TRADITIONAL AND CONTEMPORARY BUILDING STYLES USED IN TANZANIA AND TO DEVELOP MODELS FOR CURRENT NEEDS

BY

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DECLARATION

I declare that my thesis is an original and all the work that went into preparing the thesis was performed by me. The views expressed in there are from my investigations as well, except where reference or acknowledgements are made.

……………………………………. ………………….

Signature Date

DEDICATION

To my Late Father

Homel Mwakyusa Mwambuga

A gentleman

And my Late Monther

Nkilahani Sisala Kilembe

A great lady and visionary

For

Their love and education of their children with my father’s minimal attendance of formal school education, and my mother having not attended any formal school in her life.

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PREFACE

My closeness and participation in the various programmes, as narrated below, of the architectural profession activities in the country drove my mind to developing an interest of widening my knowledge in the field related to housing.

Immediately after completing my Masters degree in Architecture from Nairobi University in 1975 I was employed by the East African Railways Corporation as an Assistant Architect, stationed in Nairobi Kenya. The East African Railways Corporation had sponsored me for the architectural education at the Nairobi University (1969 – 1975) and at the Kenya Polytechnic Nairobi for the City and Guilds Ordinary Technician Diploma in Building and Civil Engineering (1966 – 1968). My early assignment was primarily designing and visiting constructional sites of houses, offices and railway workshops all over East AFrica – Kenya, Tanzania and Uganda.

Interest in houses development continued to build up in me as a result of being appointed a Councillor of the Ardhi Institute, (1986 – 1989); the National Construction Council (NCC) (1985 – 1994); External Examiner of the Ardhi Institute Architects' Diploma (1986 – 1989) Barchelor of Architecture Degree of The University College of Lands and Architectural Studies – UCLAS, (1997 – 2002), Director of the Directorate Committee of the Kisarawe Brick Factory Company Limited (1985 – 1991); Director of the Board of Directors of the National Housing Corporation – NHC (1985 – 2003) and Visiting Lecturer and resource person in construction management at the Eastern and Southern African Management Institute – ESAMI, Arusha Tanzania (1986 – 1990).

For the last twenty years, when I was the Secretary, Vice Chairman and Chairman of the Architectural Association of Tanzania (AAT) – 1985 – 1995, I had attended and participated in a number of housing workshops, seminars, congress, general assembly and symposiums in various cities of
Africa and Overseas.

My Presidential Appointment as the Chief Executive of the National Consulting Firm in the Building and Civil Engineering Industry – the National Estates and Designing Corporation (NEDCO) whose main function is the design of houses for the estates developments, coupled with my Chairmanship of the Architects Professional Examinations of the National Registration Board played a big role, not only in equiping me with ample experience, but also in developing interest in me of studying further. At this stage I thought of seeking for admission and accepted in March, 2002 as a student of the St. Clements University for the purpose of part time study leading to the degree of Doctor of Philosophy.

ABSTRACT

The purpose of this research is to find out and understand the original situation, condition and cultural ties of the traditional rural houses in Tanzania by ***exploring***, ***identifying*** and ***studying*** specific objectives and establish the shortfals in as far as performing their intended purposes, optimumly, are concerned; aiming at understanding and drawing up a practical approach for houses improvement without affecting the preservation of the cultural and traditional norms of the rural people.

Consequently, the dissertation is not only posing to give specific recommendations but also attempts to reveal some of the background in the recommendations.

This thus, touches on the origin of mankind with his habitat in Tanzania, population situation and its growth and movement, geographical and climatic influence and the government and NGO's involvement in the rural houses improvement in the country.

The submission addresses the improvement of rural houses in the country by properly utilizing the readily available local building materials, application of modern house designs techniques suitable for modern low cost constructional development towards improving space utilisation, functionalism, house durability, stability, aesthetics and hygiene.

Not much infrastructural services, such as electricity, piped water and sewage has been delt with in this dissertation, due to lack of reality to individual plot in the rural parts of Tanzania; but some submission on the use and construction of pit latrine has been made.

Although the recommendations given are related to rural situation, some of them may also be of some use in the design of urban areas. The dissertation is also intended and attempt to be of use and understandable to the technicians, craftsmen, fundis and individuals, whose roles of participation has also been looked at in building the rural houses.

The dissertation initial approach incorporates a study of a Village Museum of Tanzania with furnished traditional houses from different regions and ethnic groups of the country, onto which the typical rural traditional houses problems cross-sectionally, can be found, supplemented with personal interviews to people familiar with rural houses, desk research and a designed questionnaire.

The Village Museum represents all the types of styles of houses spread in Tanzania.

Further details, where necessary, have been obtained by seeking the required information from the experienced village personnel, such as the way animals are kept and the disposal of waste water.

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ABBREVIATIONS

AAT	-	Architectural Association of Tanzania
AD	-	Anno Domin
ALAF	-	Aluminiium Africa
AQSRB	-	Architects and Quantity Surveyors Registration Board
BC	-	Before Christ
BP	-	British Petrolium
BRA	-	Building Research Agency
BRU	-	Building Research Unit

^{o}C	-	Centigrade (metric temperature measure)
CBO	-	Community Based Organisation
CCM	-	Chama Cha Mapinduzi (political party)
CDA	-	Capital Development Authority
CDC	-	Commonwealth Development Corporation.
CHAP	-	Community Humanitarian Action Plan
CHS	-	Centre for Human Settlement
CM	-	Centimeter (length metric measure)
COET	-	College of Engineering Technology
CRB	-	Contractors Registration Board
CU.Ft	-	Cubic Feet (volume imperial measure)
Cu.m	-	Cubic meter (volume metric measure)
DIT	-	Dar-Es-Salaam Institute of Technology
DPC	-	Damp Proof Course
DRC	-	Democratic Republic of Congo
DSM	-	Dar-Es-Salaam
DTC	-	Dar-Es-Salaam Technical College
EA	-	East Africa
EAA	-	East African Airways
EAC	-	East African Community
EACSO	-	East African Common Services Organisation
EAHC	-	East African Harbours Corporation
EARC	-	East African Railways Corporation
EMC	-	Equilibrium Moisure Content

ERB	-	Engineers Registration Board
^{o}F	-	Fahrenheit (imperial temperature measure)
FTC	-	Full Technician Certificate
FoE	-	Faculty of Engineering
GDP	-	Gross Domestic Product.
HBS	-	Household Budget Survey
HFCK	-	Housing Finance Company of Kenya Limited
IDA	-	International Development Agency
IET	-	Institute of Engineers Tanzania
IHSS	-	Institute of Human Settlement Studies
IPI	-	Institute of Production Innovation
ITP	-	Institutional Transformation Programme.
KM	-	Kilometer (Metric Measure of distance)
KBFC	-	Kisarawe Brick Factory Company
MECCO	-	Mwananchi Engineering Construction Corporation.
MP	-	Member of Parliament
MSTHE	-	Ministry of Science Technology and Higher Education.
NACTE	-	National Council of Technical Education.
NCC	-	National Construction Council
NDC	-	National Development Corporation
NEDCO	-	National Estates and Designing Corporation.
NHBRA	-	National Housing Building Research Agency.
NHC	-	National Housing Corporation.
NHP	-	National Housing Programme.

NIC	-	National Insurance Corporation
NORAD	-	Royal Norwegian Embassy
NPF	-	National Provident Fund
NVTD	-	National Vocational Training Division
pCET	-	Prospective College of Engineering Technology
PHFCT	-	Permanent Housing Finance Company of Tanzania Limited
PSRP	-	Public Service Reform Programme
RAA	-	Refugees Affected Areas
RVTSC	-	Regional Vocational Training Services Centre
SAMP	-	Swedish African Museum Programme
SIDA	-	Swedish International Development Agency.
TABCA	-	Tanzania Building Contractors Association.
TACECA	-	Tanzania Civil Engineering Contractors Association.
TANGO	-	Tanzania Association of Non-Governmental Organisation
TBA	-	Tanzania Building Agency
TBS	-	Tanzania Building Standards
TCCIA	-	Tanzania Chamber of Commerce Industry and Agriculture.
TDTC	-	Technology Department and Tansfer Centre
THB	-	Tanzania Housing Bank
TIC	-	Tanzania Investment Centre
TIRDEP	-	Tanga Intergrated Rural Development Project
TIQS	-	Tanzania Institute of Quantity Surveyors

TRADA	-	Timber Research and Development Association
TShs	-	Tanzania Shillings (1 USD = TShs.1,200/=)
TTCL	-	Tanzania Telecommunications Company Limited
TZ	-	Tanzania
UCLAS	-	University College of Lands and Architectural Studies
UN	-	United Nations
UNDP	-	United Nations Development Programme
UNHCR	-	United Nations High Commissioner for Refugees
UNICEF	-	United Nations Children's Fund
US $	-	United States of America Dollar (1 USD = TShs.1,200/=)

List of Drawings

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CHAPTER ONE

1.00 INTRODUCTION

1.1 Background

In realisation that for more than forty years now from when Tanzania got independence in 1961 rural housing in Tanzania has been given theoretical high priority in its various development plans, policies and strategies; as such, it is felt necessary that some practical approach on carrying out research concerning modern house designs and utilisation of local building materials and construction methods ought to be made, and thus prompting to carry out research on ***Traditional and Contemporary Building Styles used in Tanzania to develop models suitable for current needs.*** So the aim is to foster and address improvement of rural houses in Tanzania by properly using local building materials and adopting the techniques of modern low cost constructional developments towards paying attention to providing space functionalism, house durability, stability, aesthetics and hygiene.

The aforesaid is in line with the Habitat Agenda which proclaims that adequate shelter means more than a roof over one's head. It also means adequate privacy, adequate space, physical accessibility, adequate security, security tenure, structural stability and durability, adequate lighting, heating and ventilation, adequate suitable environmental quality and health related factors; and adequate and accessible location with regard to work and basic facilities, all of which should be available at an affordable cost.

The Government of Tanzania, like all other signatory to the 1996 Istambul Declaration for the Habitat Agenda, committed to enable all its people to acquire shelter that is described above, and further, it proclaims that housing is one of the three basic human needs after food and clothing (National Housing Policy, 1982). Not only housing in a narrow sense but a decent house is a right of every individual regardless of one being in a developing or developed world. According to the ***National Housing Policy "SERA YA TAIFA YA MAENDELEO YA NYUMBA, 1982",*** there was a gap of 300,000 houses in urban areas; while in the rural areas the problem was even worse because most of the so called houses were of poor quality, to an extent of being denied the count of their existance.

Since the Istambul Declaration for the Habitat Agenda, 1996, through the Ministry of Lands and Human Settlements Development, the government has demonstrated its commitment to implement the Habitat Agenda by, inter alia, putting in place a National Human Settlements Development Policy 2000.

The National Human Settlements Development Policy seeks to primarily have a house which ought to meet the dweller's needs and requirements. Such a house may be produced by using traditional, conventional or modern technologies and can be located in both rural and urban areas of the country. For the rural involvement this demands ample understanding through research, of the existing rural cultural habits in relation to housing and internal arrangement of the house. In addition to this, research in the field of hygiene, materials and construction of houses, demands notable attention consideringthe weakness of rural houses and communicable diseases, pests of all kinds etc. The attraction of this involvement can be exemplified by the living patterns and household activities such as the cooking facilities, treatment of foodstuffs in the household such as its preparation and its storage and collection as well as disposal of waste and soil water.

According to the statistics available at the National Housing Building Research Agency (NHBRA) immediately after Villagization programme (mid 1970's), houses regarded as traditional were those noted in the rural areas (Second Year Development Plan 1969 – 1974), with details as to how these houses were utilized, how they were built, construction materials used, life span, functionalism and rural people affordability.

The primary intention of this submission, therefore, is for the researcher to draw the attention on the above and make a useful and understable constribution to the technicians and craftsmen working in the rural houses in Tanzania. It should be regarded as a presentation of a stage in a continuous work. Realising that the Tanzania Society is changing rapidly, this kind of recommendations can never be considered final, but regarded as a stage contribution out of the many more to come. However, discussions for low-cost housing in towns and cities have been entertained in some parts due to its relevancy in connection with the standard of rural cost housing, in similarity and application of the available resources, such as the use of building materials, building technicians and design approach.

Rural low-cost housing is vast area of problems, resources and processes. It comprises a vital part of people's environment. Housing in its widest sense is an area of human activity, where materials and technology on one had is marched by values of social systems on the other, set in a framework of the local conditions thus resulting into adaption new shelter styles and high demand of shelter for the incomers.

Use of Prototype Designs Limitations People in the villages need ample advise, guidance or information concerning design of houses. This should not lead to an expert producing a prototype designs as are not always suitable or practical. Designs of prototype tend to overlook and skeep the application of some of the relevant essentials. A particular house design should never be imposed upon self-help builders against their will. The family that is going to build and live in the house must take a decision on the design. This should be tied up with the fact that different household families have different neeeds and desires concerning housing, and that the resources they can set aside for building purposes (money and work), culture, habits, positioning, climate etc. varies considerably.

The concern put forward is brought about by the fact that Housing is one of the basic requirements for human survival. For a normal person owning a decent house provides significant economic security. For a complete shelterless person, possession of a house brings about a profound social change in his existance endowing him with an identity, thus entergrating him with his immediate social millieu.

Tanzania Rural and Urban Population Growth.

Tanzania has its 1st National Population Census carried out in 1948 with a result of 7,480,400 persons ending up with the 6th National Population Census of 34,569,232 persons carried out in 2002. These figures show that the population has grown 4.6 time to the year 2002, August.

Referring to the table below
(Population Trends, Tanzania – Internet and Daily News, Wednesday, 01/01/2003) it is observed that rural/urban population distribution has it that 77 per cent of the total population of Tanzania mainland lives in rural areas and 60 percent in Zanzibar.

One conclusing to draw from 1948 and 2002 Population Census figures is that the number of people living in urban areas has risen 42 times, while the share of the urban population in the total population has risen 9 times of the same 1948 – 2002 period.

The number of people living in the rural areas has, percentage-wise, dropped by 20.55 percent within the same 1948 – 2002 period indicating that absoption of people to urban centres is increasing, though with the share of the rural population in the total population dropping by 1.27 percent.

Tanzania Rural and Urban Population Growth.

YEAR	TOTAL	URBAN	RURAL	
1948	7480400	183,862 (2.5%)	7,296,538 (97.55%)	1967 Census
1957	8,788,500	364,072 (4.1%)	8,424,428 (95.86%)	2nd National Pop. Census
1967	11,958,654	685,547 (5.7%)	11,273,107 (94.27%)	1st Post-Indep. National Pop. of 1967
AUG. 1978	17,516,610 Incude	2,412,900 (13.78%)	15,103,710 (86.23%)	2nd Post-Independence

	Zanzibar and Pemba			Population
AUG. 1988	23,174,336 include Is. Zanzibar and Pemba	6,305,359 (27.2%)	16,868,977 (72,80%)	
	22,533,758 Tanzania mainland alone	6,079,175 (26.98%)	16,454,583 (73%)	National Population Census.
	640,578 Zanzibar and Pemba alone	226,184 (35.5%)	414,394 (64.69%)	
2002	33,584,078 Tanzania mainland	7,724,338 (23%)	25,859,740 (77%)	
	34,568,609 Incl. Zanzibar and Pemba	7,950,780 (23%)	26,617,829 (77%)	National Population Census
	984,531 Zanzibar and Pemba alone	393,812 (40%)	590,719 (60%)	

From the above statistics, it may be concluded that despite of having a low urban population growth base, the urban population of Tanzania has increased about nine times over a period of five decades from 2.5 per cent of the country's total population in 1948 to 23 percent. In a country with a weak urban economic base, without a strong urban tradition and institutional capacity to handle urban growth, this is a very big increase both in absolute and relative terms of the urban population in relation to the total population of the country in such a short period of fifty four years.

Causes for Urban Population increase

There are four major factors which account for this rapid increase in the urban population of Tanzania notably rural-to-urban migration, natural population increase of the urban population, a change or changes in geographical boundaries of urban areas, formation of new urban centres as district headquarters (e.g. Kibaha, Igunga, Karatu and Simanjiro), and effects of past government policies. A big net rural-to-urban migration accounts for the bulk of the urban growth in Tanzania. For example, studies carried out in the past on urban growth show that the percentage share of the net migration in urban growth over the 1970 – 1975 period was found to be 64 percent while the share of the urban growth due to natural population increase was 36 percent over the same period (Newland 1980, 10; Renaud 1981, 165 - 166).

Study carried out by the Ardhi Institute

A study carried out by the Ardhi Institute, Dar-Es-Salaam in 1988 covering six major urban areas in the country shows that 82.3 per cent of the 5,568 heads of households who lived in the 1,568 houses visited and surveyed in the six study towns were not born in the study towns. For Dar-Es-Salaam primate city 80.7 percent of the 2,606 heads of households living in the 660 houses surveyed were not both in Dar-Es-Salaam city proper. (Kulaba 1989, 20). That study further shows that about 74 percent of all the 1668 respondents were not born in the study towns, where they now live. (Kulaba 1989.23). Moreover, that study shows that 70.6 percent of migrant respondents were living in rural areas before they moved to the study towns. Da-Es-Salaam City has the largest percentage (76 percent of its migrant respondents coming from rural areas). (Kulaba 1989, 23). By contrast, only 29 percent of the migrant respondents were living or staying in smaller towns before they moved to the study towns (Kulaba 1989, 23).

If the population of the suburbs (i.e. areas immediately outside the city and township boundaries) of these towns, and municipalities were to be added, growth rates for individual urban areas show even higher growth rates than the average annual growth rate of the urban population,

It is clearly to draw from these figures that the growth rate of the urban population is very high, and such a high growth rate means doubling of the urban population in far less than a decade. It therefore can be concluded that the major source of urban population growth in Tanzania is rural-to-urban migration.

1.2 CONCERN OF NEGATIVE ATTENTION TO RURAL HOUSING DEVELOPMENT

All the way through, practically notable attention has been given to the development of houses in urban centres. And this has been the hub of consideration with general development and policies concern. Provision, improvement and upgrading of housing by the government or external assistance has always been focussed to urban centres, as we have already seen, not realising the rural settlement impact it has on the growth of urban centres. Even where the government embarks itself in providing basic infrastructure like roads, water and electricity and accessibility to housing finance; not done in the rural areas, it indirectly enables people to actually what people can do in the absence of government involvement.

Taking from the time of Tanganyika's independence in 1961 a number of deliberate approaches policies formation and programmes, although commitments on paper, not in practice, have been given towards transforming rural settlement, principally aiming at improving the rural houses. Much attention have been advocated towards considering the urban housing and its associated infrastructure.

Political Party Contribution to Human Settlement and Built Environment on page ……… of this thesis and Chapter Five on Organisations Contribution to Housing Development in Tanzania submits the various approaches and commitments taken by the government towards improving both urban and rural houses.

In Tanzania, researchers on individual capacity have shown limited interest in the rural housing development, particularly studying how peasants build and afford to build their houses and thus improve or modernise them. As Hamdi (1991) puts it that the worsening housing conditions in non-industrialised countries are caused by the fact that institutions and professionals are not aware of the realistic shelter requirements. He puts forward his submission by presenting a historical account of the housing supply and land use planning in order to identify and focus on the significant shifts in practice and thinking. This is caused by the kind of policies and strategies adopted by the government over the years, which again are only for the urban centres, and where the existing literature is found, is centred on government owned houses. National policies and strategies have concentrated on infrastructure, providing water, electricity, solid and liquid waste management not benefiting the rural community.

Like in non-industrialised countries, individuals in rural areas in Tanzania are always responsible for the construction of houses they live in, in a similar way the bulk of which takes place in informal settlements in urban cetres, and this has resulted in having no growing demand for houses in the rural areas; but existance of growing demand for decent, durable, aesthetical and functional houses.

1.3 RESEARCH OBJECTIVES

The objective of this research is to analyse, understand the rural traditional houses in Tanzania so as to comprehend and apply information acquired into updating the traditional houses with notable attention paid to proper application of local building materials available to the users, to promote and attain durability of the houses, hygiene and affordability, the house requirement sufficiency in terms of optimum use, spartial qualities of indoor functions and find out solutions of hinderances of rural houses improvements.

The research goes into investigating the entire neighbourhood of the homestead so as to establish the internal layout of houses and their relationship with the essential services/functions of their homestead, which brings in the attraction and involvement of the living patterns of household activities, such as the cooking facilities, treatment of food-staffs in the household, preparation with its storage, livestock keeping and waste disposal.

Improving the standard of the rural, house ought to meet the dwellers' needs, requirements, behaviour, comfort, health, safety and optimum use of construction materials employed. For one to embark on this, on behalf of the house owner, it demands ample understanding of the rural cultural habits in relation to housing design and internal arrangement of the house, research in the part of hygiene, the materials and construction of houses and ample attention towards fighting communicable pests of all kinds, etc.

SPECIFIC OBJECTIVES

The main objective of the study is to explore, identify, analyse and establish the shortfals of the rural traditional houses in as far as performing their intended purposes optimumly are concerned. This incorporates techniques of construction, the choice and use of the traditional building materials, spatical qualities and arrangement of functional spaces of various activities. The Specific objectives are:

-To ***explore*** and analyse the behaviour and the level of improvement required of a rural house as a gauge towards examining and understanding the prevailing situation of a house.

-To ***identify*** and analyse the major shortfals of a rural traditional house in terms of functionalism, construction techniques, durability, stability, hygiene, local building materials used and space utilisation, with the aim of suggesting improvements to the house.

-To ***study*** indoor and outdoor

- use of space of a given house and surrounding area.

- materials used in the building construction

- application of technical know-how (craftsmanship) employed so as to establish the relationship between a rural traditional house of local building material and a modern house of conventional materials

-To ***explore*** the rural local house users, their level of affordability towards upgrading/improving their houses.

The specific objectives converge to the understanding the rural traditional house from its construction to its use and avail the opportunity to its improvement towards promoting a comfortable living mould, safe against weather conditions and natural catastrophe.

THE RELEVANCY OF THE RESEARCH.

The relevancy of the research prior to taking measures and give suggestions of improvement of the traditional houses is based on the necessary need of knowing and understand the current position of the houses and the users requirement. This will reveal the extent of the improvement required coupled with the retention of the social and cultural behaviour of the members of the households. This, thus, addresses the following:

-Determine traditional spaces required

-Determine traditional arrangement of functional spaces

-Determine the type, shape and size of the traditional house

-Determine the commonly used building materials and its proper use

-Determine the technical know-how and knowledge of house construction

-Determine the hygiene aspect and level of traditional houses and households

-Determine the financing of traditional houses.

RESEARCH QUESTIONS

The main research questions are:-

- How are the houses like at the moment?
- Do the houses need any improvement?
- How can the houses be improved?
- Are the people satisfied with the present condition?
- Can the people afford to improve them?
- Any assistance to afford?

RURAL HOUSING IMPROVEMENT AS AGRICULTURAL AND FARMING PROMOTION

The activities carried out by the rural people which is mainly agriculture and general farming justifies the relevancy of this research. 60.4% of the rural people depend on agricultural income, and such a big vote of the population is towards boosting the economy of the country, while 21.5 percent is for the population of the urban centres, including Dar-Es-Salaam city of 1.9% of its people. The rest of the population carried out other activities/involvement excluding farming. (BHS 2002).

In most ***Regions***, around 60 – 80 per cent of adults report agriculture as their main activity. The proportion is lower only in Dar-Es-Salaam city, Arusha and Mbeya where employment of other activities are more common than elsewhere (BHS 2002).

