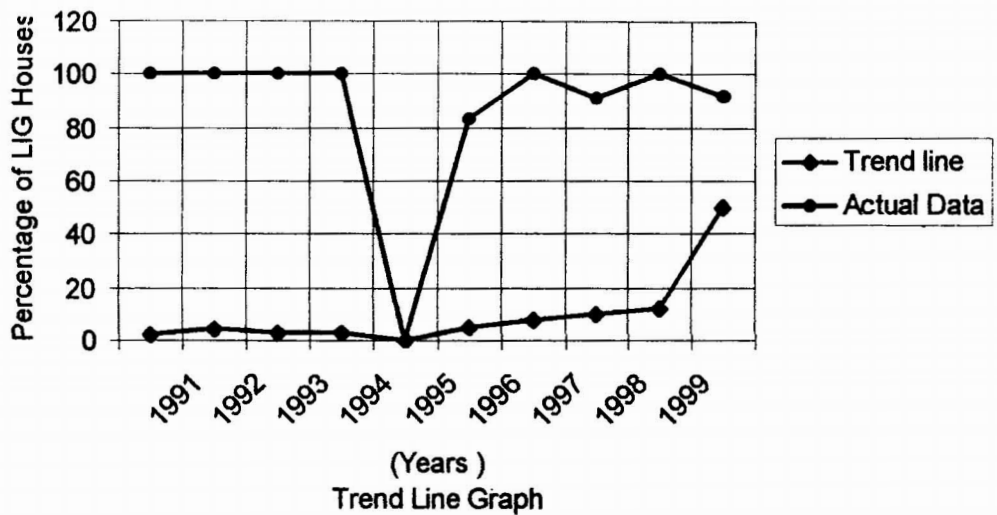


Figure shows that during the year 1991, 92, 93, 94, 97 and 2000 the unit got 100 percent achievement of LIG housing projects. But during 1995 it does not got any orders. Again at the same time during 1996 when compared to other periods, except in 1995 the unit got less orders of LIG projects.

### **6.8 NIRMITHI IN THIRUVANANTHAPURAM DISTRICT**

The unit was started its functioning in 1989 at Museum Bains complex at Kowdiar in Thiruvananthapuram district. It was started as a charitable organisation which aims at to help the poor people for their shelter facilities.

The unit has undertaken only a few number of residential projects in the district as it concentrates largely on the construction of institutional

buildings sponsored by the govt. of Kerala. The table below shows a clear picture about the residential projects undertaken by the unit during 1990-2000.

**Table (6.8)**  
**Residential projects constructed by Nirmithi**  
**Thiruvananthapuram (1990-2000)**

Years	No:of LIG Houses	No:of MIG Houses	No:of HIG Houses	Total no:of Houses	% of LIG Houses	% of MIG Houses	% of HIG Houses	Total percentage Achieve- ments
1990-91	0	0	0	0	0	0	0	0
March								
Apl.91-92	1	0	0	1	100	0	0	100
92-93	3	0	0	3	100	0	0	”
93-94	2	0	0	2	100	0	0	”
94-95	3	0	0	3	100	0	0	”
95-96	6	0	0	6	100	0	0	”
96-97	8	1	0	9	89	11	0	”
97-98	10	1	0	11	91	9	0	”
98-99	12	1	0	13	92	8	0	”
99-2000	120	2	1	123	97	2	100	100
<b>Total</b>	<b>165</b>	<b>5</b>	<b>1</b>	<b>171</b>				

Source : Data Collected by survey conducted at Nirmithi,  
Thiruvananthapuram on February 2000.