Relevancy of the research can also be traced from the submission of the Member of Parliament at the launching of the Second Poverty and Human Development Report for 2003 held in Dodoma, Tanzania on Friday 11/06/2004 where he said:

> "How does it sound for a child to study at a well-built school and then return home in a ramshackle house? Or a patient to be admitted in a nice hospital, and then returns to a pathetic house"? (MP, Jenista Mhagama). At the same seminar, Gwassu Sebabili (M.P. Ngara Constituency) wonderd why 40 plus years since independence, many Tanzanians lived in poor housing "Poverty cannot end if people's housing 40 years after independence continues to be that poor to the extent that some share it with livestock. If Rwanda which has experienced a lot of internal strife provides her citizens with corrugated iron sheets on credit what about the peaciful Tanzania?"
> (OBSERVER – SUNDAY, 13/06/2004).
>
> At the same meeting justifying the importance of agriculture and thus continuous living in the rural areas;
> Prof. Juma Mikidadi (MP Kibiti Constituency) argued the government to ban hand hoe farming and instead encourage mechanized and irrigation farming in order to get rid of poverty. "However whoever engages in hand hoe farming should be jailed. People should engage in irrigation farming using tractors."

As per BHS 2000/01, around 89 percent of rural households report ***owning land for agriculture and grazing,*** a similar proportion to BHS 1991/92. The degree of agricultural ***mechanisation*** among rural households is low - while 11 percent own a plough, only 0.2 per cent have a tractor.

Further ***relevancy*** of the research is the answer of the expected demand of the government attention to the Tanzania rural houses development which is doubtlessly feasible realizing that Tanzania being the third largest country in Africa in terms of area after Sudan and Zaire, and the …………. Country of Africa in terms of population and the first country in East Africa in terms of area and population, is one of those African countries which is least urbanized with the majority of its population still living in rural areas. The rural population counts for …………. per cent of the government annual earnings.

It is assumed that findings of this study will provide knowledge about the ***evaluation*** of the traditional rural houses aiming at improving the use of the local building materials, the use of the available space towards improving the rural people's living conditions. And thus lead and assist the researcher to determine and decide as to the extent of the improvement required.

It is realized that some work has already been done in connection with the study of traditional rural houses, as such, the research is attempting to fill in the gaps to enable the rural peasant possess some knowledge of putting up his own house using the local rural resources within his proximity.

The pace of rural houses improvement in Tanzania seem not to be moving at an appreciable rate while as per the Household Budget Survey 2000/01 the provision of other housing amenities show some improvement:

-46 per cent of households in 1990/01 to 55 per cent of households in 2000/01 using protected water resources. (BHS)

-9 per cent of households in 1990/91 to 12 per cent of households in 2000/01 with electricity. BHS

Good and comfortable housing is an incentive with studies concentration to school children in rural areas where so far school attendance and registration is lower than urban centres.

A healthy house will lead to disease reduction.

ORGANISATION OF THE THESIS:

It starts with Title, Table of Contents, Declaration, Dedication, Abstract and Acknowledgement, The Dissertation is of Nine Chapters as below:-

- Chapter One - Introduction
- Chapter Two - History of Housing Development in Tanzania
- Chapter Three - Geographical and Climatic Influence to Shelter
- Chapter Four - Local Building Materials
- Chapter Five - Organisations and Research Centres, Contributing to Housing Development
- Chapter Six - Research Objectives and Methodology.
- Chapter Seven & Eight - Research Findings and Analysis
- Chapter Nine - Conclusion and Recommendation.

1.4 HOUSING DEVELOPMENT IMPACT TO SOCIAL ECONOMIC ROLE OF HOUSING DEVELOPMENT

Role of Housing Development

For well over a century now, there has been a debate of whether housing is a social service or an investment good. There could be various answers to this depending on to whether one refers to rural or urban housing. However, over the last four decades there has been a more or less consensus amongst protagonist and antagonists of housing development that housing is both an investment and a social service. At low levels of development, especially in rural areas and primitive societies, the primary role and function of housing is to offer protection to man from the elements of nature like rain, heat or hot sunshine, cold and security. Apart from giving man protection from the elements of nature, good housing in particular also affords him a sense of privacy, security, stability and diginity as well as providing him with a framework within which he can develop his talents. Besides these functions, housing and its related facilities play other important roles in society both in developed and developing countries, amongst which include:

•Well conceived housing programmes provide an opportunity for the government to allocate public services directly to the rural community or low-income families. This had been the intention of the ***Chama Cha Mapinduzi (CCM)*** ruling political party in Tanzania, (under the Chairmanship of the party, the Late Mwalimu Julius K. Nyerere), to put the rural people together in a nucleared village.

•Good housing contributes to a reduction of health and fire hazards in residential neighbourhoods.

•Sanitary and improved housing contributes directly or indirectly to improved health and productivity of an individual and thus society as a whole especially where clean water supply and improved sanitation are available. Indeed improved health and productivity are essential to the national development of a country (ST/ESA/50,1976).

•Well planned and located villages or residential neighbourhoods near roads to urban centres, commercial centres and community facilities simplifies transport problems and purchase of building materials produced by the small-scale cottage industries.
A number of scholars in advanced countries in the West and the United States of America, have argued that good housing leads to increased motivation and effectiveness in the education of rehoused children, and a reduction in crime and juvenile delinquency (J. Jacobs, 1965). Although there may be no conclusive empirical evidence to support this causal relationship there does seem to be some positive correlation between the two.

Medical experts in Tanzania have also argued that good housing and environmental sanitation tend to reduce the chances of children contracting diseases and so lowers the rates of absenteeism from schools. Thus the children's chances to receive education are improved.

<u>Housing Development with Population Growth</u>

Since a house, especially its shape, performance, durability and composition and its developing pace is influenced very much by the size and composition of the population, rate of growth of the population and income levels and distribution of that population additional findings has been submitted

on the proceeding chapter so as to tie up with the history of housing development in Tanzania.

Improved and better nutrition, health care, general education, the teaching of personal hygiene and and environmental sanitation to the population, and an easily available, clean, pipe water supply both in rural and urban areas have improved the general health of the population. All these positive developments have in turn raised the average life expectancy in Tanzania. For example, life have increased from an average of about 40 years or less at the time of independence in 1961 to more than 55 years to the present time.

Similarly, the majority of the population – with 51 percent of the population being in the reproductive age group of 15 – 45 years and hence having a high fertility rate – will contribute to a big natural population increase in the next decade even if each couple decides to have only two children in their life time - which is a very low figure of assumption for the rural people.

1.5 RURAL-TO-URBAN MIGRATION
RURAL-URBAN LINKAGE

Rura –Urban Linkage

When carrying out research for most rural development, if not all, a mention of urban development in some areas is viable, as it is acceptingly argued that there is a linkage between rural and urban development.

"rural-urban linkage development perspective" has become the more accepted approach. ***(Inter-regional Conference by the United Nations Human Settlements Programme – UN Habitat*** to be held in Nairobi, Kenya in October, 2004 submits so). ***Cities – engines of the rural development*** as the Theme.

Rural urban linkages generally refer to the growing flow of public and private capital, people and goods between urban and rural areas, the flow of ideas, the flow of information and the flow of diffusion of innovation. Adequate infrastructure is the backborne of this urban-rural development linkages approach. There is also relationship between adequacy of infrastructure, ease of mobility and access to employment and enhancement of income. Adequate investments in infrastructure also improves rural productivity, allows access to markets, jobs and public services by both men and women.

It is important, therefore, to treat urban and rural issues holistically, as it will be the case in this research, because they form part of dynamic system in which the linkages have to be strengthened. One cannot do without the other. As such, population migration and its growth in the rural areas with the urban linkage, has to be studied leading the researcher to discovering the housing development brought about by the impact of population changes.

Tanzania is suffering serious situation of rural-urban migrations. This, however, is not an uncommon phenomena in Africa where it can be reasoned that over a billion urban dwellers mostly in Africa, Asia and Latin America live in slums. June 2001 – Habitat Debate. The driving forces are political or ethnic turmoils, conditions of famine and as is the case in Tanzania, the need and the search for work. Rural people are not leaving in search for better houses they are leaving in search of worthwhile work.

Well over 73% (2002 National Population Census) of the population in Tanzania live and carry out the economically relied and most important activity of farming and agriculture in the rural areas. Their success in production, when not hampered by adverse weather conditions like lack of rain at times, floods, locusts and the like, a boost in the country's economy is boasted. Thus the rural areas improvement can justifiably be demanded and put up additional arguement if demanded, that farmers are most heavily taxed in Tanzania, if not Africa, and desappointingly, no one comes up with any feasible housing plan for them (Arch. T. Almeida).

Quoting some statistics available it is said about 900 youths enter the city of Dar-Es-Salaam, running away from various problems existing in the rural areas. Thefty in urban areas is noted to be carried out by youngsters of between 21 and 30 years (Daily News).

Dar-Es-Salaam, the most populated city in Tanzania (Pop 2,497,940) and experiencing the highest rural-to-urban migration in the country, enjoys by far the greater share of development.

The balance being shared by the remaining urban areas. The rural areas where the majority of people live, appear as having been forgotten and missed out.

As submitted at the introduction of this part, therefore, the goal of rural-to-urban linkage is not met.

Rural-To-Urban Migration with Population Growth

Migration is largely a result of increased poverty in the rural areas. It is projected that by 2015 Tanzania will have a population of 47,221,000 people of which 21,769,000 equivalent to 46 per cent will comprise urban population.

URBAN AND RURAL POPULATION GROWTH 1957 – 2030

YEAR	URBAN(‘0000)	RURAL (‘000)	TOTAL	URBAN AS % OF THE TOTAL
1957	364	8,422	8,786	
1967	686	11,273	11,959	6.0
1978	2,258	14.790	17,048	11.1
1988	6.250	16,284	22,534	10.7
1996	11,750	16,355	28,105	8.2
2000	11,021	22,496	33,517	32.9
2002	7,724	25,860	34,569	23
2015	21,769	25,452	47,221	46.1
2030	34,948	28,170	63,118	5.4

Source: National Population Census 1948 – 1988,
URT 1996, Cities in a Localizing World,
Global Report on Human Settlements 2001.

Rural-To-Urban Migration Housing Effects

The shear inability of the urban centres to cope with the influxes of people gives rise to the uncontrolled mushrooming of the ghettos. These slums besides being urban eye-sores are devoid of most basic services and essentials and are known to harbour in-built hazards and even seeds of discontent.

It has also been noted that a slum is a housing area that has deteriorated like Manzese, Annanasifu, Msimbazi Valley and Kigogo in Dar-es-Salaam.

It was originally applied to those parts of cities that were once respectable but which gradually has deteriorated as the original residents moved out to newer and better areas of towns.

The bulk of the Tanzania population which live in the rural areas is being eroded towards the urban areas, demoting the areas important activity of farming and agricultural involvement the rural population is performing.

However, going by the submission of Babar Muntaz, Senior Technical Advisor to the UNCHS/UNDP (UNCHS – Habitat, September 2001, Vol. 7 No.1, 21), slums is an intergral part of the process of growth and development of a city.

He submits that slums should have their conditions deplored and see their formation as an indicator of urban success. They play a useful role in providing cheap (though not necessarily cheerful) housing for those who cannot or, as likely will not, want to spend any more on housing than they possible can. Slums are prime destinations of city migrants as they get in to shape their lives as new ventures. ***City without slums*** can only work where there is some housing development or either this can mean even more hardship for the very group that is so essential to urban development: the rural migrant. Just as slums and slum dwellers need cities to survive, so do cities need slums to thrive. Many people competing for work in cities, it is easier to pay low wages. However, a worker still needs to live, and without the informal settlement, the minimal acceptable salary would really hit the pockets and the profits of the rich.

As long as gross wage disparities exist, making it possible for cities to employ cheap labour, slums are here to stay.

Basing on the above, it can therefore be concluded that as the country's population swells, the rural-to-urban migration in the country increases as time goes by. The migration is due to the increased poverty and government neglection of rural development. This has an effect of increasing the unwanted ghettos, slums and squatters in the urban centres. Urban centres cannot cope with the influxes. This is tied up with the devoid essential services. The migration to urban areas demotes the agricultural and farming activities in the rural areas, and thus preventive measures to discourage migration ought to be made.

Rural-To-Urban Migration Discouragement

To stern or reduce the rural-urban influxes requires Tanzania to embark on the path of providing equal opportunities for all, and by all means, all areas, rural and urban of the country.

Rural housing improvement is necessary so as to, in turn, curb/fight the subsequent mushrooming of the unplanned settlement in the urban areas brought about by the rapid urbanisation activated by the migration of people of the rural areas, as job seekers and better living, and this is because of relatively little has been done for the improvement of rural housing and community facilities which would assist Tanzania achieving opportunity for all and a ballanced – rural development. And this is more so with a pointing finger to a society which advocates equality.

Agriculture and farming could be accepted as an attractive involvement of one life and get away with the job-seeking notion of many rural-urban migrants if it could be lucratively handled by the government, by at least, facilitating the acquiring some conventional building materials to ease build houses for themselves, aiming at sorting out the issue of peasants owning modern and decent houses, with the presence of efficient and fair welfare services and infrastructure within reach of their proximity.

Environmental living conditions which includes housing from its primitive state, minimal economc base and decent palatable social welfare centres, should be established with the government intervation.

Promotion of infrastructure, social welfare and other amenities in the rural areas will demote rural-to-urban migration, ending up promoting the rural activity of agriculture and farming general.

1.6 POLITICAL PARTY CONTRIBUTION TO HUMAN SETTLEMETN & BUILT ENVIRONMENT

The Ruling Party as well as the Government under the party's power has put great emphasis on shelter. In the party's ***Arusha Declaration (1977)*** and the Party blueprint for social-economic development, shelter is the third basic human need after food and clothing. In this connection, the party and the government have established many institutions to guide and achieve set goals to provide shelter to all Tanzanians.

In the 15 year Party Programme under the heading ***Education, Social Services and Culture*** outlined the following:

> -The party recognises housing as a fundamental basic human need similar to food, and therefore it is among the most important services, and it will assist the people in solving basic obstacles towards provision of housing. The aim of the party is to have basic shelter for all by the year 2002.
>
> -The need for shelter increases at an accelerated rate with the population growth, while the dislocation of international economic order makes poor countries poorer, thus making our goal more difficult.
>
> -The party realises this and has therefore programmed itself to direct the Government to alleviate this problem by the following guidelines:
>
> (a) Public Building institutions to be strengthened as possible means of reducing cost.
>
> (b) Co-operative building ventures to be planned where they do not exist and strengthened where they exist.
>
> (c) The party and the Government will educate and encourage people to use burnt bricks and lime mortar in the construction of their houses instead of depending on cement only.
>
> (d) The government to set out a policy and oversee the availability and distribution of building materials, (such as conventional building materials

as roofing metal sheets and cement) at low cost. Use of local building materials to be emphasized (with suggested improvement on the same and its use where necessary).

A notable reliable and strong Housing Bank like the dead Tanzania Housing Ban (THB) to be established and give loans at reasonable prices.

1.7 USE OF LOCAL RESOURCES

Technical Services provided by artisans, craftsmen, carpenters, masons, and brickmakers to the construction of a rural house and the availability of ***local building materials*** are the major resources worthy looking at for the implementation of a rural house construction. And these are necessary for human settlements and housing promotion.

Successful housing development relies on expertise form various professions, which include planning and design, land adminstration and surveying. Others include architectural, engineering, quantity surveying and specialised building services such as sanitation, water supply, and electric wiring.

Along side provision of these services, maintenance, monitoring and supervision are essential technical inputs for sustained housing improvement particularly in urban centres. In rural areas artisans, craftsmen, carpenters, plumbers, painters, electric technicians, masons, welders and brick makers provide most of the technical services which lack professionalism i.e. in many cases procedures, standards and regulations are not strictly adhered to due to lack of not being farmiliar to them.

Technical Services which are necessary for rural housing development may be obtained from services offered by graduates from technical colleges and vocational training centres both public (VETA) and private. In order to ensure the availability of technical expertise, Tanzania government has been putting emphasis on technical education since independence. Before independence, the government had distinct science and crafts curricula for the middle schools. After the Arusha Declaration, in compliance with the self reliance spirit, the role of vocational and technical education was boosted substantially both in terms of policy and action. For instance, two new technical colleges were established in Arusha and Mbeya in 1978 and 1986 respectively.

Lack of sufficient professionals and technicians has contributed to lack of or provision of poor technical services for housing development in Tanzania.

Inaccessibility to and neglect of the importance of the technical services in housing development is among the factors which have undermined improvement of housing situation in Tanzania. The National Housing Programme (NHP) among other things aims at developing and facilitating the availability and access to technical services by individuals, community groups, and private organisations involved in housing development in rural areas.

More information on Technical Services is given on Chapter. Four.

Building Materials

Tanzania has a potential for ***building materials*** from the natural resources available. Tanzania has also a number of good factories manufacturing conventional building materials. But there are issues that hinder the availability and affordability of the materials in other part of the country. To ensure good availability of both conventional building materials (imported and locally made) and the traditional materials, there is need to look into a number of issues as presented at Chapeters Three and Four of this submission.

1.8 HOUSING IMPROVEMENT PHILOSOPHY AND BUILT ENVIRONMENT

House improvement can be expressed with the idea that every family should live in a free standing house construction of the ***foundation*** and seriously looked into in obeyance with the site condition requirement. In addition to this, in 1974/1975 budget of the Ministry of Lands, Housing and Urban Development formulated as follows:

"He (the farmer) is needed to have a house consisting of the following qualifications":

1. He must build by using materials that lasts for a long time and which are not destroyed by either rain or sun.

2. He must build in a way that his house will not be attacked by insects.

3. The house must have sun shine, enough air, its environment must be healthy, it must have a latrine, kitchen and clean ground around.

Improvement of a Rural Dwelling House and Built Environment

Usually when experts talk about ***housing*** or ***housing development*** within the subject of financing public housing take the issue in a broader context, as the entire residential neighbourhood or living environment. Such a wider definition, highly appreciated, include amenities and services that a community requires in a given residential neighbourhood. These include water supply, sanitation, roads, drainage, electricity, schools, health clinics, community centres and recreation facilities.

Despite of the need and essentiality of the afore said, the submission of this dissertation will limit itself to what a rural person can do for himself, the ***improvement of a dwelling house*** as a unit possessing qualities of, not costly and complex, but befitting durability, functionalism, healthy, strength/stability and easily maintained with some aesthetics qualities with anticipation that a rural person can build for himself, as usually is the case for rural families, getting away from cash paid labour.

The above analysis is in line with the requirement of the 1974/1975 government budget, presented as aforesaid.

The Development of Villages as Settlements

The settlement of people in the country came in different groups in various forms of activities like trade, refugees needing to settle down and carry out farming instead of hunting, and settled not in villages but in undefined pattern of location each one having his own choice where to live, in different parts of the country, ending up with a nation of 120 tribes of different social groups and cultures.

APPENDIX

QUESTIONNAIRE ON TRADITIONAL HOUSE SURVEY

1.00 1. Date of interview ……………………………………………….
2. Name of interviewer ……………………………………………....
3. Name of interviewee ……………….. Responsibility ……..….

2.00 **HOUSE CONDITION AND TYPES**

4.(a) Types of houses present (please elaborate………………………
(b) Which type is the most favoured and why?…………………….….

5.(a) How many rooms does it consist? ……………………………...

(b) Mention the purpose of each room ……………………………..
……………………………………………………………………..

6. Does the house have any storage facilities? Yes/No.

(a) If Yes, is it inside the main house? Yes/No.

(b) If inside the main house, where is it located? ……………
………………………………………………………………

(c) If outside the main house, how far from the house? …….
……………………………………………………… metres

(d) Crops stored ……………………………………………...

(e) Size of storage …………………………………… Sq.m

(f) If separate storage house, mention the constructional materials used?
……………………………………….….
………………………………………………………………
………………………………………………………………

7. Is there any kitchen for the household? Yes/No.

(a) If Yes, tick what is applicable (V)

(i) inside the main house ( )
(ii) Separate house in the back yard of the main house ( )

(iii) Separate house from the main house and the back court yard ( )

(iv) Kitchen in the open outside ( )

(v) Other Location ( )
If Yes, mention location ………………………..

(b) If separate house of Kitchen from the main house and backcourt yard, how far is it from the main house?
………………………………………………………………

(c) If separate house of Kitchen from the main house and back court yard, mention the constructional materials used………………………………………………….

8. Is there any latrine for the household?

(a) If Yes, tick whatever is applicable (V)

(i) inside the main house ( )
(ii) outside the main house ( )
(iii) in the back yard ( )
(iv) pit latrine ( )
(v) western type ( )
(vi) eastern type ( )
(vii) Other type ( )
If Applicable, mention type ……………………….

(b) If the latrine is outside the main house, how far is it from the main house? ………………………………. Metres

(c) If separate house/hut used as Latrine, mention the constructional materials used? …………………………...
…………………………………………………………
…………………………………………………………

9. Any presence of livestock? Yes/No.

(a) If Yes, name different kinds of animals kept.
……………………………………………………………………………
……………………………………………………………………………
………………………

(b) Are there any livestock kept in the main house? Yes/No.
If Yes, mentione them: …………………………………..
…………………………………………………………

(c) If ***not*** are they kept (please tick):

(i) in the open ( )
(ii) in a fence ( )
(iii) separate house ( )
(iv) Other ( )
Please mention ……………………………………

(d) If separate house outside, how far is it from the main house? ……………………………………… metres.

(e) If separate livestock house, mention the constructional materials used?

10. Raw materials used for construction

Type	Source	Availability Easy/Not	Bought or Freely Obtained	If bought, Price per unit
i) Soil Clay/loamy/red soil				

ii) Poles iii) Trusses iv) Ropes/Strings v) Rafters vi) Purlin vii) Ridge viii) Roofing materials -Thatching grass -Palm leaves -Other (state)				

11. Cost of conventional building materials

A. Cement per bag (50 kgs) ……………………………………………..

B. Roofing sheets per bundle/per sheet

a) G.C.I. sheets

i) Gauge 35 per m ………………………………………..

ii) Gauge 32 per m ………………………………………...

iii) Gauge 30 per m ………………………………………...

iv) Gauge 26 per m ………………………………………...

b) Aluminium

i) Gauge 28 per m ………………………………………...

ii) Gauge 26 per m ………………………………………...

c) Timber

Type	Size	Price/Metre
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………………..

D. Sand per trip ……….…………….. tonnage …………………..

E. Aggregates per trip ………………. tonnage …………………

F. Ceiling boards

Type	Price
……………………………	
……………………………	
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….

…………………………… ……………………….

G. Primer per Litre ………………………………………………….
H. Oil paint per litre ………………………………………………..
I. Water paint litre ………………………………………………...
J. Nails:

Size	Price/Kg
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….

K. Mosquito wire gauze/m^2 ……………………………………….

L. Butt hinges

Type	Size	Price/Metre
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………..
……………..	……………..	……………..

M. Latches ……………………………………………………...

N. Barrel bolts

Size	Price/Kg
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….
……………………………	……………………….

Transparent glass sheets/m^2 ……………………………………

12. Availability of manpower in your area:-

a) Skilled Yes/No.
d) If Yes, what type of manpower available?

Mason …………………………………………….

Carpenter ……………………………………
Plumber ……………………………………..
Architect …………………………………….
Other (state) …………………………………

e) Unskilled manpower Yes/No?