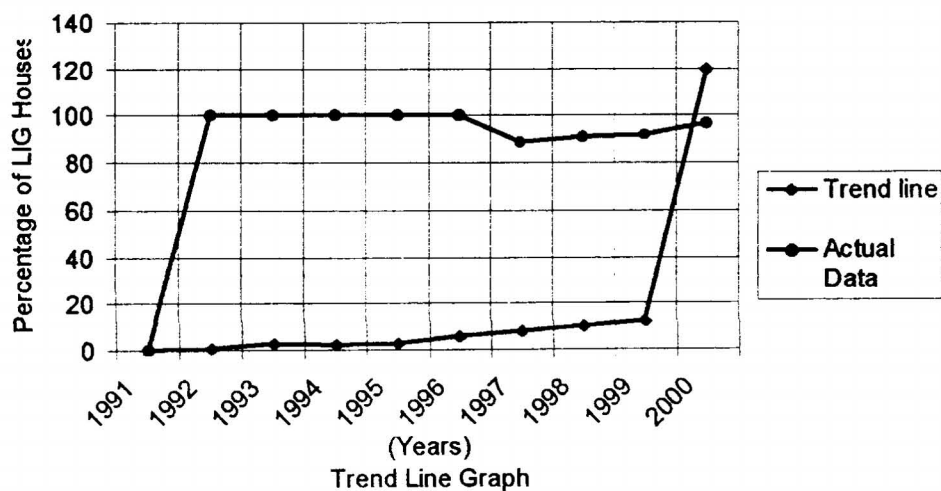
The table shows that out of total 171 residential projects constructed 165 ( 96 %) projects being LIG, tending towards the alleviation of rural housing problem in the district .

In addition to these, the unit has accepted the orders of 120 LIG

houses under people's plan programme. It has also undertaken 176 general projects during 1990 - 2000. The projects consisting of Anganwadies, Tourist cottages at Kovalam in vizhinjam panchayat, several school buildings, toilet blocks, Administrative blocks, shopping complexes, panchayat office buildings, primary health centres, Veterinary Hospitals, Matsyabhavans at Kadinamkulam panchayat and an Ayurveda Hospital at Naavayikulam panchayat in the district. Moreover, the unit owns a production centre at Akkulam which produces hollow concrete blocks.

However, the trend growth of LIG projects undertaken by Nirmithi Thiruvananthapuram has been represented by the figure given below.

**Figure 6.8. Trend Growth of LIG Houses  
(Nirmithi in Thiruvananthapuram District)**



The figure reveals that during 1990 - 91 march, the unit does not got any orders of housing projects. During the years 92, 93, 94, 95 and 96 the unit obtained 100 percent achievement of LIG housing projects. While during the year 1997 the percentage achievement of LIG projects has diminished.

## 6.9 COSTFORD IN THIRUVANANTHAPURAM DISTRICT

The unit was started its functioning on 1990 at Ullur as a registered voluntary charitable organisation. It's functioning in the low-cost housing construction sector is so wide that it could provide a large number of low-cost residential projects especially LIG houses aimed at to the poor people concerned.

The unit in the district has undertaken a very large number of low - cost residential projects during 1990 - 2000. The table below presents a clear picture about it.

**Table (6.9)**  
**Residential projects constructed by COSTFORD**  
**Thiruvananthapuram (1990-2000)**

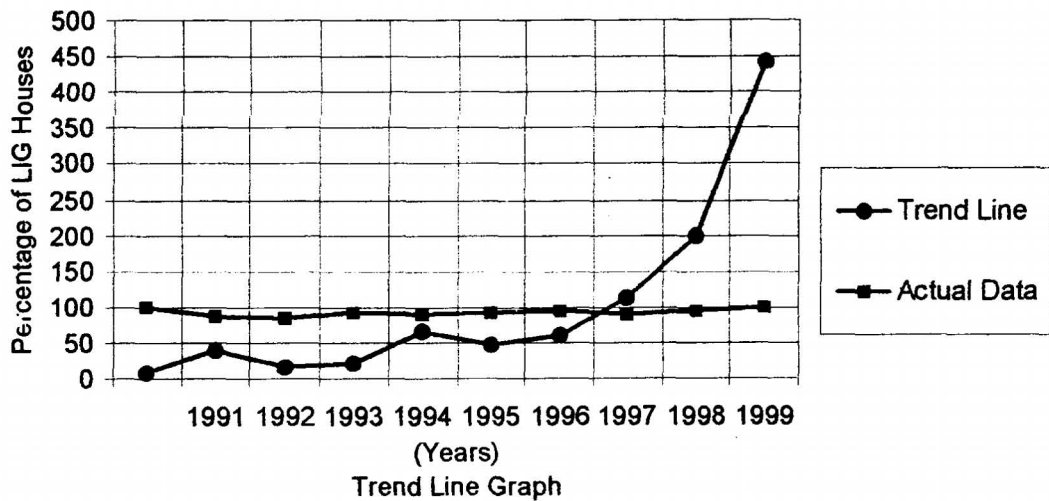
Years	No:of LIG Houses	No:of MIG Houses	No:of HIG Houses	Total no:of Houses	% of LIG Houses	% of MIG Houses	% of HIG Houses	Total percentage Achieve- ments
1990-91 March	7	0	0	0	100	0	0	100
Apl.91-92	40	4	2	46	87	9	4	100
92-93	15	2	1	18	83	11	6	"
93-94	22	1	1	24	92	4	4	"
94-95	65	5	2	72	90	7	3	"
95-96	48	3	1	52	92	6	2	"
96-97	60	3	1	64	94	5	1	"
97-98	112	10	4	126	89	8	3	"
98-99	200	6	4	210	95	3	2	"
99-2000	442	5	3	450	98.2	1.1	-7	100
<b>Total</b>	<b>1011</b>	<b>29</b>	<b>19</b>	<b>1060</b>				