13. Labour most commonly used

i) Employed ………………………………………………...
ii) Self ……………………………………………………….
iii) Family ……………………………………………………

14. What is the total cost estimate of the house? …………………...
What is the source of income? ………………………………….
Income per capita ……………………………………………

15. Can people afford to build such a selected/recommended/house?
…………………………………

3.00 MATERIAL AND CONSTRUCTION
(INFORMATION AVAILABLE AT THE VILLAGE MUSEAM)

16. Floor:-
  a) What kind of the material does the floor consist of:
  ……………………………………………………..
  b) What is the level of the floor in relation to the outside ground?
  c) Any kind of plaster applied? If yes, of what kind?
  d) Illustration of how the floor is made up of:-
  Supported by joists or not ………………………..
  Size of joists ………………………………………
  Is the floor made of sticks etc. ……………………

17. Does the house have any foundation? If yes please explain.
……………………………………………………………………..

18. Walls:
  External wall:
  a) What are the components of the external wall?
  ……………………………………………………..
  b) (i) How are they erected?
  (ii) Distance of erection, width of poles, etc………
  ………………………………………………...
  c) Illustration of the wall plate ………………………
  ……………………………………………………..
  d) What is the height of the wall? …………………..
  ……………………………………………………..
  e) Thickness of the wall ……………………………..

Internal wall:

How is the following:-

i) Any pole used and their size ……………………..

ii) Plastering (if any) ………………………………

iii) Partitioning ………………………………………..

19. Roof:

a) How are the wall plates constructed (if any)?
……………………………………………………..

b) How is the roofing material supported to the external and internal wall? ………………………..
……………………………………………………..

c) What kind of the roofing material is used for roofing purposes?………………………………….
……………………………………………………..

20. Doors and windows:-

a) position and size of doors (if present) …………………...
……………………………………………………………

b) Do they have any lintel? If yes, please mention their sizes
…………………………………

c) Materials used for the doors ……………………………..

d) Presence of windows, Yes/No …………………………...

e) Size of windows …………………………………………

f) Size of lintels used for windows …………………………

21. Site planning:-

a) How is the site for construction chosen? ………………...
……………………………………………………………

b) How is the position determined? ………………………...

CHAPTER TWO

2.0 HISTORY OF HOUSING DEVELOPMENT IN TANZANIA

2.1 SHELTER AND HUMAN HISTORY IN TANZANIA

According to the prints of the National Museum of Tanzania, the history of constructing permanent houses for human settlement in Tanzania started some six thousand years ago (10,000 years ago in some other places). This came up as a result of the developed early man Homo Sapiens who had emerged from ***Australopithecus*** four million years ago and lived up to one million ago. The remains of ***Australopithecus*** group (together with groups ***Afarensis, Agricamus, Boisei*** and ***Robustus)***, have been found in Africa, Awash, Ethiopia, Turkana, Kenya, Lake Eyasi, Laeroli and Olduvai in Tanzania and South Africa. Prior to all this, 30 years ago, there had been the ***sokwe*** family who developed through 12 stages to mankind of to-day passing through the ***Australopithecus*** (Pliopithecus, Proconsul, Dryopithecus, Oreopithecus, Ramapithecus, Australopithecus, Homo bahilis, Homo erectus, Homo Sapiens of the Original - Archaic. ***Binadamu wa Solo, Binadamu wa Neanderthal,*** Homo Sapiens and Sapiens ***(Binadamu*** means Humanbeing)

The history of human life in Tanzania goes back to over one and a half million years. The remains of the earliest known man were discovered here in 1959 by Dr. Leakey.

The early life of the developed mankind did not live in a house of any kind or any defined shelter but lived in caves, bushes, under and on top of trees . His major activity and source of food was dependant on hunting animals, birds, roots and fruits, insects and taking security against wild animals.

As the first man had his outlook developed and possessed wider understanding and knowledge of the environment surrounding him, he lent how to tame animals and birds, such as cattle, goats, sheep, chicken, doves etc. Although hunting was carried on, this compelled one to settle down permanently at one fixed place, for the purpose of looking at his animals and birds, improving his own security, promotion of social interaction and carrying out cultivation of land for food and have some of it for future use. ***(Shomari Uvuruge, Museum)*** Even to-day shelter for the animals in rural areas is given notable attention.

The effort of the early man to improve, his habitat is clearly noted in caves where paintings and drawings are noted. Tanzania is one of the few countries in the world which have been lucky to have such drawings and painting in its caves serving as exhibits of the ancient world. Most of the drawings are similar in their style and type of drawings. These drawings and paints are commonly found in Arusha Region (Mbulu District, Mumba Village,Siponga village, Endanyawishi, Ligangareri Yaedachini) Dodoma Region (Kondoa District, Kolo Village, Masange village, Kisesa, Kinyasi, Kuduzi, Pahi, Lusangi Mungumi) and Singida Region, Iramba District, Kiomboi, Sibiti Village, Isanzu, Iambu, Mkalama). The drawings are in red, white and black estimated to have been drawn between 20,000 years amd 3,000 years ago. Most of the drawings are of animals, such as elephants, giraffe, zebra and birds such as ostrich, korongo, eagle and also people dancing, drawings to educate young people how to hunt, drawings to indicate certain activity in the area, such as medicine-men, witchcrafts etc.

Basing on the above, it is noted that the necessity of a suitable and permanent shelter to a human being need no debate to promote it. Mankind from the beginning of his existence has struggled to form some shelter for himself, starting from living in the bush/forest, open jungles, on the trees, moving into caves, and then to constructed shelters using all sorts of available organic and inorganic materials around their vicinity/locality in the forests, without the assistance and reference of leadership, policies etc. And indeed this proves that the shelter was and is a necessity next to food.

2.2 <u>THE IMPACT OF CULTURAL GROUPS TO HOUSE TYPES IN TANZANIA</u>

The original style, layout and method of construction of traditional Tanzania houses depended on a number of factors. These include geographical conditions, availability of construction materials and skills, normadic way of life and security against wild animals, tribal wars and cultural influence.

Some improvements sought by advocating government policies, rules and laws, banks, local and international NGO's. Cultural influence seem to have taken the lead of introducing the shape and layout of traditional houses aiming at fulfilling and upholding the traditional norms. Leaving aside the interesting existence of the 48 km long Olduvai Gorge in the Serengeti Plains on the edge of the Great Rift Valley on the northern Tanzania, which is narrated to have had the majority of Tanzanians ancenstors, the well over 120 tribes originally found in Tanzania have moved into the land from afar countries as a result of trade, normadic life, tribal wars, political movement and farming. Different sources of origin of tribes came in with different types of cultures and values, social system, their language and traditional houses to suit. These tribes recognised themselves to be relatively distinctive and different from their neighbours, although their borders between them are now becoming vague, if not completely blurred, due to various social developments, like intermarriage, political influence and interaction, education, urban employment, tribal wars, draught migration and looking for animals green pastures.

The history of Tanzania goes back to over one million and a half years. The remains of the earliest known man was discovered in Arusha, Tanzania in 1959 by Dr. L. Leakey ***(Shomari Uvuruge, Museum)***. From outside, there is evidence of at least six civilization which have left traces of their culture and history. Excavations have revealed Romans coins and Chinese pottery.

Persians, Turks and Portuguese had transitory settlements in the 16th and 17th centuries. There was also considerable developments along the coast during which time the Swahili language evolved, being a derivative of Africa, Persia and Arab languages.

The country is composed of *eight cultural groups* (as per the classification based on Language of Africa 1963 - through a Building Research Unit Working Report, No. 68 of April, 1990), within them, as aforesaid, having slowly immigrated into the country with different cultures, way of life and house styles.

Siting out the principle tribes, out of the 120 tribes in the country, representing each of the eight cutural groups forming up the culture, traditional behaviour and way of life in Tanzania it will show that the Tanzania community evolved from numerous origins of different cultures in recent years.

The ***Sukuma,*** the largest single ethnic group in Tanzania with other nine tribes, including the Nyamwezi, forms the largest cultural group in Western Tanzania Bantu. Location by define the Sukuma are in Mwanza and Shinyanga Regions located in the Western and Southern paprt of Lake Victoria. This covers 20 per cent of the country's population, and believed to have originated from North-Western part of Africa. According to the 1988 preliminary population census report the two regions had a total of nearly 4 million (3,650,820) people; while for the 2002 census they were 5,745,900 (2,940,108 for Mwanza Region and 2,807,292 for Shinyanga Region ***(Daily Newspaper - 1/1/2003)***.

The Wasukuma are thus the largest single ethnic group in Tanzania.

The Nyamwezi live south of Lake Victoria in Tabora region. They share many cultural characteristics with the neighbouring Wasukuma in the North such as cattle - herding, language and cultural dances. The Wanyamwezi are the second most populated ethnic group in Tanzania.

The traditional houses of the this cultural group are of the MSONGE type. They are rectangular or round hipped roof and cone-cylindrical houses, constructed of poles, sticks, bamboo, mud and grass with ample decorations of paintings on their external surfaces. Their roofs are neatly trimmed into steps using the elephant grass.

Fig 2.1 Sukuma Tribe Traditional House

The Second largest cultural group formed by 15 tribes which include Makua, Makonde, Wamwera, Ndengeroko, Ngoni, Matumbi and Mbungu, covers 16 per cent of the country's population and is concentrated in the south-east part of the country in the regions of Ruvuma, Mtwara, Lindi and Coast.

Example of the Ngoni tribe from this group are said to have advanced northwest and crossed the Zambezi River from South Africa, immigrated and settled around Ruvuma River in Southern Tanzania 1935, having left South Africa in 1924. The reason was because of the Mfecane Tribal war arising due to land shortage and advancement of the Boers from the South.

Their traditional houses are MSONGE type, rectangular in shape, built with poles, bamboo, sticks, soil and grass.

Fig. 2.2 Makua Tribe Traditional House

The Third cultural group, same size as the Second cultural group, is the Southern Highlands Bantu, formed of 20 tribes which includes the Hehe, Nyakyusa, Bena, Fipa, Safwa covering about 15 per cent of the country's population and is concentrated in the south and south-west part of the country, in the regions of Mbeya, Sumbawanga and Iringa.

The traditional houses of this cultural group are of the TEMBE type, whose construction is mainly bamboo, grass and mud. Bamboo has been used extensively for every element of the house.

Fig 2.3 Hehe Tribe Traditional House

Fig 2.4 Fippa Tribe Traditional House
Researcher standing by the side

Fig 2.5 NyakyusaTribe Traditional House

The Fourth cultural group formed by 14 tribes, which includes Sambaa, Zaramo, Bondei, Zigua, Luguru, Kwere, Doe, Kutu. This group has cultural and linguistic similarities and share the same clan origin, religion and social pattern of life. The group covers 14 per cent of the country's population and is concentrated in the coastal areas of the Indian Ocean extending to nearby districts, primarily in north-east part of Tanzania, in the regions of Dar-es-Salaam, Morogoro, Tanga, Coast and Mtwara.

Their houses are of the BANDA type, rectangular in shape, with the ***Swahili*** house properties. Mud and poles, sticks, soil, palm leaves and grass are the major building materials employed. Grass thatch is a common material for roofing in most parts of this cultural group.

The traditional house found in the rural areas of the coastal strip of the Indian Ocean is a Zaramo house. The Zaramo house is most probably the origin of the Swahili House. This is raised as a question by Dick Urban Vestbro in Functional Use of the "Swahili Type House". The notable distinction of the Swahili rural and urban is primarily for the urban having urban habits a greater number of rooms, an enclosed courtyard behind the house, pit latrine, washroom and kitchen.

Fig 2.6 Zaramo Tribe Traditional House

Fig 2.7 Swahili Tribe Traditional House

Fig 2.8 Sambaa Tribe Traditional House

The fifth largest cultural group, formed of 8 tribes, which includes Gogo, Mbugwe, Nyaturu covering about 11 per cent of the country's population. These are the Central Tanzania Bantu and is concentrated in the Central part of the country, in the regions of Dodoma and Singida.

The type of houses they use are the ***Tembe*** type, entirely constructed in materials available in or close to the village - bush poles, grass and soil. The *tembe* building style is found extensively in Central Tanzania and it extends far north as Singida Region.

A layer of earth is placed on the roof top of this ***Tembe*** building, and it is common to see pumpkins growing there. The roof is also used by women who sit on top of it to spread their cereals out to dry.

Fig 2.9 Gogo Tribe Traditional House

The ***Sixth largest cultural group*** which is ***Interlacustrine Bantu,*** formed by 8 tribes, which includes Haya, Ha, covering about 11 per cent of the country's population and is concentrated towards the border in the north-west part of the country, in regions of Kagera, Biharamulo and Kigoma. The traditional houses of this cultural group is the ***bee-hive*** type constructed of poles, bamboos, sticks and grass.

Researcher standing by the side

Fig 2.10 Hayya Tribe Traditional House

The Seven largest cultural group, which is about 2 per cent of the country's population is one of the four smallest cultural groups. It is the Nilo-Hamitics which includes four tribes in Tanzania. These are Waarusha, Maasai, Barabeg and Cushites, concentrating in the northern part of the country covering the Arusha Region.

The traditional houses of this cultural group are principally cone-cylindrical and semi-subterranean "Mbulu". A "Mbulu" semi-subterranean is partly dug into a sloping ground with only the front wall entirely free from the ground, and thus the orientation of these houses on sites depends on the direction of the slopes of the ground.

Major constructional materials for these houses are poles, sticks, grass and soil.

Fig 2.11 Maasai Tribe Traditional House

Households from the ***Kosain and Luo cultural group,***which also might cover a small fraction of the country's population (less than 1 per cent for each). These are in Mara Region. Their houses being cone-cylindrical ***"Kuria"*** constructed in mud and grass.

The Wachagga Tribe

According to ***Alice Aforo Makule*** in her book ***Asili ya Wachaga*** (meaning the ***"Origin of the Wachaga tribe),*** the Wachaga tribe originated from a number of family groups of many tribes of the Bantu and Hamitic in 1500 AD (17^{th} Century) which are in Kenya and Tanzania. From Kenya were the families of the Kamba, Kikuyu, Taita, Pokomo while from Tanzania were the Pare, Sambaa, Meru and Waarusha tribes. The Ndorobo and Maasai entered Kilimanjaro from Kenya and Tanzania.

Prior to the entering of the big and small tribes in Kilimanjaro area, the land was inhabited by the ***Wakoningo (Wakonyingo)*** at times called ***Watarimba*** very short peple (eskimos), with big heads, who lived in the area before 1400 AD, living in the deep forests of mount Kilimanjaro. They disappepared to the unknown as the big tribes entered the area. Some people assume that they moved to what now we call the Democratic Republic of Congo (DRC) while some of them were seen in the Ngorongoro and Loliondo Animal National Parks in Tanzania prior to their complete disappearance.

At this stage, around 1500 AD is when these big tribes which entered Kilimanjaro started to clear the forests around the mountain for agriculture and houses construction. (***Alice Oforo Makule***). The type and shape of the traditional houses found in this area resembles the traditional houses of the ***fourth*** and ***seventh*** largest cultural groups which formed the Wachaga tribe - bee-hive house. The Kikuyu, Kamba and Taita of Kenya have bee-hive houses as their traditional houses ***(Arch. D. Mutiso)***.

Fig 2.12 Chagga Tribe Traditional House

2.2.1 The Disappearance of Cultural Boundaries

The positive fratanity, a long political stability and peace, social interaction and common communication of Swahili language have promoted immense intermarriage among tribes and thus breaking up the cultural and small groups of people, and no longer going by the generalised definition of “tribe” of being a group of people possessing a common name who ended up recognising themselves to be relatively distinctive from their neighbours in the traditions in their way of life, their social system, culture and values and their language.

The country’s population rapid growth, after this admirable interaction, has changed the cultural values and unfamiliar social system and tribal norms ending up modifying the traditional houses to choices suitable to many, as a natural compromise.

2.2.2 Slave Trade Influence in Housing

The existence of Slave Trade in Zanzibar as the trading centre for the whole of East Africa and spread to a number of places in Tanzania coastal areas of the Indian Ocean, such as Bagamoyo, Saadani, Kilwa Kivinje, Mikindani and Mtwara has influenced the housing design, style, planning and shape in these areas. These are the Swahili houses whose type could be traced back to the 13th Century, with its language evolvement being a derivative of African, Persia and Arab languages. This type of house, now can abundantly be seen both in urban centres, rural areas and the coastal areas.

Zanzibar carried out trade with foreign nations 2000 years ago. The Zanzibar nucleus (Unguja Kuu) had been in existance for a long time witnessed by traditional styles which featured out from the 6th Century.

The Pete cave discovery shows that people of the last term of the Stone Age started to participate in trade. Kisimkazi Forest in the Zanzibar Region shows that there were Moslems in the 12th Century. These are the people who started to put up the Swahili town of Zanzibar which started to grow up after the arrival of the Portugese and many Europeans from Europe. The Zanzibar town got more strengthened, with the original rural house improvement materially and craftsmanship, when the Sultan of Oman Said Said decided to make Zanzibar main settlement in 1834. Zanzibar ruled and commanded upcountry trade and spread the Swahili housing styles, extending to as far as the Democratic Republic of Congo.

The traditional houses of the Swahili style have spread all over the rural areas of the Indian coastal strip concentrating in all rural areas surrounding notable centres with notable Arab remains, such as Pemba Island (7th Century), Tanga Region (14th Century) Pangani (13th Century), Kipumbwe (17th Century), Saadani (13th Century), Utondwe, Bagamoyo (18th Century), Kaole (9th Century), Mbweni (14th Century), Kunduchi (17th Century), Kimbiji (14th Century), Kisiju - Dindini (15th Century), Kwale - Kisiwani (13th Century), Mafia Kisiwani (13th Century), Kilwa (11th Century), Lindi (19th Century) and the last harbour in the South of Tanzania Mikindani (Mtwara) which let the trade of slavery pass through to Kilwa (11th Century) and finally to foreign countries; and also some parts of the hinterland where the slave trade passed. Kilwa (before was known as Kilwa Kivinje) was the biggest town in the whole coastal area of East Africa. The influence spread to Tabora, Ujiji, Kigoma. ***(Shomari Uvuruge, National Museum of Tanzania)***

2.3 <u>PRESSURE CAUSING MIGRATION CULTURAL CHANGE</u>

The causes of migration noted are divided into six groups. These causes compelled people to move from one place of a given ethnic or cultural behaviour and tradition to another area with a different culture and tradition.

- Dense Population
- Famine
- Epidemic
- Military Disaster
- Trade
- Adventure and Fighting.

Dense Population

Some parts in Tanzania have dense population such as north-eastern shore of Lake Victoria and in other smaller concentrations of population as in the Nyakyusa area, Mbeya Region, north of Lake Nyasa. The pressure of people on such land resources is high at the present time as it has been presumed to have been high for some generations. With land shortage, such areas have been unable to absorb immigrants readily as in other areas, and in fact the shortage of land has tended to push people out, to less congested areas. Regions of this kind have their house styles persisted from immediate change due to minimal migration and thus limited cultural traditional introduction, entailing houses improvement and transformation easy. Mbeya and Kilimanjaro are typical examples.

Famine

Famine which is a result of drought eating of the standing crops by locusts, bush-crickets (Tettigoniidae) has presumally been true for hundreds of years. The fall of famine in a given area can create the population movement to the non-famine affected area.

It is common in Tanzania as part of tropical Africa that outside the regions of high rainfal, the amount which falls varies markedly not only from one year to year but also from one place to another in one year.

In a number of regions of Tanzania it is possible to stand where you live, and see it raining say twelve kilometers away, repeatedly a whole wet season while scanty showers have fallen on your area letting crops wither and dry up. This weather behaviour have compelled people to migrate from one area of dryness to the well watered area. The semi-arid regions of Central Tanzania have experienced such draughts, compelling the people to move in groups with their livestock to well watered areas and meeting other people possessing a different language from their own and tradition/culture. These days, in some areas like Kilimanjaro and Mbeya Regions where the population is high, immigrants are not allowed to move in.

Epidemics

People had moved from one place to another due to epidemics such as smallpox and bubonic plague which killed a large number of people. Not only epidemics affecting people were involved, but also those which killed domestic animals. Notably rinderpest and east coast fever. The pastoralists like the Maasai were very much affected by the epidemics, and when moved from Arusha Region they remained behind to settle as refugees among their cultivating neighbours, since the widespread use of discoveries.

Frequent outbreak of epidemics reduced the size of population in the densely populated areas which in turn must have reduced migration rather than increasing it.

Military Disaster
In recent years, movement of people of Tanzania have been experienced as a war refugees from Burundi and Rwanda resulting into cultural planting through intermarriage and social interaction. This has taken place all along the western regions of Tanzania and eastern side of Lake Victoria.

Trade
Beginning October 2003 there was a gold rush to Sakale Village in Muheza District, Tanga Region, following discovery of the precious mineral that attracted some 10,000 people from all corners of Tanzania of different ethnic and tribes (Daily Newspaper). Immediately after their arrival, plus the small miners, notable changes started to take place including posing a serious threat to the environment, messing up with the water resources feeding the Tanga Municipality.

Adventure and Fighting
Some people changed locality as adventurers, engaged in raiding or trading from where they were born to wherever their party settled, or was scattered by defeat. The example of this are the Nyamwezi on the Western region and Swahili from the coast, who gathered followers from among other ethnic group in their area of activities. The men who became the professional solders in these bands were called in Swahili "***rugaruga".***
The travel, trade and fighting of the nineteenth century resulted in a considerable redistribution of people.
Tribes fighting in their home areas had let some people get killed or captured. This had been one of the reasons of movement of people due to frequent fighting caused by raiding. This has happened in Mara and Shinyanga Regions. The survivors, as after an epidemic, felt it safer to move and settle with other less afflicted people.

Such situations were also common on borderlands between large states in the Interlacustrine region, where territory changed hands repeatedly.
(John D. Kesby, Cultural Regions of E.A.)

2.4 CULTURE CHANGE - MIGRATION DUE TO WAR

The population increase in the Western Tanzania brought about by the migration of people from neighbouring countries: Burundi, Rwanda and Congo due to war is apt to mix and introduce ample cultural change of the host population. Thus resulting into adaption of new shelter styles and shelter high demand for the incomers.

Government figures indicate that there are 170,000 Burundi refugees living in settlements and 300,000 in Tanzania villages in addition to those living in the refugee camps. In addition 3258 Somali refugees receive UNHCR assistance in the Chogo Settlement in Tanga in eastern Tanzania (UNICEF).

The table below gives the refugee population in Western Tanzania as at 31/1/03.

(Source: *Consolidated Appeal Western Tanzania, UN)*

Refugee Baneficiary Population in Western Tanzania

Population	Total in Western Tanzania**	Percentage Female	Percentage /Male	under 18 years	Assisted by UNHCR
Burundi*	789,000	49.4	50.6	56.6	319,111
DRC	147,946	50.9	49.1	56.9	147,976
Rwanda	184	48.1	51.9	52.9	184
Mixed	1,921	48.8	51.2	54.6	1,921
Total	939,051	49.8	50.2	56.2	469.192

**Government figures indicate that there are 170,000 Burundi refugees living in settlements and 300,000 in Tanzania villages in addition to those living in the refugees camps.*

***In addition, 3,258 Somali refugees receive UNHCR assistance at the Chogo settlement in Tanga in eastern Tanzania.*

Table 2,1

Humanitarian Assistance is provided to the refugees while host population receive development - oriented assistance and also humanitarian interventions are carried out where needed.