Source : Data Collected by survey conducted at COSTFORD,  
Thiruvananthapuram on May 2000.

The table reveals that the COSTFORD in the district has been enjoying a very high performance by undertaking total 1069 low - cost residential projects consisting of 1011 LIG, 39 MIG and 19 HIG projects respectively during 1999 - 2000. Moreover, the unit has undertaken 83 institutional projects also.

However, the trend growth of LIG residential projects by the COSTFORD Thiruvananthapuram has been represented by the figure below.

**Figure 6.9. Trend Growth of LIG Houses  
(COSTFORD, Thiruvananthapuram District)**



It is clear from the figure that the unit got 100 percent achievement of LIG projects only in the year 1991 march. While during other periods, the achievement of LIG projects were comparatively lesser. It is also seen that during the year 2000 the percentage achievement of LIG housing projects again increased and it reached at 98.2 %.

From the whole analysis it is clear that both Nirmirithi & COSTFORD Centres in the state are doing relentless efforts in alleviating the severe rural housing shortage in the state. Among the total low cost housing projects constructed by both Nirmithi & COSTFORD ( during 1990 -2000 ) about 80 % being <sup>LIG</sup>LIG houses only which proves that low-cost<sub>^</sub> houses are getting much priority in the housing schemes introduced by the govt. from time to time.

# THE LOW-COST HOUSING AND ITS DEMAND DETERMINANTS

Ramachandran. K.V. "Demand for low-cost building materials in Kerala"  
Thesis. Department of Economics, Dr. John Matthai Centre Thrissur,  
University of Calicut, 2001

**CHAPTER - VII**  
**THE LOW-COST HOUSING**  
**AND ITS DEMAND**  
**DETERMINANTS**

## **CHAPTER - VII**

### **THE LOW-COST HOUSING AND ITS DEMAND DETERMINANTS**

It could be observed from the study that the households which have opted for low-cost housing technology mainly belong to the low income group. They are largely motivated by reducing the cost of house construction so as to make it affordable to them. Many of the households have utilised the government grants which are made available to the adopters of low-cost housing technology. Some of the households have relatively large family size while others are small sized ones.

Thus, an attempt has been made in this chapter to find out whether these factors have any influence on the household's demand for low-cost housing. With this end in view, some houses have been selected from Thrissur district as samples for detailed investigation and to estimate the determinants of demand for low-cost<sup>h</sup> housing. A total of 150 houses including 75 low-cost and 75 conventional ones have been selected and information regarding the levels of income, size of family, availability of grants etc. have been obtained with the help of survey schedules designed for this purpose. The samples are then classified on the basis of the aforesaid factors and their chi-square values have been obtained.

## 7.1 CLASSIFICATION OF HOUSEHOLDS BASED ON ANNUAL INCOME STATUS

Most often, the poor income status may be one of the factors which tempt some households for selecting low-cost housing technology. In order to find out the effect of the same if any the sample households have been classified firstly on the basis of their annual income status as shown in the table 7.1.

**Table 7.1**  
**Classification of Households on the Basis of Income Status**

Annual income (Rs.)	Low-cost	Conventional	Total
below 10,000 (LIG)	41 (21.5)	2 (21.5)	43
10,000 -75,000 (MIG)	14 (32)	50 (32)	64
More than Rs. 75,000 (HIG)	20 (21.5)	23 (21.5)	43
Total	75	75	150

Source : Primary Data

Chi-square value is 55.831. Degree of freedom is 2.

From the table, it is evident that out of total 75 low-cost houses, 41 (nearly 55%) being the households having their annual income below Rs. 10,000. Here, the che-square value with respect to income status is 55.831 and the degree of freedom is 2. The expected value is given in brackets. Since the value at 1% is significant it is clear that the low-income group (LIG) families are greatly associated with the selection of low-cost housing technology.

## 7.2 CLASSIFICATION OF HOUSEHOLDS ACCORDING TO FAMILY SIZE

In determining the demand for low-cost housing, the size of family (the number of members occupying in a house) also may have some influence on demanding low-cost housing technology by the households. Here, in this section, the households have been classified into two categories. First, households having upto total 5 members and second the households having above 5 members. Based on these, the households have been classified as shown in the table 7.2.

**Table 7.2**  
**Classification of Households according to family size**

Size of family	Low-cost	Conventional	Total
Upto 5 members	38 (50.5)	63 (50.5)	101
Above 5 members	37 (24.5)	12 (24.5)	49
Total	75	75	150

Source : Primary Data

Chi-square value is 18.943

Degree of freedom is 1

From the table it can be seen that out of total 75 low-cost households selected 38 (50.6%) being the households having the total number of members upto 5. Moreover, the chi-square value with respect

to family size is 18.943. Since the value is significant at 1% level, no doubt, the households upto 5 members have been closely associated with the selection of low-cost housing.

### **7.3 CLASSIFICATION OF HOUSEHOLDS BASED ON THE AVAILABILITY / NON-AVAILABILITY OF GRANT**

Apart from the above, it is also necessary to know whether the availability of grant from the government has any influence on demanding the low-cost housing technology. For this, the households have been classified mainly into two. Firstly, the number of households which obtained grant and second the number of households which do not availed any grant but constructed their houses by using self-owned capital. Based on these, the households have been classified as shown in table 7.3.

**Table 7.3**  
**Classification of Households based on the availability or non availability of grant**

	Low-cost	Conventional	Total
No. of Households availed grant	37 (18.5)	0 (18.5)	37
No. of households Not availed grant	38 (56.5)	75 (56.5)	113
Total	75	75	150

Source : Primary Data  
Chi-square value is 22.141  
Degree of freedom is 1

The table shows that out of total 75 low-cost households 37 households (49%) availed grant while 38 households (51%) did not avail any grant but constructed their low-cost houses by using own capital. Anyhow, since the chi-square value with respect to grant availability is 22.141 and also the value is significant at 1 % level the grant availability is also associated with the selection of low-cost housing technology. It should also be noted that out of total households 38 (51%) households constructed their low-cost houses without availing any grant. That means, mere grant availability is not a thrust factor in determining the demand for low-cost housing technology.

Thus, from the whole analysis it is clear that all factors such as income status, size of family and grant availability have been exercising significant role in determining the households demand for low-cost housing.

In short, it can be stated that majority of low-cost houses have been constructed by low-Income group (LIG) small size households. Thus, it is evident that lowering the construction cost is the major concern behind the selection of low-cost housing technology.

# SUMMARY & CONCLUSION

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**CHAPTER - VIII**  
**SUMMARY & CONCLUSION**

## **CHAPTER - VIII**

### **SUMMARY & CONCLUSION**

At present both the conventional and cost effective technologies are available in the field of housing construction. Among these, the cost-effective technology has the advantage of economy in construction, saving of time and energy and of the optimum use of materials. Since the building materials are locally available the huge transportation costs incurred for transporting the materials and the delay in construction can be avoided. Thus, cost-effective technology, no doubt, can be opted as a permanent remedy to overcome the severe housing inadequacy in the country.

Thus, the questions arise at this point are whether we should need a 'house' or a 'shelter'? Why some people imitate or compete with others in house-building? By doing so why these people sacrifice their family's aggregate welfare? How is it possible to make the economies in construction? Then, what are the methods which enable to bring down the construction costs? Whether Nirmithi or COSTFORD is forefront in low-cost housing construction? How can we overcome the severe housing inadequacy in the country? Whether the income status, family size, or grant availability has any association with the household's demand for low-cost-housing technology? Whether the local availability of building materials has any influence on cost reduction? Among the low-cost houses

constructed by Nirmithi & COSTFORD which type of houses (whether it is more of HIG/MIG/LIG houses) show an upward trend? A deep attempt has not been made so far regarding these questions.