Population statistics table for Kagera and Kigoma including refugees [1]

Region-Kagera	Total district population	Local Population Less Refugees in Camps as of December 2002*	Local Population Figure
Ngara	334,939	111,189	223,750
Biharamulo	410,794	5,105	405,689
Region - Kigoma listed below	Kagera district covered: 745,733	116,294	Total local population 629,439
Kasulu	628,677	155,679	472,996
Kibondo	414,764	159,387	255,377
Kigoma Urban	144,852	0	144,852
Kigoma Rural	490,816	84,520	406,296
	Kigoma districts covered 1,679,109	399,586	Total local population: 1,279,523
Total Population covered in the CHAP	**2,424,642**	**515,880** ***Information provided in UNHCR 2002 Annual Report**	**1,908,962**

Humanitarian interventions include the provision of shelter, food, water, health care, clothing, security and protection.

Interventions that address social or livelihood issues include programmes for education (primary and vocational/life skills only) the environment, gender empowerment and income generation.

[1] *Population and Housing Census: General Report, President's Office, Planning and Privatisation, Central Census Office, National Bureau of Statistics, 2002.*

Table 1.2

2.4.1 ***Population Growth & Housing Development***

The population of Tanzania increased at a rate of 2.8% per annum between 1978 and 1988 which is a lower growth rate than that of 3.0% per annum over the 1967 - 1988 period. The population increased from 11,958,000 people in 1967 to 22,533,800 in 1988. The 2002 census is saying that the population of Tanzania is now 34,568,609 people with growth rate of 2.9%, with a density of 38 people per km^2(mainland Tanzania), and 3.1% with a population density of 398 people per km^2 (in Zanzibar).

According to a 1955 World Bank Report, in 1993, 75% of Tanzanian population was living in rural areas. While the urban population has been increasing at a rate of 10% per annum in the period of 1980, 1997, it is estimated that the population of Tanzania who live in rural areas has dropped to 70%, as per the Past Population Census Reports (1978 - 1988). This is being fuelled by the rural-urban migration as a better life chasing behaviour from the poor state of living in the rural areas. This in turn, have it that many towns in Tanzania are now being threatened by the unwanted ***growth*** of squatter houses and demoting the farming and agriculture advancement in the country.

The rise of rural population in Tanzania as time goes by, and also as given under the ***Chapter of Introduction*** (Tanzania Rural and Urban Growth), in turn, threatens the swelling of urban centres due to rural-to-urban immigration if immediate measures are not taken. Looking at from the broader context, we are told that Africa with 487 million rural inhabitants in 2000 is expected to see its rural population rise to 460 million by 2030 remaining the second largest during the period. All major areas are expected to experience a reduction of the rural population between 2000 and 2030 except for Africa and Oceania.

> ***World Urbanization Prospects: 199***
> ***Revision prepared by the United***
> ***Nations Population Division***
> ***(UNHS, Habitat Debate - June 2002 Pg. 5)***

2.4.2 ***Habitat Effects Due To Change In Western Tanzania.***

As time goes by, the precarious political and military situation in the Great Lakes Region of Africa, in particular the ongoing civil and political unrest in Burundi and the Democratic Republic of the Congo (DRC), large number of refugees have continued to flee in Tanzania entailing a notable concern to the region's habitat, health, security and satisfactory shelter to the new influxes of refugees and the local population. This new influxes into Western Tanzania, as shown in the figure below, which filters into the rest of the country, complicates the situation in that even the large scale voluntary repatriation back home is off-set by the births in the camps and new arrivals. Expectation of improvement in the short time is not expected.

Camp Population Figures in Western Tanzania ***(Source: Consolidated Appeal Western Tanzania, UN)***

District	Camp	Origin	Total Camp Pop.05/2000	Total Camp Pop.06/2001	Total Camp Pop.31/12/2002	Total Camp pop. As of 31/08/2003
Kasulu	Nyarugusu	Congolese	53,666	53,993	55,754	57,617
	Mtabila I	Burundian	15,312	16,576	17,362	17,795
	Mtabila II	Burundian	40,024	42,466	43,689	44,786
	Muyovosi	Burundian	35,274	36,926	38,874	39,857
Kigoma Rural	Lugufu	Congolese	52,765	62,149	84,520	90,329
Ngara	Lukole A+B	Burundian & Rwanda	120,000	133,042	110,887	83,528
	Mbuba Centre	Burundi & Rwanda	0	133	133	86
	Mwiza	Burundian & Rwanda	0	91	189	62
Biharamulo*	Kitali Hills	Burundian & Rwanda	0	18,753	5,105	0
Kibondo	Mtendeli	Burundian	46,185	43,440	52,239	41,334
	Kanembwa	Burundian	17,683	18,547	19,148	19,697
	Karago	Burundian	46,837	50,763	35,842	26,508
	Nduta	Burundian	51,263	53,511	50,157	45,523
	Mkugwa	Mixed	1,495	1,739	2,001	1,900
Total			483,004	532,129	515,880	469,022

*The Kitali Hills camp was closed at the end of 2002 but the RAA in Biharamulo district has been hard hit by the camp closure and lack of development aid.

Table 1.3

2.4.3 <u>Refugees Effects To Environmental Problem And Building Materials.</u>

Degration of forests for firewood, bricks burning and houses construction has been extensive, and water resources have been affected. This has led to increased erosion and has forced the entire population, both refugees and locals, to walk further and further distances for firewood and local building materials obtained from forests.

There was extensive reforestation and conservation work that was needed before refugees arrived. The more obvious impact of refugees has now made this a priority that is starting to get some attention by NGO's. Sufficient supply of safe drinking water is also a problem for both refugees and the host community.

Putting up a house now in the rural areas is difficult due to having no traditional materials like poles and sticks and water for making clay bricks and no firewood to make burnt clay.

Regional Status

The Household Budget Survey (HBS) 2000/01 shows that Kigoma and Kagera are among the least developed regions. Percentage of the population below the needs poverty line is 38 per cent for Kigoma Region and 29 per cent for Kagera Region.

The poverty position in these regions coupled with the influx, of refugees from other countries let's the introduction of foreign cultures and social behaviour easy to penetrate and accommodate itself in the regions.

Western Tanzania Refugees

Western regions of Tanzania have been hosting fluctuating numbers of refugees since 1962. By 1993 - 1994 the Benaco Camp had 800,000 - 1.1m refugees. By April 2001 over 500,000 were being assisted in Tanzania. As per ***East African*** Newspaper of May 3 - 9, 2004, on top of the 500,000 Rwanda Refugees in the country, there are now 600,000 Burundians and more than 100,000 refugees from the Democratic Republic of Congo (DRC).

Current Context in Western Tanzania

The Government of Tanzania estimates that Tanzania hosts almost 1.0 million refugees whose figure is the largest in the African continent. The majority of these are from Burundi, although Tanzania also hosts refugee populations from the Democratic Republic of Congo (DRC), Somalia and a small number from other countries. Humanitarian assistance is provided to some 470,000 refugees hosted in campus which is 47% of the number of refugees living in Tanzania.

Around April, 2001 injured Burundians fleeing the escalating civil conflict have been entering Tanzania's western border region of Kigoma. The Burundian government statement in mid-May 2001 had it that about 15,000 to 20,000 civilians had fled their homes after rebels burnt schools, medical centres and houses in the newly - established central province of Mwaro.

The area referred to as Western Tanzania in this issue includes Kagera and Kigoma Regions. There are ten districts within Kagera (total population 2033880) and Kigoma total population (1,679,109), but only six districts have been provided in the CHAP (Common Humanitarian Action Plan). The six districts are: Ngara, Biharamulo, Kigoma Urban, Kigoma Rural, Kasulu and Kibondo. Population figures include both local residents and refugees as recorded in the Population and Housing Census: ***General Report President's Office, Planning and Privatisation, Central Census Office, National Bureau of Statistics, Tanzania 2002.***

The Government of Tanzania has graciously accommodated refugees fleeing in neighbourhood countries for decades, despite the tremendous pressure their presence has put on local resources and populations. The continuous influx of refugees into Western Tanzania particularly the regions of Kagera and Kigoma, has put a strain on host populations that do not receive development assistance at the same rate as other regions in Tanzania.

Although, some inputs for refugees operations have benefited the host community the perceived disparity of assistance provided has spurred tensions between the populations.

Refugees Benefited Activities

The UNHCR Plant Unit completed a total of 20.15km rural roads, the 0.3km long airstrip repair, refurbishment and resurfacing of 3 bridges, the 29.9km in town access road repair, and culvert installation at 26 locations.

More than 27,481 refugees are involved in environmental and agricultural activities. 2086 houses were constructed using mud bricks in Kasulu District, and about 39 per cent of the households were using improved mud stoves, 60.7 per cent using 3 stone stoves and 0.3 per cent charcoal in Kibondo. About 12,498 improved stoves and 2086 houses were constructed using mud bricks in Kasulu district.

UNHCR transported some 100,000 refugees and moved 52,371 metric tonnes of construction materials for hospitals, schools and distribution centres throughout of the year of 2003.

Negative Impact of Refugees to Housing Development

Both the rate of influx and the rate of repatriation greatly are, to a great extent, dependent on events outside Tanzania in countries of origin. The lack of progress in peace processes for the region has thus had a negative impact on the overal size of the refugee population in Western Tanzania as the returns are largely offset by new influxes which follow in the aftermath of clashes on the other side of the border and the new born in the camps.

Due to the chronic under development of Western Tanzania, the local population suffers from the lack proper shelter, and has limited access to water and health and other facilities, while refugees receive reliable albeit limited assistance in the predictable manner.

Basing on the 18th May, 2001 UNICEF Report (Donor Update) UNICEF, with UNHCR, WFP and other relevant agencies, had started to prepare for a possible repratiation of Burundian refugees. A number of meetings have considered various scenarios. A highly volatile security situation, combined with severe malnutrition in Northern Burundi, and an ongoing malaria epidemic might force more people to seek the relative safety of the camps in Western Tanzania. Even if no new refugees cross the border, the camp population continue to rise due to high fertility rates._ In one camp of around 50 refugees, some 450 babies were born in January - February 2001. This ever increasing population of babies and their mothers will require proper shelter and basic assistance to ensure their survival and well being.

2.4.4 **Government Efforts on Housing Production**

1964 - 1969: Government plan for the Urban Areas housing development.

1969 - 1974: Within this period is when the Housing Finance Company for the high income development was transformed into the Tanzania Housing Bank. ***Chapter Five*** discusses in detail the formation of Housing Finance Institutions by the government.

1976 - 1981: Development Plan for 1969 - 1974 was revised and stressed on the previous government urban development plan with no apparent consideration for the housing of the rural area.

The most recent Housing Policy was formulated in 1981 falling in the Third National Five Year Plan (1977/78 - 1981/82) stipulating housing both in rural and urban areas, as an essential human requirement and thus labelling it as one of the national priorities. As a consequency, this emphasized the provision of affordable shelter to all Tanzanians.

The ruling political party's directive (***Chama Cha Mapinduzi - CCM***) on the community and economic development for the period of 1987 - 1992, submitted that the government should abide to the following goals within the period:

-Prepare housing development policy in line with the UN's call so as to build human settlement for all by the year 2000 by abiding to the environmental and capability of the country's economy.

-Revisit the Tanzania Housing Bank objectives with the end result of targetting to give soft loans for construction of houses. A Housing Bank should also be established in Zanzibar.

-The National Housing Corporation and the Registrar of Buildings to continue building houses so as to reduce the shortage of residential houses in the country. The two organisations should repair the worn out existing residential houses they own.

-Carry out research and disseminate results to the public on the building materials suitable for the purpose of their environment.

-All employers to build residential houses for their employees. Employees should be encouraged to form co-operatives for building residential houses.

2.4.5 **Arusha Declaration With Human Settlement**

Declaration adopted by the then ruling party the ***Tanzania African Union (TANU)*** on 5TH February, 1967, providing a policy booklet for human settlement in Tanzania on socialism and rural development covering and ramification of socialism as it appears to Tanzania rural life and its people, with Equality, Self Reliance and ***Ujamaa*** being the major principle. The ***"Ujamaa"*** principle (brotherhood) had it that the villages in the country ought to be reactivating equality and self reliance on which the traditional extended family was based. The earlier extended family was based. The earlier extended villages did not uphold the above principles, as such, production, distribution and consumption were not shared by all equally; and in several places settlement were very scattered. Further, it was argued and assurance given that when people collected in one homogenous settlement they would be provided with the necessary infrastructure much more easily than when they remained in isolated homesteads.

The government's obligation in what came to be known as "Ujamaa Villages" are defined in the Second Fiver-Year Development Plan 1969 - 1974; explaining the philosophy of it, train villagers in management/leadership, provision of education, health, communication services, provision of land with some priority and provision of reasonably good housing. Having got to this stage, the government moved all people living in isolated homesteads in the rural areas into nucleated settlements (villages) where these basic services, such as clean water, schools and dispensaries could be provided more easily.

The mode of production was supposed to be communal and returns would be distributed amongst the villagers.

The periods 1971 - 1972 and 1974 - 1975 ***Operation Vijiji (Villagisation Programme)*** all over the country was sped up involving rural inhabitants into nucleated and compact villages which could be economical to provide with the afore mentioned services. In 1975 the Parliament passed an Act for the registration of ***Ujamaa Villages (Brotherhood Villages)*** and other villages as legal entities.

However, this appeared not to be spearing through as the policy included economic and social goals which came into conflict with the individual goals, as such, individualism had since surfaced amongst villagers and most of the ***Ujamaa Villages*** has to turn to private production.

Housing development prior to independence 1930 Act of Construction was slightly amended in 1932 for the urban housing and not letting it involve itself to the rural housing development.

2.4.6 **Housing Finance**

All the way through the history of Tanzania there has been a near complete lack of formal mortgage housing finance facilities. This has made housing construction a difficult process for most households especially those in the low income category. Housing both in rural and urban areas is financed from personal and family savings over a long period of time and has curtailled the supply of housing in the country. ***Chapter Five*** discusses Housing Finance under ***Organisations Contribution to Housing Development*** stating that before 1972 there was no proper housing policy *(Law and Practice Relating to Securities for Housing Loans in Tanzania, page 32, By F. Ngalomba, LLM).*

Formal Housing Supply

The gap between the supply and demand for housing has been widening with time, notably in the urban areas whose impact is magnified by the rural to urban migration. It was estimated that at the end of the First Fiver-Year Development Plan (1964 - 1969) there were a shortage of 21,000 houses in urban areas. The shortage grew to 25,000 houses at the beginning of the Second Five-Year Development Plan(1969 - 1974) and short to 300,000 houses in 1982. The growing housing shortage is confirmed by overcrowding levels that are found in urban areas.

2.4.7 *Conclusion*

It can be concluded that the traditional houses in Tanzania owe their formation and existence from different types of people from different sources with different cultures and thus different forms.

Types and shapes of different houses are apt to have been transformed repeatedly from time to time due to various pressures causing migration and cultural change such as population, famine, epidemic, war, military disaster, trade and adventuring, and economic influence.

In some cases, the regions from which people constantly move away to some other regions due to the mentioned pressures, undergo minimum changes and transformation of their traditional houses e.g. Western and Central Regions of the country - military/war/famine. The overpopulated regions of Dar-Es-Salaam, Mbeya and Kilimanjaro having been the receiving ends of the migrating people, undergo ample changes of house improvement and transformation by employing modern house designs and use of conventional building materials, such as cement and metal roofing sheets, with a notable impact to cultural change from the traditional houses.

According to the Household Budget Survey (2002), Final Report, out of all the twenty one regions of the country, Dar-Es-Salaam Region is leading in the application of modern roofing materials with a score of 98 per cent and 88 per cent being modern walls of concrete blocks and burnt clay bricks respectively. This is followed by Kilimanjaro Region with 85 per cent for roofing and 39 per cent for walling materials. Mbeya Region ranges third with 53 per cent for roofing and 32 per cent for walling materials. The average percentage of households in dwellings with a roof of modern materials across the country is 40.3 per cent while for the modern walls is 23.7 per cent; the minimum being 16 per cent (Rukwa Region and Lindi Region) for roofing, and 4 per cent (Lindi Region) for modern walling materials.

Despite of the government efforts and housing production and provision of housing policy formations, lack of housing finance institutions demotes the efforts towards the feasable improvement of the rural traditional houses.

The next Chapter - ***Chapter Three*** - will address and present the ***Geographical and Climatic Influence to Shelter*** in the country, the impact it has on the same

CHAPTER THREE

3.0 GEOGRAPHICAL AND CLIMATIC INFLUENCE TO SHELTER

3.1 INTRODUCTION

From the earliest days of exploration *Geography* **has been recognised as the study of the "home of mankind." Modern geography focuses attention on man's physical, biological and cultural environment and on the relationships between man and his environment, and thus its relevancy in the study. The geographical set up of Tanzania is of numerous formations of natural topographical forms bringing in the existance of mountains of various sizes, plateaus, ridges, rift valleys, lakes, rivers, vegetation and open seas. The climatic features not being homogeneous throughout the country, ranging from cold to hot weather, dry and rainy conditions, low and high humidity devides the country into a number different zones each with its own characteristics, entailling design consideration. All these have a direct contribution to the forms and types of traditional shelters found in Tanzania.**

The design of improved housing in any country must always take the total environment into consideration. Since independence countries in East Africa (Kenya, Uganda and Tanzania) which had always worked together, have endeavoured to improve the quality of life of their people by advocating for better and more suitable housing. In order for this effort to succeed researchers and designers must incorporate the environment in a man's social needs, e.g. housing.

Tanzania, like any other country, should attempt to focus on its prevailing climate and its impact in housing. Today much more climatic and meteorological information is available throughout East Africa than during pre-independence years. We are therefore, in a better position to develop houses which are adopted to local climatic conditions, houses that have thermal comfort and which perform better technically. Houses which are designed with climate in mind and which use local materials, and built using long tested local technologies have proven to have longer life span, require less maintenance and repairs.

A house is required to perform any functions in order to exist within its environment. Climatic adoption is just one of the requirements. Successful designers for better buildings shall therefore, altimately be judged by the way they behave within the local climate.

3.2 GEOGRAPHICAL CONDITIONS OF TANZANA

The United Republic of Tanzania with a population of 34,568,609 consists of the mainland formerly known as Tanganyika (Population: 33,584,078 annual growth rate of 2.9 per cent) and three islands of Unguja, Pemba and Mafia are collectively known as Zanzibar with its capital being in Unguja Island (Population: 984,531 with annual growth rate of 3.2 per cent) also sharing the same name of Zanzibar.

Dodoma situated in the centre of the country is the official administrative capital under construction. This is within the prominent central plateau zone with the landscape which is highly rolling with flat areas and a few rocky, eagle inhabited hills.

Dar-Es-Salaam the former capital of the country, situated by the Indian Ocean Coast remains the leading commercial centre.

3.3 PHYSICAL GEOGRAPHY AND TOPOGRAPHICAL SITUATION

The Country covering 937,062 square kilometres of which 53,000 square kilometers is covered by inland water and 247,537 square kilometers by Protected Wildlife, is situated on the east coast of the continent of Africa and lies between 1^{o}-11^{o} South of the Equator. As afore noted the country embraces the islands Unguja, Pemba and Mafia in the Indian Ocean. These islands have a generally subdued relief and Zanzibar generally rises to just over 91.44 meters (300 feet) above sea level. Extensive coral growth occurs around the islands and there are sweeping sandy beaches. The mainland has a coastline of some 804 kilometers of beaches, most of them palm fringed. Extremes of topographical relief of African continent also lie within the territory ***(BP, Map of TZ).***

The scenery of Tanzania with its vast plains and plateaus, precipitous forested mountains and its numerous lakes and rivers is an important part of national heritage. Large areas of the country such as the vast central plateau and the Maasai steppe are gently undulating and monotonous, typical of the interior of much of Africa ***(Atlas of Tanzania, Ministry of Lands, Settlement and Water Development)***. But these expanses are broken by steep side scarps in rift valleys by faulting of the earth's crust and by numerous volcanic mountains.

3.3.1 Mountains

Kilimanjaro, being one of the many mountains in Tanzania, is the highiest mountain in Africa, with two peaks of Kibo with a permanent icecap at 5895 meters above sea-level and Mawenzi (5149 meters). Other Mountains and ranges are in existence mainly in the north and south of the country such as Meru (4565m), Rungwe (2961m) Livingstone (2521m) , Kipengere (2961m), Udzungwa (2137m) Hanang (3418m) Poroto (2688m), Ngorongoro (3188m), Loolmalasin (3648m), Lemagrut (3132m).

Lakes, and Rivers

For obvious reasons of fertility of land for various purposes, human settlements has been established and flourished at all suitable and convenient points around the lakes and rivers with moderate agricultural activities, farming and fishing as their main living dependence and cash income.

Settlements near rivers and their activities are primarily the same as for, those living around lakes but to a lesser scale due to difficult positioning of houses near river edges.

Despite of the government strong argue put forward before the people not to build houses on river valleys and lakes, river flooding during rain seasons has let houses being swept away by water due to the poor house siting coupled with constructional techniques employed.

3.3.2 Lakes

Tanzania has the largest amount of lake waters in Africa totalling to 59,052 square kilometers of water area which is 6.3 per cent of the total area of the mainland Tanzania.

Lake Victoria noted as the second largest lake in the world with an estimated total area of 68,000 square kilometers, whose 34,835.5 square kilemeters being its area on the Tanzania side.

The Lake borders the northern part of the country with Kenya (Eastern) and Uganda (Western) at an altitude of 1134 meters above sea level.

Lake Victoria is shared by the three East African countries, Tanzania taking the bigger share of 52 per cent, Uganda 42 per cent and Kenya 6 per cent of its total area.

The increase of fish from Lake Victoria has also led to an increase in the number of fishermen around the Lake. By 1999 for instance, Tanzania had 120,000 fishermen, Kenya had 34,340 fishermen, while Uganda had 35,000 fishermen, and all these have made their settlements as homes by the lake at different places. It is further estimated that 1.0m people live along the shores of this East African lake (***UN Habitat, 20th Governing Council Human Settlement Programme).***

In the deep trough-like depression within the Great Rift Valley on the Western boarder of the country is ***Lake Tanganyika*** with an area of 13,338.5 square kilometers and 774.4 meters deep, being the second deepest lake in the world at an altitude of 1432 meters above sea level.

Lake Nyasa, with an area of 5568.5 square kilometers at an altitude of 472 meters above sea level lies on the western arm of the Rift Valley on the south western boarder of the country. It is heavily populated with a density of 1934 (for Kyela District with 791 Sq.km. and a population of 153,000), around it, ample rain all the adjoining mountainous land with big rice and banana plantations.

Other lakes in the country are ***Lake Rukwa*** (793.1 meters, altitude) with an area of 2949 square meters, situated in the Rift Valley of the Western side***; Lake Eyasi*** (1030 meters, altitude) with an area of 1036 square kilometers; ***Lake Natron* -** soda (609.9 meters, altitude) with an area of 906.9 meters, and ***Lake Manyara*** (960 meters, altitude) with an area of 518 square meters spread in the Rift Valley of the eastern side, running more or less north-south at the centre of the country.
(Atlas of Tanzania, Min. of Lands, Settlement and Water Development)

3.3.3 Rivers

Major rivers in the country are the Great Nile with Lake Victoria as its source draining its water in the mediterranean sea; Ruvu, Wami, Ruaha, and Rufiji draining in the Indian Ocean; while Kagera River originating from Rwanda drains its water in Lake Victoria. (It is said that, by the local people, River Kagera from Rwanda is the origin of River Nile passing through Lake Victoria then out, entering Lake Kioga and Albert in Uganda on its way to the Mediterranean Sea in Egypt through Sudan).

3.3.4 Craters and Gorges

Ngorongoro Crater

The Ngorongoro Crater, 610 meters deep and 20 kilometers in diameter (314 square kilometers), with Lake Magadi in the crater, is the home of hundreds of thousands of animals of flamingos and other birds which stage speculation displays.

Ngorongoro was an active volcano some eight million years ago whose cone collapsed following volcanic activity, leaving a crater or more properly a caldera ***(B.P. Guide to Tanzania).***

The crater rim, with Maasai scanty settlements, is situated at an altitude of 2,286 meters, is wooded with mountain forest vegetation.

The Maasai houses away from the crater – on the rim and adjacent areas – are constructed with a lot of security in mind for fear of wild animals around, and no windows are provided to their mud plastered oval (bread shaped) houses, and also due to cold weather of the area.

A thorny fence is constructed with several houses enclosed in the boma. Their cattle are enclosed in kraal.

The crater is also a conservation area. No human settlement is seen in the crater except for the normadic Maasai herding their cattle, among wild animals.

Olduvai Gorge

Between Ngorongoro Crater and the Serengeti National Park and forests lies Olduvai Gorge, the "Cradle of Mankind." It was discovered by a Germany, Prof. Kanwinnkel in 1911. There existed a lake estimated at some 2.0 million ago with a gathering of all sorts of animals, birds including human beings. Due to changes of the weather the lake dried up after many years have passed, resulting into a Gorge which we see it to-day. It is a soil eroded valley on all the edges of the old lake.

Under the direction of the famous Dr. Leakey, who lived in this area with his family for research work, the gorge has yielded abundant fossil material dating back at least two million years. The remains of prehistoric elephants, giant horned sheep and enormous ostriches has been unearthed in this stone age site. On 17/7/1959 the remains of the Nutcracker Man or "Zinjanthropus bosei" whose skull is in the National Museum in Dar-Es-Salaam was discovered here. ***(Chapter Two of this Dissertation).***

Following the discovery of mankind to have lived in this area, it is believed that even the man's habitat started from this zone in Tanzania, by living in caves for refuge from wild animals which are still found in the area. Traditional houses found in this area are of the Maasai as in the case of the area near the Crater.

It makes one wonder as to what had made a complete Tanzania Fauna and Flora including human beings coveraged (assembled) in this area in abundance at the start of the human-being living history in Tanzania.

But what can clearly be seen, if it is the contribution to the attraction, is the topography of the land allowing easy formation of caves for the early people to live in, ample fruits, roots and animals of all types and forests.

3.3.5 Soils

Soil, earth or ground is generally defined as a mixture of disintegrated rocks and organic material in which plants are rooted. The fact that it is not the original ground is embodied in the definition which adds: "it is the matter of the surface of the globe." Soil is simply a detritus, but a most important one to mankind in building construction to use it in producing house elements or supporting agent of the house as a foundation. This is more so that the country's economy is almost wholly dependant on soil for agriculture, grazing and forestry.

Tanzania possesses a greater variety of soils than any other country in Africa. (***Min. of Lands, Settlement and Water Development, TZ – Atlas of Tanzania).***

Soil classification as below has been made in view of the local circumstances and the need to indicate differences in agricultural potential. These chiefly involve the sub-division of the Ferrisols and Ferrallitic soils on a basis of present day climate and according to parent material, rather than on the nature of clay minerals and soil colours!

- Raw Mineral Soils
- Weekly Developed Soils
- Juvenile Soils on Recent Deposits
- Calcimorphic Soils
- Vertisols
- Podsolic Soils and Soils Lessives
- Brown and Reddish Brown Soils of Semi-Arid Tropical Regions
- Eutrophic Brown Soils of Tropical Regions
- Ferruginous Tropical Soils
- Ferrisols
- Ferrallitic Soils.

3.4 CLIMATE OF TANZANIA

3.4.1 General

The climate of Tanzania is essentially of the equatorial type although there are considerable modifications caused by the varied topography and by the latitudinal position.

Over the country temperatures are either high or moderately high and do not vary much throughout the year. At no time does temperatures impose a total restriction on agricultural and pastoral pursuits and the terms used for the temperature climate seasons of winter, spring, summer and autumn (fall) are meaningless in Tanzania. The only element that imposes restriction on these pursuits, at times, is the availability of water. The availability may be direct from natural rainfall and from natural river flow and lake storage or it might be indirect through artificial storage and irrigation. In either case, the source of the water is the natural rainfall and this is the most important climatic element in Tanzania.

3.4.2 Climate and Building

As submitted elsewhere in this dissertation under ***History of Housing Development in Tanzania,*** the first men on earth, the forerunners of ***Homo sapiens***, lived naked and exposed to the elements. Gradually, however, as they moved into the other areas, as the natural hair covering of their bodies decreased and they became “softer”, they felt the need to protect themselves from the vagaries and rigours of the weather. Apart from the importance of clothing, the equally importance, if not more, of man’s attempt to protect himself of obtaining shelter came up.

When technical knowledge was almost non-existent, man was not possessed of the ability to build habitations and had to be contented with the shelter supplied, usually in form of caves. He soon recognised that within these caves he was protected, not only from an omni-directional attack by enemies or wild animals but also from the weather, however inclement, so that he was still relatively safe and snug within within his “home”. Climate within caves is very equable, most climatic variations being smoothed out within 15 meters of the entrance ***(Amboni Caves in Tanga Region).***

At first man would have had to exist in the cave mouth region where he could get sufficient light during the sun hours. Later as he was able to control fire and heat, he could retreat further to the protection of the cave to enjoy the uniform climate there. Submitted at ***Chapter Two – History of Housing Development in Tanzania, under Shelter and Human History in Tanzania.***

Else where, if we take the Australian aborigine as the next development example, we see that man then began to build himself crude shelters, more in the nature of windbreaks that were not vertically erected, but were angled so as to reduce the night radiation loss. Tents soon came into being when the normadic pastoral people needed to be often on the move, following the rain with their herds. These covers gave protection from the precipitation and radiation while allowing through ventilation when this was required for cooling.

When man became more settled he turned to the naturally available materials of his origin, either wood, sticks, poles, grass or stone, to build himself and his family a protection suitable for all seasons. Over the years he has gradually developed the optimum design, within his limited ,means, with regard to technology, material and cost, to combat or minimize the extremes of his region's weather. Up to to-day we are still learning a lot and taking note of some of the design characteristics of the indigenous people.

3.4.3 *Climate and the Architect*

When an architect is faced with the problem of preparing the plans for a specific construction he is made aware, at a very early stage, of such fundamental factors as the type of construction required, house, church, offices, shop, etc., the location of the building and the cost limitation. It is most unfortunate that he is not also supplied with equivalent climatological knowledge. Too often the appearance of the finished product is put ahead of its utility, while shortcomings of the design are excused on the grounds of aesthetic aspect must be lost is where the true "art" of the architect shows through, but this is a sphere where art and science must be blended.

Atmospheric conditions are very relevant to a number of aspects of construction, choice of site and materials. The optimum climatic data needed by the architect may be considered under four main headings:

thermal consideration - **under this ideally, the architect should know air temperatures, solar radiation, humidity and air speed, plus the frequency analysis and interrelationships of these variables.**

ventilation and wind pressure - **it will only be on "on the site" inspection that can decide such things as: is the building situated where it is sheltered by natural and man-made objects or excessively exposed. The normal increase of wind speed must be appreciated by the designer.**

daylight factors - **information would have to be obtained by using a conversation from radiation to even sunlight data. Normally a monogram or template is used; but experience and commonsense can apply when dealing with rural houses. When monogram or template of the solar altitude and azimuth, are used, so as to calculate the sun's position and then to compute various daylight factors within buildings by means of graphs or further monograms practical results are obtained from these calculations. And these include such matters as the siting of clerestory windows and the location and size of overhang for cutting out the high sun's rays while permitting the heat from the low altitude to enter the room.**

precipitation or dampness aspects -
Rainfall has an appreciable effect upon the interior of the buildings, affecting the materials employed in the building, waterproofing, damp courses, etc. When it is coupled with high winds it may also affect the interiors. By making certain assumptions about prevailing wind directions it is possible to construct overhangs and protective walls in order to shelter the exposed house walls from the brunt of the rainfall.

3.4.4 Hydrology

Hydrology is a branch of earth science dealing with the waters of the earth with special reference to properties phenomena, and distribution. It includes within its definition such disciplines as civil engineering, meteorology, chemistry and geology. It is a relatively recent "specialisation" brought about by the necessity to gain particular information on the water resources of the earth; their occurrence, their origin, their relation to life on the earth, their physical properties and their utilisation potential.

The engineer, for example, requires a high degree of exactness in planning structures (dams, weirs); in public water supplies; in producing hydroelectricity and planning irrigation canals and channels. "The hydrologist", as part of his duties is responsible for supplying the most accurate information he can collect to provide the engineer with his design quantities. In this way a scheme or project can be planned with the maximum of efficiency and the maximum of expense. However, despite of its importance not much can be investigated and discussed in this dissertation due to minimal complexity required and cost conscious in the design of rural and low cost houses, although planning and design of dams and general water supply for the rural population is necessary.

The country is well drained, distributed all over the country for an equable distribution population settlement towards utilisation of water for various purposes;

such as agriculture, fishing, building purposes, domestic use and as transportation. The country is devided into four Drainage Basins:

- **Indian Ocean Drainage Basin**

The entire coastal line of Tanzania (804 km) spreading a full southern half of the country with a full coverage of the Lake Nyasa boarder.

- Mediterranean Sea Drainage Basin

  This is the northern part of Tanzania, all round Lake Victoria.

- Antlantic Ocean Drainage Basin

  The western boarder of the country spreading to the centre part of the country interrupted by the Interior Drainage Basin around Lake Rukwa, in the west and around Lake Manyara, Naivasha up to Dodoma on the north-west.

- Interior Drainage Basin

  This is around Lake Rukwa, covering 31000 square meters, on the west and Lake Eyasi, Lake Manyara and Lake Natron up to the centre of the country Dodoma.

3.4.5 Rainfall

As the convergent windows into Tanzania have an easterly component it would be expected that the wetter areas would be in the East.

Although the offshore islands and the Coast are wet there are other wet areas inland. These fall into two categories. One is the higher rainfall areas associated with high ground and mountains where the orographic effect plays a prominent part. The areas are those from Kilimanjaro South along the Pare and Usambara mountains, along the Uluguru mountains to the Southern Highlands, in the west from Sumbawanga along the high ground to the Burundi border and along an extension from the Kenya Highlands in the Mara Rgion. The other category includes the high rainfall areas around Lake Victoria, Tanganyika and Nyasa. Here the cause is a semipermanent low pressure trough along the line of the lakes with its own local convergency effect. The extremely high rainfall area at the northern end of Lake Nyasa is a result of both these extra effects.

3.4.6 Temperature

The temperature regime throughout the country is typical of equatorial latitudes. Variation between the hottest and coldest months of the year is small and the annual range is smaller than the daily range.

3.4.7 Wind

Surface winds are not easy to generalize. Although the seasonal change from the April to September south east monsoon to the November to March north east monsoon is very apparent on the coast the effect becomes less noticeable

further inland. This arises from the broken and elevated topography and the presence of large lakes which impose local surface wind effects.

Wind speeds on the whole, tend to be below, particularly at night. Day time winds are usually less than 15 knots although 20 knots along the coast, over Lakes Victoria and Tanganyika and in several places near escarpments or mountains such as Mbeya and Iringa.

3.5 CLIMATIC ZONES OF TANZANIA

There exists a wide range of climatic conditions in Tanzania.

This range also changes throughout the year and between day and night. The factors governing the climatic conditions are dynamic and very complex. In order to understand the climatic conditions of a country like Tanzania and the factors influencing these conditions one has to establish certain broad categories. This work was originally undertaken by UNESCO through a study carried out by C. Fera, F. Scriven and J. Soulat. This study had become the model for later work on housing and building design and climate in Tanzania. For purposes of design the country has been divided into six broad zones. These zones are based on similar climatic conditions in relation to human comfort and building performance.

The six climatic zones in Tanzania are as follows:

(i) Coastal Tropical
(ii) Intermediate Tropical
(iii) Lakes
(iv) Plateau
(v) Uplands
(vi) High Uplands.

The zones were originally stated in broad terms but later on they were demarkated by the Building Research Unit (BRU) by using climatic information from the Meteorological Department. They now make a useful framework for practical reference.

3.5.1 The Coastal Tropical Zone

This zone comprises the Islands and a stretch of land along the Indian Ocean varying in width from 20km to 100km from the sea. Most of this zone is less than 300m above sea level. There is high humidity and it is not excessively hot. The annual mean maximum is 29^oC - 31^oC and the annual mean minimum is 21.5^oC – 25^oC. Diurnal Range 6.5^oC – 9.5^oC. The humidity is permanently high ranging from 65 – 75 percent at 1500 hrs.

In this zone rain may fall at any time of the year, although rainy days may range from 80 to 140 days in a year. Annual mean rainfall ranges from 750 – 1500mm. In the north of the country there are two rainy seasons. One major in April – May and a minor in October – November. In the south there is one rainy season from December to April. Driving rain may penetrate openings of a house facing windward.

The prevailing winds are North-East monsoons during December to March and South-East monsoons during April to October. Local winds such as sea breezes also influence coastal climate.

Its nature is of varied and lush vegetation and partly well forested with mangrove swamps in sheltered estuaries.

To a large degree the soil in this area is actively induced: coconut plantation, mango and cashew nut trees are common. In wet areas flood-plain rice is cultivated extensively. Elsewhere bushland dominates the vegetation.

Comfort Aspects

Combination of high temperature and high humidity causes permanent discomfort. June and September more comfortable due to small temperature drop, less humidity and brisk winds. Nights offer little relief from the heat of the day. Complete sun exclusion and maximum ventilation is required.

Traditional Houses

The coastal area of East Africa have a common cultural tradition: the Swahili culture, with its typical house type, the so-called Swahili house. The house in its present form consists of a rectangular double-banked house, with main entrance facing the frontage of the house and a fenced kitchen yard with separate out-buildings for kitchen, store and latrine. A wide central corridor leads through the house with usually three rooms on either side. Very often the plan is stepped, creating on one side at the front a sheltered verandah or baraza.

The roof is usually a hipped or gambrel roof. The large six-room Swahili house is most suitable for large extended or ploygamous families common among Muslims.

In urban areas the house has become very popular, as it is suitable for letting, with the tenants occupying one or several rooms, according to their paying ability and household size. This pattern is particularly evident in coastal towns, but can be seen in many inland towns as well. This system of sub-letting may cause overcrowding as families rarely can afford more than one room. However, such over-crowding is rare because most tenants are single.

Traditional Construction

The coastal strip has an abundance of building materials, such as clay soil, lime, coral stone, timbers grad and palm fronds are usually available everywhere. In some areas, however, it may be difficult to find straight poles. Traditional construction can be traced to two main sources:

1. A noon-durable light weight construction based on poles, sticks grass and palm leaves, a typical example is the Zaramo house.

2. The mud and pole structure, probably influenced from Arab house-building tradition. The Arab traditional construction can be seen in e.g. the existing buildings in Zanzibar, Bagamoyo and other old trading centres. These houses were built of dressed limestone, sometimes several storeys high, with flat roofs, or vaulted domes.

The vernacular Swahili house has constructional elements from both traditions. The mud-and-pole structure consists of straight poles dug into the ground. Split poles are tied horizontally on the outside and inside of these poles. This framework is then covered with mud, usually plastered on the in-side. Sometimes the framework is packed with coral stones before plastering.

The wall thickness is usually 150mm or more. However, over a period of several years with repairs and replastering the thickness tends to increase.

The traditional roof is a hipped or gambrel roof which has its structure partly supported by internal walls. Such a roof has fairly complex roof trusses, but has two advantages from a climatic point of view.

1. Both roof types protect the four walls from direct sun light, and

2. Particularly the gambrel roof provides excellent ventilation of the roof space.

Traditional materials for the support structure are termite resistant mangrove poles, or when not available or too costly, other timbers, even sisal poles. The traditional roofing material is palm fronds (makuti) which give high insulation value, low thermal capacity and allow for a certain amount of ventilation through the roof itself.

3.5.2 Intermediate Tropical Zone

This zone comprises the strip of land with varying width from 10km to 200km wide between the more humid, coastal tropical zone and the plateau zone.

The Intermediate Tropical Zone is hotter than the Coast Tropical Zone, with a higher day temperature. The annual mean maximum ranges from 30^{o}C to 33.5^{o}C and the annual mean minimum ranges from 18.5^{o}C to 21^{o}C. The diurnal range is 10^{o}C to 12.5^{o}C.

The humidity in this zone is lower than the Coastal Tropical Zone but still permanently high. The annual mean relative humidity at 1500 hrs. is 50 – 60 per cent. The rainfall pattern is the same as for Coastal Tropical Zone but there is less rainfall although the average number of rainy days are the same. The annual mean rainfall ranges from 600 – 1200mm. Rainy days vary from 90 to 130 days in a year. The prevalent winds follow the monsoon pattern but less pronounced.

The Zone is generally low with its altitude ranging from 300m to 600m above sea level, and thus having its vegetation comprising mainly of a mixture of woodland and wooded grassland or savannah. The northern part is more cultivated, agriculturally, than the southern part. House construction is a thatched zone with mud-and-pole walls and thatched roof.

Comfort Aspects

Although day temperatures are high the zone offers some relief compared to Coastal Tropical because nights are cooler. The combination of humidity and less wind may cause discomfort if temperature is high. House should allow maximum cross ventilation and give complete sun exclusion.

Traditional Houses

The zone has a variety of traditional house forms and layouts. The coastal Swahili house is common and increasing in popularity. However, there has been a strong tradition of using several smaller houses for specialised functions rather than one large house. Circular houses have been wide spread, but are not common in the new villages. Rectangular are usually single-banked.

Traditional Construction

The zone shows a variety of house constructions using various structural principles and materials. Circular houses are constructed as a thatched zone or with mud-and-pole walls and thatched roof. Rectangular houses are also frequently constructed with grass-covered walls, except for the main house which is usually constructed of mud-and-pole with a thatched roof.

3.5.3 Lakes Zone

The Lake Zone comprises of 4 – sub-zones, the land around the four largest lakes in Tanzania: Lake Victoria (1,133m. altitude), Lake Tanganyika (773m altitude), Lake Nyasa (475m altitude) and Lake Rukwa (793m altitude). Around these lakes there is a stable climate with only slight seasonal and daily variations.

The zone ranges in average from Lake level to about 150m above lake, and extends from lake shore to as much as 30km inland where the land is open and flat. The width of the zone the lakes of the Rift Valley is considerably less, only a few kilometers at the most.

This zone comprises the areas bordering Lakes Victoria, Tanganyika, Nyasa and Rukwa. Around these lakes there is a stable climate with only slight seasonal and daily variations.

The annual mean maximum temperature ranges from 26-28^{o}C. The diurnal range is 10-12^{o}C. The mean annual Relative Humidity at 1500hrs is 60-70% and the annual mean rainfall ranges from 800-2900mm. Rainy days vary from 70 to 165 in the year.

The major characteristic of this zone as far as design is concerned is the lake-land breeze near the lakes. Breeze from the lake to the land from noon until dusk and breeze from land to the lake during the night. The lakes in the Rift Valley System have catabatic winds. These are cold winds sliding down from the mountains during the night.

Although there are some variations of comfort conditions in this zone Kagera Region, north west corner of the country has a cooler climate than the rest of the zone. Mostly the climate is warm and humid although land-lake breezes offer relief during the night.

The land around Lake Victoria, bordering the northern part of the country with Kagera Region on its western side, Mwanza Region on its southern side and Mara Region on its eastern side comprises mainly of actively induced vegetation, some grassland and wooden grassland. Most of the land is flat with rocky outcrops. The land around lake Tanganyika bordering on the western arm of the Rift Valley of the country with Kigoma and Rukwa Regions on its eastern side Rukwa Regions on its eastern side consists of woodland, only parts of the zone has been actively induced. The Fipa plateau slopes gently in forested, undulating hills down the Lake.

The land surrounding Lake Nyasa, within the eastern arm of the Rift Valley bordering the south western side of the country with Mbeya Region on its northern part, Iringa and Ruvuma Regions on its eastern side, consists mainly of woodland. Only the areas around Itungi Port and near Mbamba Bay have been actively induced. The Livingstone Mountains on the eastern side of the Lake rises steeply from the landscape lakeshore. Further south the landspace slopes more gently down to the Lake.

Due to the fluctuating level of Lake Rukwa surrounded by Mbeya (east and south) and Rukwa (north and west) Regions the landconsists of large areas of swamps and wet grasslands. The north-eastern side of the Lake comprises mainly of grassland, which the south-western side consists of wooded grassland. Only the southern area around Nyomba has been actively induced.

Comfort Aspects

Some variations of comfort conditions within rest of the zone. Most of the zone is warm/humid, lake-land breezes offer relief during nights.

Traditional Houses

Traditionally there exists a wide range design types in this zone. Except for the Nyakyusa main house, they are all circular, either small, just accommodating a few persons in a single space, or large, capable of accommodating a large family in several rooms. Most traditional houses accommodate a limited number of functions in a small area.

The traditional circular plan types are being more and more discarded, since they offer little opportunity for topological, functional or constructional development and improvement. The rectangular plan types are now almost generally accepted, and certainly offer a wide choice of lay-outs.

Traditional Construction

In forested areas, houses are usually made of poles or mud and pole walls while in areas with less trees available for building purposes, houses are often made of mud-blocks, or thatch. In many areas there is a wide range of grass such as bamboo, papyrus or other reeds, elephant grass etc. Such grasses are used for a wide range of building purposes.

In the Lake Zone all traditional roofs are thatched. Although thatched roofs have a short life span, they have excellent thermal properties with a high insulation value and low-heat storing capacity.

3.5.4 The Plateau Zone

The Plateau Zone comprises the greatest parts of the country ranging in altitude from 450m – 1200m, and it has three sub-zones

•***Central and Western Plateau***

Comprising the area west of the ridge stretching from Lake Nyasa in the south to mount Kilimanjaro in the north consists mainly of woodland (miombo). Along the rivers there are wooded grassland and grassland. Large areas have permanent swamp vegetation. Around Tabora and north of Nzega the vegetation is actively induced.

•***South-Eastern Plateau*** comprising Ruvuma Region and Ulanga District consists of woodland but with considerable areas of wooded grassland.

•***North-Eastern Plateau*** comprising the Maasai steppe, most of the Arusha District consisting grassland and semi-desert vegetation. Some small areas of grassland and wooded grassland have been actively induced.

The climate of the zone, days may be hot but nights are cool. The annual mean maximum ranges from 27^{o}C to 31^{o}C and the annual mean minimum 15^{o}C-19^{o}C. Diurnal range is 12^{o}C-16^{o}C. The annual mean Relative Humidity at 1500 hrs ranges from 40 – 50 percent.

Rainfall follows the same pattern as on the coast at the same latitude but there is less rain. The annual mean rainfall ranges from 250mm to 1650mm in a year. ***The Central and Western Plateau*** has one rainy season from November to April. ***South-Eastern Plateau*** has also one rainy season from November to April, while the ***Northern Plateau,*** however, has two rainy seasons, major from March to May and minor from October to December. Generally light breezes follow monsoon pattern at periods there is no dominant direction.

Comfort Aspects

Discomfort during day-time due to high temperature, despite low humidity. Some comfort in shade is experienced. Nights are cool. In July/August and during rains the weather is chilly. There are mosquitos near lakes and swamps.