So, with a view to answering these questions we set certain specific objectives such as

(1) To examine the relative cost differences between the conventional and cost-effective technologies with special reference to Nirmithi & COSTFORD. (2) To examine the preferential differences in building materials employed by both Nirmithi & COSTFORD (3) to analyse the trend and pattern of the demand for low-cost houses built by Nirmithi & COSTFORD in the state and (4) to examine the factors influencing the households demand for low-cost housing.

The first objective has been fulfilled with the help of secondary data. For examining the relative cost differences between conventional and cost-effective technologies data has been collected by the survey conducted at Nirmithi and COSTFORD centres in Thrissur district. The relative costs have been examined by using simple statistical tools such as averages and percentages.

For the second and third objectives also secondary data has been used. The necessary data has been collected by surveys conducted at

Nirmithi and COSTFORD centres in Kerala by making use of questionnaire I.

The last objective has been fulfilled by conducting household surveys at various selected panchayats in Thrissur district for which questionnaire II has been used. The panchayats have been selected by the means of purposive sampling method. In order to find out whether the income status, size of family or grant availability has any influence on the households demand for low-cost housing a simple statistical tool 'chi-square' test has been employed.

## **8.1 SUMMARY OF FINDINGS**

Based on the afforesaid objectives of the study, the survey results prove that there is vital differences in construction costs and material consumption between conventional and new specification. Likewise, there is slight variations in both the construction costs and types of materials used between Nirmithi and COSTFORD centres in the state. This is due to the change in method of construction, types of materials used and in the availability of materials. Moreover, from the survey it is also clear that while the COSTFORD concentrates mainly on the construction of residential buildings, the Nirmithi concentrates on Institutional buildings sponsored by the government of Kerala.

Accordingly, the survey results reveal that if we use conventional specification for housing we have to spend around Rs. 410 per square feet plinth area whereas by using cost effective technology the per square feet cost is Rs. 322/50. Thus, when compared to conventional specification, the average square feet saving by new specification is Rs.87.50.

Further, the study reveals that there is an intra-district and inter-unit (between Nirmithi and COSTFORD) differences with regard to building materials employed depending upon the local availability. For example, the Nirmithi in Thrissur district employs burnt clay bricks for walling while the Nirmithi in Kannur district employs laterite stones for the same. Likewise, the COSTFORD in Thrissur prefer roofing tiles while the Nirmithi in the same district prefer Mangalore pattern roofing tiles for roofing.

With regard to the trend growth of low-cost residential projects undertaken by both Nirmithi and COSTFORD during 1990-2000, the study reveals that there has been a wonderful achievement in the growth of low-cost residential projects in the state except in the years of 1996 and 1997 when the massive gulf return to the state affected adversely to the construction activity in general.

Finally, for the purpose of satisfying the last objective of the study, the factors such as income status of the households, size of family and availability/non-availability of grant from the government for housing have been taken as the determining factors of the demand for low-cost housing technology by the households. Based on these, the study found that all these factors are having a close association with the demand for low-cost housing. Thus, it is clear that among such factors no single factor can be isolated as the dominant factor in determining the demand for low-cost houses.

## **8.2 SUGGESTIONS AND RECOMMENDATIONS**

It is seen that some people just imitate others in house-building. They most often forget about their income capability/affordability level. By doing so, they actually sacrifice their family's aggregate welfare by getting trapped into a huge financial debt. So, a point which needs to be taken care of in the interest of better housing may be that one should not imitate others in house-building and it is better to construct houses according to the income-affordability of each. By selecting cost effective technology we can definitely construct houses based on our budget line which is being the basic tenet of the present study. Thus, we must plan a house according to our need only and not to imitate what other man round the corner of the street has built. For achieving the economy in construction the following points should be taken into consideration.

- i) Try to use locally available building materials and avoid high priced scarce materials. By doing so, we can avoid unnecessary costs and delay in construction.
- ii) Before embarking upon a particular housing project, try to understand its 'cost effectiveness' when compared to other technologies.
- iii) It is better to avoid wasteful expenditure by giving garish colours and points on housing - "let the bricks look bricks".
- iv) As Dr. K.N. Raj says "West is best" attitude should be changed. We should have a mind to welcome our own technology (Low-cost). This calls for an attitudinal change in the mindset of individuals.
- v) "Housing is a problem". But it will not be a problem or a dream not to be fulfilled if we use cost-effective technology.
- vi) A clear-cut understood strategy is a must about structural planning and architectural designing of housing.
- vii) The reduction in thickness of wall construction is good. It will assure not only the economy in construction but also gives more space for rooms by reducing the difference between plinth area and floor area.
- viii) It will be better to concentrate more on internal facility rather than giving external outlook for housing.