Traditional Houses

A wide range of traditional house forms have developed in this zone. Some house types contain all functions within a single house, such as the houses in Iringa (Wahehe) Dodoma (Wagogo) or in Mwanza (Wasukuma). In other areas, traditional houses are more specialized and a family may have several houses.

Well built traditional houses are climatically well suited and show an ability of adaptation to local conditions. The modernization process has brought about rapid changes. In may cases the new houses are inferior to the traditional houses as far as climatic performance and social suitability are concerned.

Traditional Construction

Soil, grass and poles are the major materials used in the construction of traditional houses in this zone. Houses are constructed in a circular or rectangular shape. Circular houses have walls or mud blocks or mud and pole and thatched roofs. In the case of a Maasai house, it is a shell-like mud and pole structure with a continuous wall and roof surface. The structures locally produced within the resources of the local community are climatically sound and adaptable.

Rectangular houses or their derivations, such as various types of court-yard houses, are also mainly constructed in mud blocks, or mud and pole walls with thatch or mud roofs.

3.5.5 The Uplands Zone

This zone comprises all area of high altitude, ranging between 1200m and 1800m above sea level mainly mountains and plateau stretching from Lake Nyasa in the South to Mount Kilimanjaro in the north. The altitude reduces day and night temperatures as well as it increases rainfall.

The climate is pleasant and never too hot nor too cold. Annual mean maximum temperature ranges between 23^{o}C and 25.5^{o}C, and annual mean minimum ranging from 10.5^{o}C to 14^{o}C. Diurnal range is between 11^{o}C and 12.5^{oC}. The annual mean Relative Humidity at 1500 hrs. vary from 52 – 60 per cent. Annual mean rainfall ranges from 750mm to 1500mm and 80 – 150 rainy days of the year.

It is drier in the Northern Uplands than in the South except for Mount Kilimanjaro. The North has two rainy seasons, March to May and November to December, while the south has one rainy season, November to April. Hail may occur

but rarely below 1500m. Some hail occur in Southern Uplands, north of Mbeya. There are moderate winds with no predominant direction. Strong gusts occur during rainy season.

As most Uplands areas have rainfall, the vegetation is lush and green most of the year. Most of the vegetation consists of woodland except in some drier areas with grassland. Many of the Uplands areas belong to the Rift Valley with very steep mountain slopes.

Comfort Aspects

Solar radiation of houses may cause overheating, ventilation is required. Chilly during cool season. Cold night cause discomfort. Few mosquitoes.

Traditional Houses

Circular and rectangular house plans are common, and a variety of court-yard types are used in Irings (Wahehe) and Dodoma (Wagogo) regions. The Maasai house is used in parts of the zone, and has the special circular or snail-shell shaped plan. Traditionally, double-babked houses have not been used, but they are becoming more and more popular as circular designs are being abandoned.

The intense solar radiation and low night temperatures make a compact building form most appropriate in order to minimise solar heat gain and reduce loss during nights.

Traditional Construction

Traditional houses in Upland areas have either been constructed from heavy earthern materials with a high thermal capacity or thick layer of thatch with a high insulation value.

3.5.6 High Up-Lands Zone

The High Up-lands Zone comprises of mountain areas above 1800m mainly of the area between and around Mbeya, Njombe and Iringa earlier known as Southern Highlands. It also includes the highest altitude of the mountains around Sumbawanga, Morogoro and Nguru. The Northern Highlands comprise the highest altitudes of the Mountains Kilimanjaro, Meru, Loliondo, Ngorongoro and Mbulu, roughly between Hanang and Endabash. This zone is generally forested although some of the most fertile and high yielding agricultural areas are found in this zone. Few people live above 2500m.

Due to the altitude daytime temperatures very rarely exceed comfort zone while night time temperatures very often drop well below the comfort zone. The annual mean maximum temperature ranges between 18^o – 23^oC while the annual mean minimum temperature ranges from 8^o – 12^oC. The mean duiurnal ranges from 10^o – 14^oC. The zone has brisk winds are sporadic air

movements which in cold weather may be very uncomfortable. However, high wind velocities are uncommon. Cold downhill winds (catabatic winds) maybe more pronounced in this zone and cause considerable temperature drop during clear calm nights. The relative humidity at 1500hrs is approximately 45% or higher. Humidity especially during the night causes dew and often fog is common.

This zone receives a considerable amount of rainfall. Annual mean rainfall varies between 800mm and 1400mm, some areas receive more than 2000mm per annum. The number of rainy days vary between 60 and 230 in the year. During July and August it can be rather cold indeed. Heating is necessary. The designer must therefore bear in mind the very different comfort situation in this zone as compared to those of lower altitudes. The major climatic performance criteria for buildings is therefore to provide protection from the cold.

The zone is forested with grassland and bushland. Vegetation is actively induced in most High Upland areas: agriculture, grazing and forestry. Very few live above 2500m.

Comfort Aspects

Never too hot, often too cold outside. Air movement not required for comfort. Nights and early mornings uncomfortably cold, particularly if not heavily dressed or exposed. Sunshine is always required and house heating is required for most of the year.

Traditional Houses

In this zone there is not a wide range of traditional house types; although both circular and rectangular shapes of houses have been used widely, usually thatched cone-shaped houses of fairly small size. Such houses are economic to heat and the steep roof provides good rain protection.

Traditional Construction

The zone consists to a large degree of well forested areas, which provides a variety of quality timbers, hard-woods as well as soft-woods. There is an increasing utilisation of soft-woods for commercial purposes.

Due to low temperature and continuous rainfall, laterate soils are mostly absent from this zone. However, clay deposits provide an excellent raw material for brick-making. There are also large areas with bamboo forests and despite its short life-span, it is a very popular wall and roof material.

Traditionally emphasis was put on high quality thatch roofs built as cone-shaped circular huts, such as in Sumbawanga district (Wafipa) and around Kilimanjaro (Wachagga).

In Tukuyu District, the Wanyakyusa have built the entire house of bamboo covered by a thatched roof.

ECONOMIC GEORAPHY WITH HOUSING DEVELOPMENT

3.6.1 *Agriculture*

The major part of the weath of the country comes from its agricultural produce. The chief exports are coffee, cotton, cloves, sisal, tobacco, tea, pyrethrum and cashew nuts, Coffee and tea are grown on the Uplands and the High-Uplands zones like in the Southern Highlands Regions, Kilimanjaro Region in the north and part of the western side of Tanga Region. These areas have more advanced houses with conventional building materials employed than in other parts of the country. Sisal, cashew nuts and coconuts are grown in the coastal zone while cloves in the island of Pemba. Cotton, pyrethrum and tobacco are grown in some parts of the Plateau Zone. Apart from the produce for exports the country is endowed with the production of other types of crops like beans, maize, ground nuts, millet, rice, cassava, sorghum and vines are main crops produced on the greater part of the country – *plateau.* **Other produce on the plateau includes honey, beewwax, ghee, grains, oilseeds and salt.**

Apart from agriculture, plateau practices pastoralism, which is quite predominant. Cattle, goats, sheep and chicken can be seen in almost every household. Donkeys are also kept as beasts of burden.

Sugar cane for sugar production is grown in the low-lands of rivers of Kilombero, Kagera and Mtibwa in Morogoro and Kagera Regions.

Production of various types of fruits and vegetables is a source of income to most petty farmers and is carried out nearly every where in the country without the government involvement. These are lucratively cultivated in uplands coastal areas, lowland of rivers and where there is frequent rain down pour. Local markets are stocked with tomatoes, carrots, mangoes, oranges, cabbages and the like.

The total exports from Tanzania immediately after independence – 1963 amounted to $63,500,000; of which this figure agriculture and related enterprises contributed $55,700,000 or about 88 per cent. Agriculture alone contribute 70.9 per cent of the total export.

The 2002 HBS reports that, position of agriculture, there isn't much change to date as over 89 per cent earn their living from land compared to 90 percent in 1963. – almost half a centuary ago.

3.6.2 *Minerals*

The physical geography of the country has come up with the availability of various types of minerals in various areas.

Areas of the chief minerals occurance has attracted a rural population to converge and put up villages for settlement.

Various minerals available and exploited in the country contribute to the country's revenue and provide some income to the rural people when employed as labourers:

Apart from the gains by the rural people and assembling them together for settlement the mineral sector of Tanzania is becoming a more significant part of the economy with the opening of several new gold mines. Large-scale diamond and gold mining as well as small-scale mining operations play a major role in Tanzania's mineral development. Gold production from the small-scale mining sector alone provided some 76% of Tanzania's total mineral export in 1992, when small-scale miners sold 4.5 tonnes of gold worth US$ 40.4 million to the Bank of Tanzania. The International Labour Organization (1999) estimated the number of people employed in small-scale and artisanal mining in Tanzania at 450,000 – 600,000 *(Internet).*

- *Gold and Silver:*

Mwanza (Mwadui Williamson Diamonds), Musoma, Iramba Plateau, Sekenke Goldfield, Lupa Gold Field.

- *Tin:*

Karagwe, Tinfield (north west of Tanzania)

- *Nickel, Chromium and Cobalt:*

Musoma

Mica:

Uluguru mountains, Swibesa in Mpanda, Bundali Hills in Rungwe, Usambara and Pare Mountais, Mbulu and Southern Highlands Region.

Salt:

Uvinza, Mandawa area between Kilwa and Lindi.

Gypsum:

he impure or earthy or sandy from known gypsite is more widespread, occuring in old lake beds and in seasonal swamp area known as "Mbuga." One such deposit worked at Mkomazi between South Pare and Usambara mountains.

Clay:

lay for these enormous deposits is used locally for the manufacture of bricks and tiles. Kaolin has also been formed by the deep weathering of granite rocks between Iringa and Njombe while glass sand has been investigated in a variety of other sources including mine dumps, coastal and lake shore sand.

Granite:

It is wide spread in the ancient metamorphic rocks.

Lime:

nd other minerals for local use in the building industry, such as sand, gravel and stone, are of wide spread occurance. Limestone deposts suitable for the manufacture of cement are found mainly in the belt of manne sedimentary rocks along the coast.

Songo Songo Gas

anzania has already started developing the 880 billion cubic feet natural gas resources of the Songo Songo Island deposit southeast of Dar-Es-Salaam.

3.6.3 *Farming – Cattle Distribution*

As found out and submitted in *Chapter Two – History of Housing Development in Tanzania,* **farming has been the first occupation practised by the Tanzania ancestors from its beginning, and stil being proudly practised to date. Even the elite class in the urban areas dared to keep cattle in their residential compounds in the city centres, a move which was prohibited by the government about half a decade ago.**

Pastoralism is practised in nearly every zone in Tanzania at varying scales seeming to be more predominant more so on the central part of the Plateau Zone. Cattle, goats, sheep and chicken can be seen in almost every household. The keeping of these animals is either in the pan, or in the family main house where it numbers about one, two or three.

A livestock census made in 1965 revealed that there were nearly 10,000,000 cattle and 7,000,000 sheep and goats in the country. There were also about 160,000 donkeys for load of produce haulage to local markets, and 15,000 pigs.

Compared with the census of two decades back (1946), these figures show an increase of 53.5 per cent and 30.4 per cent respectively – cattle and sheep/goats.

Distribution of cattle, sheep and goats by Regions.
(*Atlas of Tanzania, Min. of Lands, Settlement and Water Development, DSM.)*

	Cattle	*Sheep*	*Goats*
Arusha	**1,880,000**	**706,000**	**843,000**
Coast	**64,000**	**7,402**	**19,489**
Dodoma	**1,143,348**	**469,212**	**803,019**
Iringa	**617,865**	**97,237**	**141,135**
Kigoma	**60,645**	**23,327**	**86,059**
Kilimanjaro	**293,554**	**29,495**	**54,534**
Mara	**836,000**	**202,000**	**146,400**
Morogoro	**80,674**	**29,059**	**68,880**
Mtwara	**10,388**	**4,682**	**51,191**
Mwanza	**622,439**	**208,051**	**316,722**
Ruvuma	**10,747**	**2,474**	**34,118**
Shinyanga	**2,141,597**	**543,062**	**762,378**
Singida	**620,777**	**18,153**	**279,474**
Tabora	**637,322**	**123,541**	**158,195**
Tanga	**29,000**	**103,500**	**200,500**
West Lake	**99,609**	**28,000**	**124,000**
TOTAL	9,408,965	2,757,195	4,089,094

Table 3.1

As per the *Sunday OBSERVER: 20/3/2005* **the country has now 17,700,000 cows, 12,500,000 goats, 880,000 pigs, 3,500,000 hens and 3,500,000 sheep. This is 77 per cent increase for cows when compared to the 1965 figures, and much more than 78 per cent increase for goats.**

The reasons for the greater proportional increase of cattle is that they are still regarded in many areas as a status symbol. The next annual increase in the total cattle population, after deductions of slaughter and deaths, (due to draught and insect deseases), is at present 4.2 per annum. The increase of populations of sheep and goats are much smaller because these animals have no status value and are regularly slaughtered by farmers for good for himself and his family.

Industries:

Light and small industries are increasing rapidly particularly manufacturing textiles, foodstuffs, leather goods and various types of building materials.

Imports and Domestic Exports:

Imports of food primarily reflect the effects of the climate of Tanzania's own production with a substantial increase production, disastrous drought and flood years of 1961 and 1962.

Imports

- **Machinery and transport equipment**
- **Beverages and tobacco and clothing and footwear.**

Export

Cotton: **Around Lake Victoria**

Among other exports, the steady rise in DIAMONDS should be noted. Here again, increased production determined the rise in exports. Tanzania's entire output comes from the Williamson Diamond Mines of Mwadui near Mwanza, in which the government have a half share.

Cashew:

Mtwara Region and Dar-Es-Salaam Region and vitually the whole crop is sold to India for processing.

The only other exports to show a pronounced increase, working on history records, was *tea,* **mainly between 1956 – 1965.**

<u>FLORA AND FAUNA</u>

Vegetation

The relationship between vegetation, climate and soil is appreciated. Climate determines the type of vegetation that grows in a specific area. Most plants cease their growth when the soil temperature is below 43°F, for, if the temperature is too cold there is a low rate of moisture intake and the plant cannot replace the transpiration loss quickly enough. Freezing temperatures can damage the plant cells by causing desiccation and chemical change. High temperatures cause increased evapotranspiration unlike the plant wilts, but rarely, except by "burning" cause trouble directly themselves.

There are eight major Vegetation Types distribution:

(i) *Forest:*

It is uncultivated track of land covered with trees in close proximity. This includes upland and lowland rain forest, deciduous forest and ground water forest.

(ii) *Woodland:*

This is land with an open, cover of trees, their crowns not forming a thickly interlaced canopy and as a rule leafless for some period during the year most common: Acacia Woodland, Brachystegia – Isoberlinia, Woodland (Miombo).

(iii) *Bushland and Thicket:*

Evergreen and decidous armed and unarmed, prevails in the more and parts of the country, particularly in the great rain-shadow area adjoining the highlands arc westwards.

(iv) *Wooded Grassland:*

This is defined as land carrying grasses and herbs with grouped or scattered threes or bushes covering less than fifty per cent of the ground. It comprises a great variety of sub-types among whom the most frequent are commonly termed "Open-Bush" and "Parkland".

(v) *Grassland***:**

Grass and herbs cover not less than eighty to ninety per cent of the ground. The two main sub-types are valley Grassland (including seasonally flooded plains), and slope and Ridge Grassland.

(vi) *Permanent Swamp:*

Carrying a herbacious vegetation of grasses, reeds and rushes.

(vii) *Desert and Semi-Desrt:*

Vegetation is neither non-existant as in temporary and permanent salt pans or on rock and ice (alpine desert) or is so thinly scattered that the aspect of the land is dominated at all season by the colour of the soil rather than by that of the plants.

(viii) *Actively Induced Vegetation:*

his comprises produced under the influence of man's presence, actual occupation of the land, including perennial and annual crops, pastures, fallows, etc.

here are times when we talk about *Jungle;* **strictly means wasteland but often used to describe a dense mass of vegetation; a tropical forest with much undergrowth. Naturally, areas of forest and woodland blend into each other and it is often difficult to set down accurate word picture describing the various types.**

3.7.2 Forest Reserves:

Forest constituting covers of trees, flora and fauna, are essential to the development of the rural area which wholly counts as the major source of building materials

of the rural houses and climatic improvement towards enhancing agriculture and farming activities.

The total area of the rural sector includes the cover of forests, the protected ones, as forest reserves, and unprotected forests. Traditional building materials for both rural and urban houses are obtained from the unprotected forests while produce from protected forests have most of their produce exported.

The total area of forest reserves amounts to about 14 per cent of the total land area of the country. These reserves are roughly divisible between the following vegetation groups:

(a)	**High Forests**	**-**	**5766.6 sq.km.**
(b)	**Woodland, including Bushland and wooded Grassland**	**-**	**72752.5 sq.km.**
(c)	**Grassland, moorland etc.**	**-**	**2181.8 sq.km.**
(d)	**Tidal forest (Mangroves)**	**-**	**495.6 sq.km**
		Total	**81196.5 sq.km.**

Apart from utilising trees for timber for building purposes, rural people destroy the tree cover on account of massive cutting for chacoal.

Realising that the total area of the country is 937,062 square kilometers and having the water area of 53,000 square kilometers, game conservation of 31,325 square kilometres and the government action of reserving forests as protected forests for both state and local authority whose initial area was 83036 square kilometers in 1964 *(Atlas of Tanzania, Min. of Lands, Settlement and Water Development).*
the remaining area of the rural people to obtain local building materials for rural houses, carry out agriculture, hunting and chacoal burning, firewood collection is notably reduced; and draws attention to the careful and economic use of forests and rural land.

This is also more so that, as per the government implementation, in 1964 when the programme of Reserved Forests started produced 45.3 per cent of the cut of the saw logs harvested in the country, while the bulk of the firewood and poles came from the Unreserved Lands.

The recorded cut of all classes of wood in 1964 was 14,301,074 cu.ft. (404720.4 cu.m). This figure includes 4,746,671 cu.ft. (134330.8 cu.m) of round logs for sawing and 9,554,403 cu.ft. (270389.6 cu.m) of building and other poles and

firewood is only a small percentage of the estimated total consumption of these products, the majority of which is taken freely from Unreserved Lands.

Total timber exports during 1964 were 781,227 cu.ft (22108.7 cu.m) valued at $ 622,128 of which 189,711 cu.ft. (5368.8 cu.m) worth $ 98491 were sent to Kenya and Uganda.

47162 cu.ft. (1334.7 cu.m) of plywood, valued at $ 2688 was exported overseas, but Kenya and Uganda took 3,739,347 sq.ft. (105,823.5 cu.m) valued at $ 77,548.

It is noted that many parts in the country have faced deforestation by destroying the old tree cover, with the example, certain areas of the slopes of mount Kilimanjaro now have trees after most of the old trees cover was destroyed, especially on account of massive cutting of acacia trees for charcoal and house building materials.

Efforts to plant trees are being done which include encouraging pupils in schools and at home, while Kwimba Reforestation Project, for example, involved churches, schools and youths.

It is estimated that over five million trees have been planted since 1998, with plans to put up another four million seedlings continuing to cover especially Kigoma, Morogoro and Tanga.

The country loses up to 300,000 hectares of forest each year, planting 25,000 hectares annually, that being the plan, as a replacement is a drop in the sea, being less than even 10 per cent. *(Guardian Newspaper: 15/3/2005).*

In 2002 the target of planting trees was 100 million trees of which 83 million was planted.

In 2003 the target was 57 million and 61 million was planted, more than what the government expected, but in 2004 62 million trees were planted against a target of 70 million. Even if the target show a 90 per cent success rate reforestation is far from being achieved when compared as to how many trees are actually needed each year as a replacement to the annual lose due to deforestation.

To supplement the effort of reforestation the use of chacoal, which now is being used even in most boarding schools, the problem ought to be taken care of by an energy use revolution, with little doubt tied to improving uptake of mineral coal. The later may be polluting but trees will be saved.

3.7.3 Game Conservation

Apart from the human settlement in the rural areas, national parks and game reserves as game conservation, the government has set aside a notable amount of land for the purpose. National Animal Parks totaling to 31,325 square kilometers of land where no human settlement, carrying out any activity like agriculture, hunting and collection of building materials is permitted. Those are restricted areas.

Most of the common game referred to, are such as leopard, lion, buffalo, wildebeest, hippo, elephant, zebra, impala, bushbuck, reed-buck etc.; and these are widely distributed throughout the country.

The freedom of hunting animals every where in Tanzania from when the human-being stated to settle down some 10,000 years age (*Chapter Two – History of Housing Development in Tanzania),* **stopped in 1933 when a** *Convention* **was established and enforcement commenced.**

African fauna generally was protected under the provisions of the London convention of 1933, but a new African Convention was later introduced. This was given local application under the Fauna Conservation Ordinance (Cap 302) which protects the country's fauna.
(*Atlas of Tanzania, Min. of Lands, Settlement and Water Development TZ 1967).*

Four types of game sanctuary have been set aside which provide animals with varying degrees of protection. These are:

(a) *National Parks* **under the control of Public Board**

erengeti National Park

he Serengeti National Park in Mara Region and Shinyanga Region is a vast area of over 14,763 sq.km. with the most spectacular concentration of game found anywhere in the world is the Symbol of Africa's Wildlife. The park is Tanzania's largest National Park. The Park contains all the big five and over 35 other species of game animals and a splendid selection of bird life.

ikumi National Park

ikumi National Park, in Morogoro Region, is the third largest Park in Tanzania, covering 3230 sq.km. (about 2000 sq.km) of a wild infested animals.

ver 300 species of birds including Eurasian migrants are found in this park.

t forms a part of the Selaous ecosystem, the world's largest game reserve. Evidence of a variety of animal species: lion, hippos, elephants, buffaloes, giraffes and gazelles, zebra, antelopes and other animals.

aranginre National Park

he Tarangire National Park, in Arusha Region is famous for its dense wildlife population which is at its most spectacular between June and December.

uring this period thousands of animals migrate from Southern Masailand to the last pool of Tarangire River looking for water.

ake Manyara National Park

ake Manyara National Park, by Lake Manyara in Arusha Region, covers an area of 325 square kilometers. There are five distinct vegetation zones within the park including the ground water forest, the *Maji moto* (hot sulphur spring) at the southern end of the park. The park is famous for its numerous buffalo, elephants and leopards. There are also over 350 species of birds, the most profuse and lovely being the flamingo.

gurdoto National Park

t is farly a small national park in Arusha Region near the boarder of Kilimanjaro Region.

ombe and National Park in Kigoma

he Gombe and NationalPark in Kigoma Region is on the eastern side of Lake Tanganyika a few kilometers north of Kigoma Municipality along the Gombe Stream.

(b) *Game Reserves,* **in which entry is prohibited other than with the approval of the Director of Game. These are found in Regions: Arusha, Kilimanjaro, Singida, Kigoma, Tabora, Mwanza, Mtwara, Morogoro, Mara and Kagera. Selous Game Reserve in Morogoro Region stretching**

s far as in Mtwara and Coast Regions is the largest, unexploited wildlife area in Africa. Through its terrain flows the mighty Rufiji River full of hippos, crocodiles and fish.

(c) *Controlled Areas* **in which there is no restriction on entry and residence, but in which shooting is only permitted on the authority of the Game Division.**

These are distributed all over the country, numbering to well over 38 major controlled areas.

(d) *Partial Game Reserves,* **in which there is no restriction on entry and residence, but in which the shooting of certain species is prohibited.**

The hunting and capture of all animals is only permitted by holders of the appropriate licences or permits.

3.7.4 Fisheries

Fishing is a dependable business among the natives in the coastal areas, lakes and rivers. Natives in the Coast and Lake Zones carry out fishing occupation as their major activity for their income. This has attracted the establishment of many flourishing villages by the sea fronts, lake and rivers.

Area and Extent of Fisheries

Tanzania, fortunately is possessing a variety of its fishery resources. The area of inland waters is 59,052 square kilometers (which is about 6.3 per cent of the total area of the country), and the production of these waters is as high as any country in the world. There are over 10,000 family fish ponds which produce an average of 100 lb (45.35 kg) per acre each year (*Atlas of Tz. Min. of Lands, settlement and water Development).*

In 1965 Tanzania produced 93,127 short tons of fish caught in Lake Victoria, 46,863 (42513.83 kg) landed weight in short ton and having a beach value $ 1,530,902.

Lake Victoria is quite different in character from the other large lakes as it has been formed by a gentle down warping of the earth crust in the plateau between the east and the west areas of the rift valley. Compared with the rift lakes it is quite shallow.

(Atlas of Tz. Min. of Land, Settlement and Water Development)

The fertile land around the lake, fish business transportation and water supply has attracted and made it a source of life of millions of families around it.

UN Habitat)

<u>CONCLUSION:</u>

The Tanzania climate which owes its behaviour, as aforesaid, from the geographical set up of the country, is generally tropical but temperate in highlands. The Central plateau is dry and arid with hot days and cool nights. June to September is the cool season. The "long rains" are from March to May and the "short rains" from October to December. The hottest months are between October and February. In the coast, it rains in November and December and from March to May. Wet in most areas with flood plains, high humidity and lush vegetation.

According to the Building Research Unit (1990) the temperate areas cover a greater variety of house types existing in these areas, although the country's population

might have been distributed squarely with 1/3 in Hot and Dry areas and 1/3 in Temperate areas.

The altitude of the Surveyed Villages vary from almost O (see level) at the Indian Ocean above sea level to the upper levels in the Southern and Northern Highlands.

The geography set up of the country with the presence of mountains, lakes, rivers, rift valley depressions, coastal lowlands, different types of soils as the country's potential asset for agriculture and buildings is endowed. Topographical variations coupled with the associated pleasant climate, and thus a variety of flora and fauna, emerging with vegetation, forests and animals for forest reserves and animal parks (tourism), provides and guarantees positive economy of the Tanzania society essentially manned by rural people; and the assurance of the ample and cheap type of local building materials. All this justifies the need of sure houses in the rural areas towards advancing agriculture, mineral exploitation and farming in general. The topography of the country is having its land rolling from forested mountains in the north and south through the great central plateau of rich brown savannah grass and bush, down to the tropical coastline with ample mangrove poles, reeds and palm leaves (fronds) commonly applied for traditional house construction purposes.

Different types, shapes, layouts and varying styles of materials application, apart from the cultural influence, houses have been dictated by the varying climatic conditions of the country which in turn has been influenced by the geographical set-up: global position, physical, economic and topography of the country.

It has already been found out that almost all zones in the country have circular and rectangular houses dominating the shapes of the traditional houses. The most common house shape is the rectangular house with hipped roof and entrance door on the long side. As per BRU Working Report 68, this house type can be found in high or low proportion in all regions of the country and according to the rough estimates this house type might have covered 40 – 45 per cent of the rural houses in Tanzania. The cone circular shapes of houses are now getting absolete in most areas despite of their economic heat-storage ability in cold areas of the highlands, and their steep roofs which provide good rain protection.

Most of the traditional houses in the cold areas of the highlands are climatically well suited to its local conditions rendering new houses being inferior to the traditional houses, as far as their climatic performance and social suitability are concerned.

The development of design type of houses which are adapted to local climatic conditions can, therefore, be looked at in three divisions: temperate, hot and humid, and dry areas. As more climatic and research information is now noted to be available than during pre-independence days, designs for better living conditions are expected than before. Houses will be healthier, perform better technically, last longer and will require less maintenance and repairs if they are designed with the effects of local climate in mind.

The next Chapter – *Chapter Four* **– will address and present the** *Local Building Materials,* **discussing their availability, their use in the building industry, shortfalls, limitations, suggestion of improvement and handling and their production.**

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CHAPTER FOUR

4.0 LOCAL BUILDING MATERIALS

4.1 AVAILABILITY AND USE OF TRADITIONAL BUILDING MATERIALS.

4.1.1 Introduction

From the time immemorial, man has moulded his habitat using locally available materials. Based on levels of locally invented technology at the time, type of materials available, and social/cultural parameters, different cultures the world over, developed their own specific art of moulding their habitats to suit. In those days and to-date, each developer was/is in Tanzania was the architect, engineer and builder of his shelter to solve the problem of his habitat with obvious attention to rain, sun, wind and against attack by animals predator's and human enemies. And this ended up having all the houses/huts in cultural group look alike with an apparent importance of aesthetics. The traditional mould/house or architecture of a given community is an architecture that has evolved over a period of time and has been handed over to generation and generation with modifications here and there dictated by the improvement of technology, weather and habitat understanding.

Tanzania is notably rich in natural resources which can be used as building materials. Some of these natural materials can be used as permanent building materials, others will need some processing to improve their quality before they are used and others may be used unprocessed as temporary materials.

4.*1.2 Traditional Building Materials and Extent of their Use*

Traditional materials are those that have been handed down from generation to generation within the context of customs and availability. They are readily available

for use with respect to specific locations and they may undergo modifications and sometimes extinction. They are commonly used in rural areas throughout Tanzania covering earth, poles, bamboo, sticks, grass, palm leaves and banana leaves and timber backs.

The major building materials are those used for building foundations, floors, walls, roofs and shutters in houses and those used for building infrastructure, such as water and electricity supply and roads.

Traditionally, Tanzania developed around the architecture of mud, pole and thatch. A good number of houses constructed by traditional materials still exist both in urban, to a lesser extent, and rural areas.

While housing problems in urban areas are centred around the availability of decent and affordable housing, in rural areas the problem is associated with quality whose solution require availability of building materials coupled with technology which is the systematic application of knowledge/science to practical tasks in the system, know-how in production of materials and converting them into a building.

The importance of building materials in all types of construction is very great, especially when considering that in Tanzania, materials account for as much as 60 per cent of the total costs of construction of domestic buildings

(National Construction Council).

Traditional building materials used in the rural areas for traditional houses are the same materials used in constructing old prestigious buildings in various countries all over the world. Despite of the lack of research and minimal understanding on the behaviour and treatment of the materials at the time, the structures are still in position up to to-day.

Unbaked earth has been used for thousands of years, not only in rural housing, but also for the prestigious monuments that reflect the main material and spiritual developments of communities – warehouses and aqueducts, ziggarats and pyramids, monasteries, churches and mosques.

In the 7th Century BC, the famous Tower of Babel was built by earth, its seventh level teetering at 90m – mankinds first skyscraper. The Great wall of China of which large parts are unbaked earth, has managed to survive since the 3rd Century BC and testifies to enduring strength of the materials.

(Arch. T. Almedia – Lecture)

Natural soil without additives is in wide spread use as a building material throughout the tropics and its history dates back from earliest times. The earliest reference, however, possibly dates back to Pliny who recorded in A.D. 67, the existance of soil-built watch towers built by Hannibal, the famous Carthaginian general, almost 300 year before.

There are many buildings, some of which are quite famous in all climates throughout the world. This tradition has been well maintained in a number of cities of Africa and the middle east: Kano, a town in Northern Nigeria, is one of the striking testimony of this (*more submission at Chapter Two),* **Agadaz in Niger, Timouctou in Mali, Qualata in Mauritania, Marakesh in Morocco, Adrar in Algeria, Ghadames in Libya, Sadah in North Yemen, Shibam in South Yemen and Yazd in Iran.**

(a) *Soil*

Soil has ever been and is doubtlessly, one of the principal traditional building material for the rural houses in Tanzania. Extensively, all the major elements of a rural house – floor, walls, roof in various regions in Tanzania, have utilized soil for the purpose.

Soil for house building purposes in Tanzania is obtained almost everywhere in Tanzania, more so in the plateaus and raised uplands. It is not every type of soil that is suitable for the purpose. For example Soil containing much clay, say, over 25 per cent, can be difficult to stabilize, and unclean soil containing organic matter will not make good walling. Soil containing large amounts of silt and clay show marked changes when their moisture content is varied and this property is not favourable to building soils.

Any soil possessing plasticity can be made into a brick. Soil containing a high proportion of clay may have to be mixed with non plastic material, e.g. sand, to reduce the contraction on drying to avoid cracking. Generally, it can be said that the best soil for making burnt clay bricks is a soil containing four parts of clay and one part of sand. Not all regions in Tanzania have suitable clay for burnt bricks. Where sand is not available underburnt bricks may be crushed and mixed into the soil.

Roughly, it can be said that the properties of a soil suitable for making bricks are:

Clay content	**…….**	**15 to 30 per cent**
Silt content	**…….**	**20 to 65 per cent**
Liquid Limit	**…….**	**25 to 40 per cent**
Plasticity	**…….**	**7 to 15 per cent**

(Clay Bricks – NH & BRU, T.I. Svare)

Mixing up the soil is done by removing the top soil of the land (vegetable soil) about 150mm deep, and the subsoil dug up with a hoe, a study hand tool which serves also as a pick and a shovel. Water is added to the loose soil which is then kneaded.

For good – quality work, for house building purposes, the soil should be sieved through 3/16 inches (4.76mm) wire-mesh sieve, any material over this size being rejected.

There are thousands of earth buildings both in dry regions, such as Spain and Italy and in rainy countries like England, Germany, Denmark and Sweden. In France, at least 15 per cent of rural buildings are still made of raw earth.

In ancient times, unbaked earth was widely used in Mesopotamia and Egypt, while later on, Romans and then Muslims built in earth and Europe, Africa and Middle East - as did the people of the Indus civilizations, Buddist monks and Chines emperors. During the middle ages, construction in an unbaked earth was practiced not only in Europe, but in North America by the Indus, in Mexico by the Toltecs and the Aztecs and in the Andes by the Mochica. The Spanish conquerors of America took with them European techniques of earth architecture and grafted them onto traditions already established there.

In Africa, the art of unburnt earth was mastered in cultures as diverse as those of the Berbers, the Dogons, the Ashant, the Bamilikes of the Haoussas in the Kingdoms of Ife and Dahomy and in the empires of Ghana and Mali.

Ever since mankind first congrageted in villages about 10,000 years ago, unbaked earth has been one of the principal building materials used in every continent. Over one third of the world's population still lives in earth houses to-day. *(Arch. T. Almeida's Lecture).*

It is not only the World's decision – makers who appreciated the architectural qualities of unbaked earth, because the majority of earth buildings have been and still are, residential houses. These buildings come in a surprising variety of forms, each indicative of the cultural characteristics of their builders. All over the world from Scandnavia to South Africa, earth constructions have been adapted to suit the most diverse types of climate.

Earth architecture becomes even more affordable because it encourages an individual to be his own client, his best own architect and his best own builder. Earth architecture, moreover, also allows for the expression of one's own individuality and talents, including art.

The Father of the Nation **(First President of the State), the late Mwalimu Julius Kambarage Nyerere had this to say concerning earth house: "People refuse to build a house of burnt bricks and tiles, they insist on using corrugated iron sheets and cement. If we want progress more rapidly we must overcome some of these mental blocks." This was the position in 1970's when he made the statement.**

Soil Stabilization

Most of the brown-reddish lateritic soils in Tanzania are suitable for stabilization. However, other soils can also be stabilized but not as effectively as laterite. Soil for cement stabilization is available in almost all regions in Tanzania.

With the use of additives, chiefly Portland cement and bitumen, the use of soil is becoming more widespread.

The main weakness of the soil-made bricks lies in their low resistance to water. Walls constructed of such products have been described to need "a good hat and boots" to survive. Overhanging eaves and verandah help considerably but tropical driving rain of any intensity can damage unprotected walls.

Soil when mixed with cement, lime and/or bitumen, has greatly increased strength and weathering properties, particularly if properly graded under supervision. The addition of the correct amount of water for mixing is also important; if these conditions are observed, walls of excellent durability can be built. Soil-cement walling is also used in areas where suitable sand is not available or where transport costs are high as is the case in many parts of the rural areas in Tanzania.

While the application of bricks for the urban houses is staggering it can be said that its use in rural areas ranges high in featuring as a conventional materials.

Clay Bricks

The preparation of bricks demands that they should be "free from soluble salutes" or that the "soluble salt content" should be limited to some definate amount. The first of these alternatives would mean that no clay bricks at all could be used, and the second, unfortunately, would not help either because the total proportion of soluble salts present bears no general relation to freedom from efflorescence and decay. It would be necessary to find the appropriate limit of every particular type of brick throughout the country.

Any reliable opinion as to the durability and freedom from efflorescence troubles of bricks can be formed from the results of a comprehensive series of test consisting

of chemical analyses of water – soluble constituents, efflorescence tests and tests of resistance to disruption of crystallization of salts. For an important building an investigation of this kind might be considered by some to be justifiable precaution.

Failing other means, the architect or builder is thrown back on the age-old practice of observing for himself whether the material he proposes to use is satisfactory. He can inspect buildings in the district where the particular brick he proposes to use have been employed.

Early settlers in Tanzania including missionaries put up schools, churches and community centres using *adobe* **(unburnt sub-dried bricks) and clay burnt bricks of which are still in use to-day. Despite this, natural soil in most developing countries is considered a lowly material whose use is confined to low-cost building largely in villages.**

(b) *TIMBER*

Introduction

Traditionally, wood or timber has been used for various purposes in Tanzania as long as man has been making tools and weapons and any sort of dwellings. Through the ages certain patterns for wood utilization have been established. They are based upon the knowledge gathered through generations and making use of some of the mere well known and common indigenous species.

As time has been passing by, this has gradually been changing due to several reasons. One of these is the increase in population, which puts new demands on forest land, forests and timber utilization. Extensive harvesting of some of the most common species threaten to deplete them, or at least remarkably decrease their economic potential *(Ref. Chapter Two – History of Housing Dev. In Tanzania, and Chapter Three – paragraph 4.7, Flora and Fauna)***. To balance this is the oncoming production on softwood from man-made forests.**

Timber found in the country have their species falling into four groups as Timber Species of East Africa. These fall into four groups: indigenous and exotic, each divided into Broad leaved (or hardwood) species and Conifer (or softwood) species. *(P.A. Campbell).*

Indigenous Broad leaved species

These comprise the majority of the species and occur over the whole of East Africa. This group includes such species Mvule, E.A. Camphor, African Mahogany, Muninga and may others most of which are more used for joinery than

building. These timbers occur in natural forests though there are a few plantations.

Indigenous Conifers

The two species found in the country, Pado and Cedar, are declining in importance in Tanzania. Both grow on the slopes of the higher mountains mainly in Northern part of the country and neighbouring Kenya. Cedar timber is not common in large sizes while Podo is still available.

Exotic Broad leaved species

The main species are ubiquitous Saligna gum and Grevillea from Australia. Other Eucalyptus are also grown in plantations and there is some Teak in Tanzania. The Eucalyptus have mainly been used for poles and not great deal in converted form in construction though there is no reason why this should not be done.

Exotic Conofers

These include Cypress and Pine growing quite extensively in the highlands of the country whose timber's main purpose is for building construction.

Naming of Timber Species

Indigenous timber is by several vernacular names in addition to trade names and botanical names. These are commonly used than the given "Standard" names.

Timber **is a term used to denote a piece of wood converted from logs by sawing them up into convenient sizes, and can be classified broadly into two categories – hardwoods and softwoods.**

"hardwood" means timber from trees belong to the botanical group, the Angiosperms, also "broad leaved" "softwood" means the timber from trees belong to the botanical group, the Gymnosperms, also "conifers" which have needlelike leaves and are usually found in temperate zones.

Both "hardwood: and "softwood" timbers are abundantly found in Tanzania and locally used for construction of houses, furniture and other domestic tools, all over the country. Rural people use the logs indiscrimately for house construction purposes. Much of the timber harvested in the country from the government reserved forests are exported.

Description of Timber

There are different types/species of timber with two major divisions of "softwood" and "hardwood" varying in density, durability, strength and resistance from pests and insects and weather attack.

Logging and Conversion

The normal maximum length of sawn timber is determined by the handling ability, which is about 6

meters (20 feet) long. Longer lengths may be obtained with some difficulty and should be avoided due to their higher lengths may be obtained with some difficulty and should be avoided due to their higher cost than the normal lengths and usually not ready produced.

The normal maximum width is 300mm (12 inches). Widths greater than this are usually not produced due to lack of demand and restrictions imposed by the size of the log. While the above leads the developer to ordering of timber for construction purposes proper description of the requirements to suit the purpose ought to be made; covering type of timber, sectional measurement and lengths. Smallest sectional measurements are 50mm x 100mm (2 in x 4 in) and 38mm x 150mm ($1^1/_2$ in x 6 in).

As for the lengths requirements, it is to be noted that pit-sawn timber usually is not longer than 3600mm (12 feet) and that few sawmills are able to deliver timber exceeding 5700mm (19 feet). Description can thus be:

50 x 100 x 2000	**(2" x 4"x 10'- 0")**
38 x 150 x 4800	**($1^1/_2$ in x 6' – 0")**

Degree of processing:

For the time being, sawn timber is the only variety readily available in the market. It is expected that in future, planed timber for joinery purposes should also be available.

Most timber so far is not seasoned. Sawmills should however be encouraged to produce seasoned timber and that should be considered as a degree of processing. Seasoned in this connection should mean an average moisture content not exceeding 20 per cent at the time of delivery.

Grading and Grading Rules

The main objective with grading of timber is to facilitate the allocation of various qualities or timber to different end uses. Normally, when grading is practised, timber is graded into three or more quality groups. The existing grading rules are compiled mainly to satisfy the export trade: "The export and grading of timber rules 1969". These rules do only apply to the end use of the timber. In certain cases it may be needed to further specify the quality requirements due to the end use category. The grading rules prescribe that graded timber should be "shipping dry". They distinguish between hardwood and softwood grading.

Grade or quality is chosen to suit the end-use, requirements of strength or appearance. Awaiting the implementation of appropriate grading rules specifyer has to

state explicit for what end-use the timber is needed. As a means of doing this could the following terms be used:-

Construction timber:

This may have two functions. One for exposed work where appearance is important and certain defects on exposed surfaces should be limited. The other one is for general constructions such as nogging studding in single-storey buildings etc. where stresses are very low and appearance not important. A general rule should be not to specify clear timber that is, timber free from visible defects and imperfections, unless it is found necessary. A somewhat knotty piece, could for instance, for have an appearance value and be accepted provided the knots do not unduly affect other properties. Constructional timber are the same species as for the structural timber, as below. The grade may, however, be lower if appearance permits. Most of the present traditional houses use poles more than timber avoiding timber preparation costs.

Structural timber

A structural timber softwoods are more and more widely used trusses, purlins and other load bearing members; pine, cypress, podo, (cedar). But also hardwoods as mtundu, mtambara, adina, afzelia and grevillea are possible choices. Locally various other hardwoods are marketed, often under the common name of "mixed hardwoods". The appearance of these may or may not be important. Strength and straightness, however, are the first consideration.

Joinery and furniture timber

For high-class joinery mninga, mahogany, mvule and camphor are most widely used for joinery and furniture production. Lesser known timber, but quite suitable, are mfimbo, afzelia, ficalhoa, loliondo (*BRU Techn. Pamphlet No.4)***. The general requirement is clear, straight timber with no defects. The rural people have used this as axe handles, hoe handles and for pangas.**

Flooring timber

Fairly large numbers of timber found in Tanzania is suitable for flooring. These are listed in detail in "Commercial Timber of Tanzania". Out of this, some of the possible choices are: adina, afzelia, afrormosia, ficalhoa, mahogany, camphor, loliondo, msaraka.

Species

The number of species available for different purposes are varying with different regions. For most common building purposes, softwoods are the cheapest choice, whereas the high class joinery, and specific uses more specific expensive hardwoods would be needed. It should be noted that many species are

interchangable with each other and do not unnecessarily overspecify. For the purpose of rural use/house, what is available in a given locality commands the choice over the choice of species.

Lesser – known species

Some of the above mentioned species are so-called "lesser-known" but have been included for the builders choice, on anticipation that scarcity, in some areas, of some of the most searched for indigenous species can be chosen as substitutes. These might be as good as the species they replace, more so for the construction of rural

houses. When chosen, utilized and satisfactorily performed its work, will encourage the marketing them and making possible a better use of the natural resources that forests represent in the country.

Timber Poles

Timber poles have been and are still being used as building materials in Tanzania both in rural and urban areas. They are readily available, but there have been restrictions on use of natural trees because of rapid deforestation resulting from their massive harvesting; and has been the major rural house construction component ever since the traditional rural houses started to emerge in the country. Timber has come into use at a later date as part of technology, and due to cost and preparation technicalities involved only a few who can afford it.

Untreated poles, as commonly used by the rural people for the houses, should be used with caution selecting those which are resistant (especially powder post) above ground. It is possible to use a cheap *sape replacement* **method** *(as explained under Timber Preservative)* **of treating many species of poles on site.**

Different trees for construction purposes are available all over Tanzania and they range from hardwood to softwood. Hardwood is mostly used for joinery work such as doors, window and fixtures while softwood, mostly treated, is used for structural purposes.

Untreated softwood is commonly used for temporary structures in urban areas. Despite the restrictions imposed on the harvesting of the trees (submitted at *Chapter Two – Flora and Fauna – Contribution to Housing Development – 4.72 Forest Reserves,* **of this dissertation) they are still being used as materials for walls and roofing in rural areas and in unplanned urban areas.**

Although there is no published information, from some research, it is known that many of the broad leaves species, the sapwood is susceptible to attack by powder post. Testing of this can have information requested from the local Utilisation Officer.

Traditionally insect resistant poles were being used for building. Through constant use, without re-planting, these special species are getting depleted. There is a need to have special programmes through MGOs and CBOs to plant forests with the species nearing depletion as to have enough stock that can be used for long lasting construction.

Campaigns through schools, public meetings and religious congregations should be emphasized so as to conserve the indigenous building trees. Local by-laws regulating the use of the local resources should be enforced, if any, or legislated.

Splitting

Lack of realisation of the importance of seasoning by the rural population, poles will generally be used green or perhaps partially seasoned and there will often be a tendency for the ends to split. This arises from the ends drying out before the adjacent portion, shrinking and then splitting. This is sometimes accentuated by growth stresses in the log and these may cause the split to open up. Splitting can be reduced by end coating the log with bitumen and after a few months replacing this with wax. The wax is less effective but looks better. The ends of the log can be bound with hoop iron.

At times bolts are used to support pole beams to prevent danger of splitting. Stitch bolts either side of the main bolt may be employed.

Strength of pole

Poles are inherently stronger than sawn timber as there is a strengthening around knots which do not, therefore, reduce the strength of the pole. It follows that poles should not be trimmed of protuberances adjacent to branches if the full strength is to be employed.

Mangrove Poles for Building

It is said about eight species of "mangroves" exist in the coastal areas. Two of these are provided with specifications for building purposes, while the others are either uncommon, non-durable above ground, or of poor form, and hence no commitment can be given to their specification as no tests have been carried out on their durability, strength or other properties of any of the mangroves.