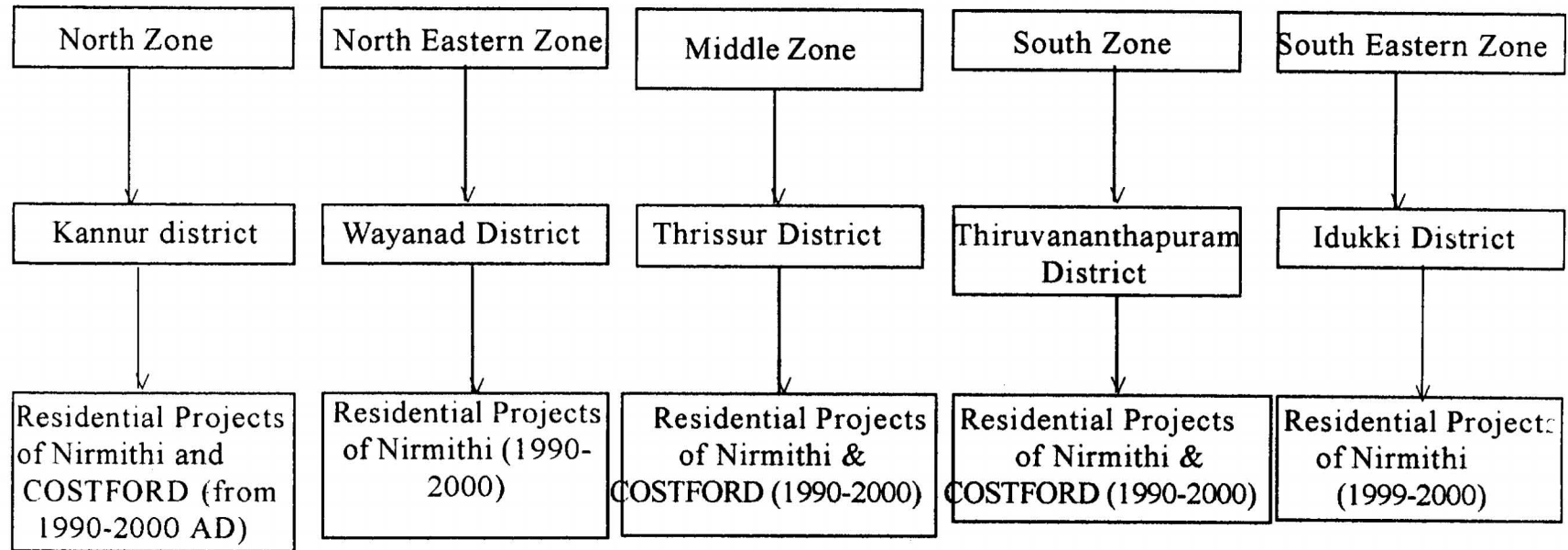
- ix) There should not be any difference between Estimated cost and Actual cost. When specification changes there will be much gap between the two. The selection of cost-effective technology enables to bridge this gap.
- x) It is not the engineer who tells what sort of house we need but we must tell to the engineer what sort of house we should have.

# **APPENDICES**

## APPENDIX - I

### SAMPLING PROCEDURE USED FOR FINDING OUT THE TREND & PATTERN OF THE DEMAND FOR LOW-COST HOUSING IN THE STATE

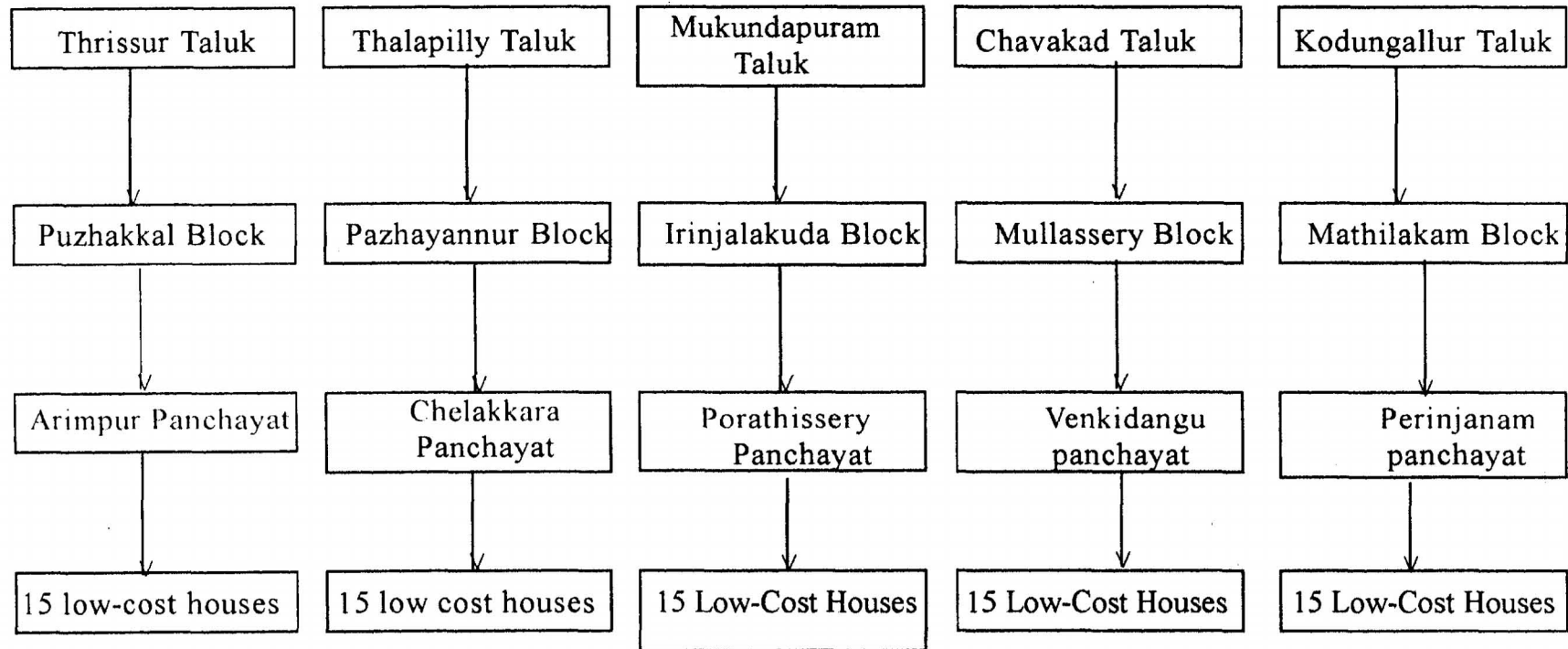
#### KERALA STATE



## APPENDIX - II

### SAMPLING PROCEDURE USED FOR FINDING OUT DEMAND FOR LOW-COST HOUSING

#### THRISSUR DISTRICT



### APPENDIX - III

UNIVERSITY OF CALICUT, DEPARTMENT OF ECONOMICS

A survey on "Demand for Low cost Building Materials in Kerala" conducted at NIRMITHI KENDRA AND COSTFORD CENTRES in connection with Ph.D. Thesis in Economics

QUESTIONNAIRE 1(Common to 5 selected Districts such as Kannur, Wayanad Thrissur, Thiruvananthapuram and Idukki).

(Tick whichever is applicable)

**I. General Particulars**

- (i) Name of the Unit : NIRMITHI /COSTFORD  
(ii) Year of establishment :  
(iii) Whether the unit is: Panchayat/Municipality/  
locating just adjacent to Corporation/Town/City  
(iv) Nature of the Unit : Charitable/Voluntary/Honorary  
(v) Chairman of the unit : District collector/RDO

**II. Details regarding the Materials and Technology selected**

- (i) Type fo Technology : Total prefabrication/partial  
usually followed as a prefabrication.  
part of low cost  
(ii) Building materials used : (ie. Materials consumption)for:-  
a) Foundation : Rubbles/Building stones/others.  
b) Walls : Hollow blocks/ Hollow bricks/  
Burnt clay bricks/Sun Dried  
Bricks/Building Stones/ Concrete  
wall frames/Hollow solid  
blocks/ asbestoes sheets/  
Hard Boards/Galvanised Iron  
sheets/aluminium sheets/others.  
c) Roofing : Roofing tiles/concreted/  
asbetoes/Hard Boards/Alumi-  
nium sheets/others.  
d) Doors and : Timber/Concrete doors and door  
windows : frames/asbetoes sheets/alumi-  
nium sheets/glass shutters/others  
e) Flooring : Tiles /Marbles/Mosaic/Red  
Oxide/Cement/others.  
f) Bonding and finishing : Cement/Lime mortar/Mud/others  
iii) Type of construction : Rat trap bond/filler system/  
device generally applied : Brick Arches/waffle shell  
system/tunnel system/dome  
type construction/Jesperson  
system/Tracoba system of  
construction/others  
iv) Building materials : Unit itself/collected from  
produced by : outside/other sources.

III. PARTICULARS about the projects completed for the period from 1990-98.

Years	Residential	Institutional	Industrial Projects	Total
1990-91				
91-92				
92-93				
93-94				
94-95				
95-96				
96-97				
97-98				

IV. Number of ongoing projects

Residential	Institutional	Industrial	Total

V. Among the total projects completed for the period from 1990-98 how many projects have LIG, MIG and HIG?

Years	LIG projects Exp. upto Rs. 1 lakhs	MIG Projects Exp. in between 1 & 3 lakhs	HIG projects Exp. above 3 lakhs	Total
1990-91				
91-92				
92-93				
93-94				
94-95				
95-96				
96-97				
97-98				





VIII. Turnover, Expenditure and Profit made by Both Nirmithi and COSTFORD for the period from 1990-98

Years	Turnover	NIRMITHI			Years	Turnover	COSTFORD	
		Exp. per year	Profit per year	Total			Exp. per year	Profit per year
1990-91					1990-91			
91-92					91-92			
92-93					92-93			
93-94					93-94			
94-95					94-95			
95-96					95-96			
96-97					96-97			
97-98					97-98			

## APPENDIX - IV

UNIVERSITY OF CALICUT, DEPARTMENT OF ECONOMICS

“DEMAND FOR LOW-COST BUILDING MATERIALS IN KERALA” - A  
SURVEY CONDUCTED AT LOW-COST RESIDENTIAL HOUSE HOLDS IN  
THRISSUR DISTRICT IN CONNECTION WITH Ph.D THESIS IN  
ECONOMICS

### QUESTIONNAIRE II

(Information collected from house holds which opted low-cost materials  
and Technology for their housing)

1. General Particulars : (Tick which ever is applicable)
  - a. Name and Address of the :  
house owner
  - b. Name of Taluk/Block/ :  
Panchayat/Municipality where  
the house is located
  - c. Type of housing : LIG/MIG/HIG
  - d. Year of the house built :
  - e. Whether the house is built by : Loan/Grant/Self-owned capital  
using
  - f. Area and sq. feet size of the house :
  - g. Total cost of construction :
  - h. Housing construction : Nirmithi/COSTFORD  
work undertaken by
  - i. Why the people demand low- : Low-income status of the  
cost materials and technology : family/poor employment status/  
for their housing. : Low-level of Edn./larger family  
size/local availability of cheap  
building materials/lowering the  
cost of construction/environment  
friendly and aesthetic beauty to  
live on/availability of grant and  
so on.



### III. OTHER PARTICULARS

ASSET POSITION OF THE HOUSEHOLD	BASIC FACILITIES IN THE HOUSE	OTHER CONVENIENCES IF ANY	ANY CHANCE IN THE APPROVED SPECIFICATION	WHETHER THE LOW-COST HOUSE IS ACCEPTABLE TO ALL/NOT	COST OF MAINTENANCE PER YEAR (IN Rs.)	PROBLEMS FACED BY THE HOUSE - HOLD IF ANY	REMARKS/ SUGGESTIONS IF ANY
Land and Vehicles 1. Land a. Type of land Field/Land b. Land Area (Size)	(a) Water supply (b) Sanitation (c) Toilet (d) Electricity (e) Cooking Gas.	Refrigerator/ Washing machine/ T.V./ Others	Yes/No If yes, what type of changes made on: (a) Walling (b) Roofing (c) Plastering (d) Flooring (e) Others	(a) Father (b) Mother (c) Children (d) All		Problems such as : (a) Leak (b) Falling sand and mud from the roof (c) Break of wall of roof and (d) Others	

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