Mkoko **(Rhizophera mucronata) and** *Mkandaa* **(Ceriops tagal) are the two species suggested for building purposes. Mkoko produces the best poles, most common and occurring occasionaly up to 300mm (12 in) in order. It is estimated to last about ten years in roofs. Mkandaa has a maximum butt diameter of about 125mm (5 in) and is more durable than mkoko in roofs.**

Poles are divided and used in a house construction as follows:

Fito - **These are poles measuring 1 in – 1.4 in (2.54cm – 3.556cm) butt diameter**
They are commonly used in house construction by fixing them horizontally on the wall to bress up the upright poles.

Pau - **They measure (1.5 in – 1.9 in (3.81cm – 7.366cm) butt diameter**
These are fixed on top of the roof on the rafters acting as purlins onto which roof covering materials, like thatch is placed.

Mazio - **They measure 3.0in – 4.0in (7.62-10.16cm) Butt diameter.**

Boriti - **They measure 4.5in – 5.4in (11.43cm – 13.71cm) Butt diameter**
These are posts commonly used for roofing, framing of doors and windows.

Nguzo 1 - **(Pillar or Post) – 5.5in – 6.4in (13.97cm – 16.256cm)**

Nguzo 2 - **(Pillar or Post) – 6.5in – 7.9in (16.51cm – 20cm)**

Nguzo 3 - **(Pillar or Post) – 8in (20.32cm)**
These act as structural columns for house support purposes.

Table 4.1: Timber Species, Location, Uses and Availability

NAME	ING REGIONS	USES	ILITY ARS)
		ng construction	50
			50
			50
	ds		50 20
			50 15
		ng construction	20
		ng construction	15 8
			8
		ng construction	15 8
			15 8
	ain		20 15

NAME	ING REGIONS	USES	ILITY ARS)
			15 8
			20

			8
eak bloodwood)	oodlands		20 15
	(Iringa)	ng Construction	15 8
		ng Construction	20 15
	nd	ng Construction	15 8
			50 20
			50 20
		ng Construction	8
			8

Techn. Pamphlet No. 4 – Nils Lundborg.

BAMBOO

Bamboo is another building material which is all things to some men and somethings to all men. Bamboo is like a man in a high position and of excellent character. A man like this is capable of bowing down like a bamboo – the taller it grows the lower it can bow down (Javanese Saying). This behaviour it has rendered the material resilient to wind even earthquake (if correct detailing is given) and readily repairable in the event of damage.

A village can be set up in hours using modular bamboo houses (TRADA Technology Limited).

In Karnataka's Dharward district, a bamboo forest towers 70 feet into the sky, on soil whose depth is only one meter over the bedrock of the Deccan Plateau.

The wonders of bamboo never fail to amaze. It is the fastest growing grass on earth, growing up an average of 3 to 16 inches a day. It grows three times faster than eucalyptus, and can be harvested four times as often.

It yields six times more cellulose than the fast growing pine tree. In a life span of 35 years, a bamboo plant can produce up to 15km of usable poles. The emerging culms or shoots of certain species are edible too (In Iringa Region bamboo can be used to prepare the most favoured local brew in the region called "*Ulanzi").*

Bamboo also restores fertility in soil. Its ability to grow in wide variety of soils from marginal to semi-arid, make it perfect for rehabilitation.

It is a great generator of biomass as well. Therefore it is appropriately called the most suitable alternative to timber, a source that is fast depleting.
(SUNDAY OBSERVER – 28/03/2004)

Bamboo has a long and well established tradition as a building material throughout the world's tropical and sub-tropical regions. It is widely used for many forms of construction, in particular for housing in rural areas. Bamboo is a renewable and versatile resource, characterised by high strength and low weight and is easily worked using simple tools together with the advantages of being used without processing or finishing.

Important considerations which currently limit the use of bamboo as a universally applicable construction materials are:

•*Durability:* **It can be attacked by fungi and insects. Unless treated a bamboo structure cannot go beyond five years.**

•*Jointing:* **Structural efficiency of bamboo is low.**
(Herbert et al. 1979)

•*Flammability:* **Bamboo is inflammable, and costly treatment against fire attack.**

•**There is no design** *guidance and codification* **of bamboo.**

Stone

Natural stones are available in most parts of the country. Igneous metarmorphic and sedimentary rocks have been cut and used for building from time immemorial.

In addition to clay, stone has been one of the man's earliest natural building material and one of the great endurance and beauty. The pyramids of Egypt were built with cut stones around 2500 B.C. Cut stones of incredible size have been Incas to built temples, palaces and fortress walls, floors and roads in Cuzco, Peru more than 500 years ago, many of which still stand firm to-day. During the Germany rule in Tanzania (known as Tanganyika then) starting around 1880 when it was a German Protectorate most of its districts and regional headquarters buildings in the mainland were built of stones bonded with lime as mortar and many of them are still in position to-date, e.g.

Dar-Es-Salaam Ocean Hospital, and Zanzibar Stone Town. This assures us the viability, reliability, availability, suitability and strength of stone when used as a building material.

Sand

Sand is a fine aggregate, resulting from the natural disintegration of rock. Natural sand is available in most parts of the country and mostly obtained from the sea or from natural river beds.

Course, clean sand suitable for concrete is available in limited quantities throughout most of the country, particularly in the water-course in granitic areas.

The requirement of sand for plastering is for it to be reasonably free from loam or vegetable matter, clay, or saline matter. Frequently, however, plasters or masons (who are often one and the same) have to use whatever sand is available.

There are some simple tests for checking impurities in sand. One is to rub a sample, between the hands or a white cloth and note whether it leaves a stain. Another test for clay or soil is to rub a portion of sand between the fingers to see whether it forms into a ball. A simple test for determining impurities of silt is to put some sand in a tin or jar, preferably with a lid, cover it with water to several inches, shake vigorously and allow to settle. Should a thick coating of scum form after settling then the sand should either be washed clean or rejected. Washing sand will also help to remove salt. Salt tends to create efflorescence, an unsightly crystalline deposit on the finished work which frequently reappears after brushing off.

(e) *Limestone*

Limestone is widely distributed in Tanzania to the extent that it is available in every region. As a building material, limestone can be used as a building stone after being quarried, after processing it can be used as mortar, plaster material, white wash and for soil stabilisation.

(f) *Marble*

There are good deposits of marble in Mbeya region. Marble is quarried and processed to construction marble of high quality compared to some of the imported marble.

(g) *Gypsum*

Gysum is available in some parts of Tanzania, but it has not been used as a building material except in the manufacture of cement. Gypsum can be used as a plaster material (stucco), manufacture of plasterboard, manufacture of building blocks and as bedding screed for floor tiles.

The available source of gypsum in Tanzania, according to some records shows that extensive mining operations are not economical as deposits have little or no over-burden and are small in quantities.

However, the available source can be utilized for the internal market on small scale production.

(h) *Pumice and Volcanic Ash*

In Arusha (Arusha Region) and Rungwe District (Mbeya Region), limestone and pozzolana are available. A mix of lime and pozzolana is as good as ordinary Portland cement. This can be used as a binder, as well as for making blocks and plastering. This makes it possible to save on cement use and thus save costs.

(i) *Sisal*

Sisal is a plant originally from Yucatan, Mexico. It is called "sosquil" and 'green gold'. It is the coarest vegetable "hard" fibre. In 1890's sisal was introduced to East Africa as a crop suitable for extreme hot and dry conditions. The majority of the sisal production now takes place in Tanzania.

After a difficult start, production prospered and by the 1960's Tanzania production alone totalled some 230,000 tonnes. Other countries involved in sisal production include Kenya, Mexico and Haiti.

The East African sisal plant originated in the Yucatan, Mexico (and received its name from the first port of export and arrived in what is now Tanzania via Hamburg in 1893.

Production in 2003 was approximately 22,000 tons per annum in Tanzania, 22,000 tons in Kenya and 8,000 tons in Madagascar. There is also production in Southern China of around 40,000 tons (very largely for domestic consumption) and smaller quantities in South Africa, Mozambique, Haiti, Venezuela and Cuba.

End products of sisal are such as carpets, wire rope cores, dartboards, specially pulps, plaster reinforcement and handicrafts.

The sisal plant has a 7 – 10 year life-span (longer in Mexico where growth is slower) and is usually cut first after 2 – 3 years and then
at 6 – 12 month intervals. A Typical plant will produce 200 – 250 commercially usable leaves in its lifetime (hybrid varieties up to 400 – 450 leaves) and each leaf contains an average of around fibres.

In Tanzania where sisal is produced on an estate basis, the leaves are in the main transported to a central decortication plant after which the fibre is dried, brushed and baled – for export or for use in the domestic mills.

Apart from ropes, twines and general cordage sisal is used in both low-cost and specially paper, dart boards, buffing cloth, filters, geotextiles, mattresses, carpets and wall coverings, handcrafts, wire rope cores and macrame. And also, in recent years sisal has been utilised as a strengthening agent to replace asbestos and fibreglass and is increasingly a component used in the automobile industry, where its strength, "naturalness" and environmentally friendly characteristics are greatly appreciated.

Sisal Reinforced Roofing Sheets

Sisal is not a very common traditional building materials in Tanzania. It could be because of not being an original species (plant) in the country. But its straight poles, which are not produced abundantly,are used as house walling poles and rafters.

The production techniques of sisal reinforced roofing sheets and ridge tiles as an experimental technology, has been newly started in Tanzania by the Building Research Unit (BRU). It uses locally available skills and materials as much as possible and a lot of adjustments have to be made to suit the local conditions. Modifications have been incorporated to suit local circumstances and experience gained during the construction of Demonstration Houses in Morogoro Sisal Authority (1978) Kabuku, Tanga (1979) and Capital Development Authority (CDA) – Dodoma (1981).

The first part of this research by BRU started in 1978 and it is still going on. The main aim of the project is to find a proper roofing material for developing countries, concentrating on the basic production and application techniques for the roofing products that have been carried out so far.

Materials

The materials needed for the production of sisal reinforced roofing sheets are Ordinary Portland *Cement* **to make high strength concrete which is mixed with** *sand, sisal fibre* **and** *water.* **The** *sand* **should be sharp grained and fine enough to pass through a 2mm (preferably 1.14mm) sieve.**

Sisal Fibre **chopped, 2cm long which are mixed in the mortar first with length fibre covering the full length, and width of the flat mould which are laid between two layers of 5mm thick sheet.**

Water **used should be the drinking water which is free from salt contamination is normally suitable.**

The main *equipment* **needed for the production of sisal reinforced roofing sheets are simple tools which can be found in most of hardware stores. The necessary tools such as masonry tools (shovels, steal floats and trowels) plastic sheets, a scale or bucket of known volume moulds and frame of 5mm thickness and 90 x 100cm internal dimension.**

Curing

Once the Sisal Reinforced Roofing sheets are moulded are carefully taken to the curing place where they are made to stand on their edges and arranged against the other sheets and then covered with either plastic sheets or wet sisal bags for seven days. The sheets are then cured for another seven days before they are put to use on the roof.

The sisal sheets and ridge tiles are likely to be heavier and have less tensile strength but greater impact resistance than asbestos beets whose products are similar in appearance to finished sisal sheets and ridge tiles and differing in several properties and have to be treated differently.

Sisal sheets and ridge tiles cannot hold a man working on the roof. It is therefore recommended that ladders and boards should always be used as protection during the construction work.

Advantages of the Mixture

Mixing of sisal fibres into a cement – sand mortar has several advantages which are dependant of the properties of the sisal fibre used.

-They make the mortar cohesive in its set state which enable to produce thin profiled sheets of materials using trowelling techniques, the thin sheet can be shaped or profiled without splitting at the corrugating stage of the sheet making process.

-As they are sufficiently strong and do bond securely into the mortar, they greatly reduce the development of hair-like cracks which occur during drying and shrinking when the cement mortar sets. This makes the sheets to have considerable tensile strength and can support a suspended load.

Some of the fibre have the capacity of providing the concrete sheets to resist impact forces. These fibres do not contribute to the tensile strength of the mortar except the prevention of cracks during cement mortar getting which allows the sheets to develop full strength when good quality cement is used. Good impact resistance must be considered particularly important during the early life of the sisal sheets. This enables them to withstand the process of handling on the building site and fixing them onto the roof. Sisal fibres (from tests) have been found to be one of the common natural fibres traditionally used for making ropes which can provide excellent reinforcement against the impacts and stresses especially during transporting, handling and fixing sheets on the roof, where there are most likely to get damaged. The long term tests on durability of the impact resistance are still in progress.

Since the sheets are made up of 98% strong concrete that means it will have the same durability as concrete provided good quality concreting materials are used. If there is any loss of fibre strength due to alkali attack or biological degradation, the roof sheets should be able to retain their form and most of their tensile strength but will become more brittle and prone to fracture from severe impact such as a body falling on them.

TIMBER DEFECTS, SEASONING AND PRESERVATION

Defects of Timber
The main causes of deterioration in timber are:

•Decay – This is caused by fungi.
•Attack by insects and termites.
•Weathering which is due to changes in climatic conditions.

(a) *Decay*

The commonest forms of decay are wet rot and dry rot. Dry rot is not as wide spread in the tropics and as in temperate climates due to the more open type of construction which permits air flow around the wood. It does however, occur in damp unventilated positions where the moisture content rises about 20 per cent. Much damage diagonised as dry rot is in fact often caused by termites.

Dry rot: **This thrives in damp, unventilated or low-lying buildings. Watered plants and wood floor or untreated fixing battens in concrete can also cause trouble. The cure is to cut away affected timber, renew, treat with preservative and ventilated area.** *Wet rot:* **This is due solely to the presence of moisture in permanently damp situations – cellars, or the vicinity of external stand pipes, leaking tanks, etc. The cure is to remove decayed timber, treat the remainder with preservative and eliminate the damp.**

(b) *Attack:*

There are a number of types of borer which attack tropical woods. The main species are the Pinhole Borer and the Lyctus or Powder Post Beetle. The Pinhole Borer attacks newly-felled logs and sometimes standing trees. This attack can occur within a few hours of felling. The beetles do not normally continue to operate a seasoned timber. The Lyctus or Powder Post Bettle attacks seasoned tropical hardwoods – particularly those which contain starch on which the larvae feed. Timber is sometimes sprayed in the timber yard to protect it until it is transported, although this is not always done.

Termites: **Termites are normally of two kinds, the drywood type which is able to fly, and the subterranean types. The types usually operate under cover and it is only after the first signs of damage have appeared that its full extent is realized. It is usual for flying termites to enter the end grain of untreated timber to build up a colony from inside, finally devouring all the interior wood, and leaving only a thin skin of wood.**

(c) *Weathering*

This is the disintergration of wood caused by alternate shrinkage and swelling due to rain, rapid change of temperature, humidity and action of sunlight. Weathering can be prevented by painting.

Shrinkage and Swelling

When sound performance of timber in a house construction or when used for any joinery purpose its moisture content ought to be controlled. The moisture content (MC) is the quantity of water as a percentage of the dry weight of timber and is measured as percentage shrinkage of timber occurs when moisture in its fibres is reduced or removed, while swelling of timber is the reverse of shrinkage.

Shrinkage from a wet green state (about 30 percent MC) to a dry state (oven dry at O per cent) i.e. the maximum shrinkage which can occur, is varying with different species

(BRU, Tech. Pamphlet No. 4).

Immediately after felling a tree, its wood starts drying. If timber is stored or kept in air with a certain temperature and a certain relative humidity, the moisture content adjusts to a state of equilibrium somewhere between O per cent and 39 per cent. That equilibrium is corresponding to the relative humidity of the air and the temperature,. This is equilibrium moisture content (EMC) and might differ slightly between different species.

When timber gets drier than about 30 per cent MC (that is the fibre saturation point) it starts to shrink.

Generally, Equilibrium Moisture Content (EMC) is reported as an average for all timber and confined to a certain region or area; and three main types of such areas are distinguished.

-EMC of the inland Savannah Areas in Tanzania is 6 – 8 per cent. This is mainly on the "Plateau".

-The higher rainfall highland EMC is 8 – 15 per cent – on the "Uplands and Highlands".

-The Coastal and Lake Zone with an EMC greater than 15 per cent – on the Coastal Tropical". "Intermediate Tropical" and "Lake Victoria".

It is important to note that technical characteristics of timber are affected by the moisture content and generally the characteristics are improved the drier the timber is. How much timber shrinks and swells in practice at changes in the air humidity and temperature, depends on how fast and durable these changes are and also of the size of the timber.

4.2.2 *Timber Seasoning and Storage*

(a) *Seasoning*

Seasoning of timber consists of drying it to a known moisture content which is necessary to prevent warping and cracking. The moisture content is the weight of water in wood expressed as a percentage of its borne-dry weight.

There are two methods of seasoning, by air and kiln. Frequently both are used, kiln-following air seasoning. Air seasoning is carried out by stacking green timber flat in layers at 0.3m to 0.5m above ground level, to allow free access of air between each piece. About 3cm. space should be left all round. Stacking area should be free from weeds and grass, the ground being poisoned first if possible.

The seasoning time varies according to the locality, humidity and time of the year.

The seasoning time may be speeded up by placing partly air-seasoned timber. For a successful operation, however, the initial seasoning must be slow and gradual.

(b) *Storage*

Usually much timber delivered to site, is partially seasoned, if at all. It is advised therefore, that timber should be stacked flat and self-crossed, i.e. each layer placed at right angles to the one beneath. Such timber should be kept off the ground and protected as described under *seasoning*, **from rain and sun, particularly strong rays of sunlight.**

The *timber poles* **or stacks should be roofed or provided with a tarpauline cover or similar so as to clear of the stack; it can be harmful if it stops air circulation. The timber should always be stacked flat to prevent warping. Warped should not be wasted but can be selected for cutting into short lengths.**

4.2.3 *Timber Preservation*

(a) *Preservatives*

Timber may be protected to some extent from both fungi and termites by use of preservatives. There are many kinds of preservatives, the most widely used is the *creosote.* **Pests but, being moisture-proof, is very useful for timber below ground or in damp positions. Creosoted timber, however, cannot be painted and doubtful its availability due to its high cost, bulky to transport more so for rural use and not being manufactured locally.**

Some of the hardwoods in Tanzania are not resistant to tropical conditions although they are locally grown. As such, certain species will need replacement from its house service after as little as 3 years, if left untreated, or not provided

with some preservatives, and fully exposed. Such defects can prove positively dangerous, especially when used for such purposes as handrails and staircases. The traditional rural houses experience of failure advocates to the collapse of roofs, walls and partitions particularly during heavy rains and strong winds. As such, some measures ought to be taken to promote their durability and fatigue reduction of frequent materials replacement.

Tanzania being in the tropical climate, biological attack in its timber cannot be avoided without taking preventive measures. Modern building methods, with better and more solid concrete foundations and walls, might help to limit the risks of attack by subterranean termites. Buildings in the rural areas due to being given poor attention, face quite another environment than those in urban areas, as are the conditions varying to a large extent between regions with various types of climate.

Timber foresters' literature spells out the durability of timbers in accordance with its use either below or in contact with the ground. Thus cautioning the possibility of being misled with respect to the durability of building timber placed in a dry, covered position well above ground.

Mtundu, **for instance is in some publications classified as "non durable," but the heartwood is reported to be resistant to subterranean termites when placed in a building.**

The information available indicates that these pests cannot attack timber with a *moisture content* **less than 20 per cent in small sections and 15 per cent in large sections.**

Along the coastal belt and in vicinity of Lake Victoria the equilibrium moisture content is generally not below
15 – 20 per cent, as such, in these zones care has to be taken in choosing timber species to be used. The higher rainfall highlands areas due to shrinkage and swelling also requires resistant timber to be used for vital parts of the building.

(b) *Pressure Impregnation*

Pressure impregnation treatment of timber is recommended, more so where softboards, such as pine and cypress, are used.

There is a small number of impregnation plants and limited of the needed chemicals and thus, pressure impregnated timber is sometimes difficult to carry it out. This is also the case for the less complicated and less expensive methods of dip-diffusion and sap-replacement. Once available it is quite useful.

The amount of impregnation required for pressure treatment with the water soluble salts *Tanalith* **and** *Celcure* **whose salts are based on copper, chrome and arsenate compounds that are permanently fixed in the timber. There are four pressure impregnation plants in the country:**

•Kagera Estate. Bukoba.
Treating Various Species, using preservative Celcure A.

•Forest Division, Moshi.
Treating Various Species using preservative Tanalith C or Pentachlorophenol.

•Sikh Sawmills Ltd. Tanga.
Treating Mtambara using preservative Celcure A.

•Sao Hill Sawmill Ltd., Mafinga.
Treating Pine and Eucalyptus using preservative
Tanalith C
(BRU Techn. Pamphlet No. 4)

(c) *Dip-Diffusion*

The dip-diffusion and sap-replacement methods are used on the building site for green timber, poles and posts. When freshly cut timber is immersed or placed with one end in a drum of solution of copper, chrome, arsenate or biflourides. The solution makes its way into the wood and give the timber a protective coating. This treatment is as good as pressure impregnation, and it will increase the service time of the timber for hardwood poles in the ground five to ten times.

(d) *Soil Poisoning*

The dry inland savannah areas, unless subterranean termites are reported, normal house construction is safe. If reported, elimination by soil poisoning and physical barriers is carried out. In this situation even the non-durable species are possible alternatives in a properly roofed and ventilated construction.

4.3 AGRICULTURAL AND INDUSTRIAL WASTES FOR BUILDING PURPOSES

4.3.1 *Introduction*

There are a good number of natural occurring materials that can be said as *natural occurring materials,* **and such materials have not been put into use either because of ignorance or because they need enormous capital investment to be explointed. The list is wide, but I shall only deal with a few that have a**

high potential to be utilized; and these are primarily associated with and spring from agricultural and industrial activities.

Out of this, in Tanzania, some research are being carried out to come up with the usability of *agricultural and industrial waste* **that is currently being wasted by using dumped or opening air burning. It has been realised that these methods are becoming unattractive due to air pollution in the case of burning and increasing haulage costs – when dumping.**

It has been realized that utilization of these waste products for building purposes is obviously most attractive from the economic point of view. Apart from being abundant, these products shall replace the importation of most raw materials which are currently being used in the manufacturing of building materials.

For both economic and technical reasons the Building Research Unit (BRU) took it up for some research work aiming at finding the potential uses of these waste materials.

Coffee
Arabica – Mild Coffee

Waste products obtained from coffee are the husks and the purchment skin. The husks consist of about 20 per cent of the total coffee bean weight. These are removed in the factory. Curing of the mild coffee is done at the Tanganyika Coffee Curing Company in Moshi.

Hard Coffee – Hard Arabica and Robusta
Robusta has 45 per cent of its weight as husk waste. This hard coffee is processed to make instant coffee at the BUKIP Ltd., Coffee Curing Works, a factory in Bukoba, with over 60 per cent of the total weight of processed coffee beans is waste at this plant. Another factory which deals with coffee curing is located at Ukerewe.

Apart from the current domestic use of coffee husks include using it, small amount, as manure by farmers in Kilimanjaro.
and
at BUKIP, the husks are burnt to provide heat for the boilers.

The Wastes output estimates (BRU WR 37)

- **Mild Arabica**
  Quantity: 36,100 m.tons/year
  Estimated husks: 144,200 m.tons/year

Estimated parchment: 7200 m.tons/year

- **Hard Arabica**
  Quantity: 2900 m.tons/year
  Estimated husks: 35,200 m.tons/year

- **Robusta**
  Quantity: 10,750 m.tons/year
  Estimated husks: 8,780 m.tons/year
  Estimated parchment: 3,580 m.tons/year

Coconuts

Most areas of the coastal zone of the country are having coconut farms of small holder subsistance type with an average of 3 hectares. A few coconut plantations are owned by both parastatals and private firms.

The Ministry of Agriculture and Livestock Development, in collaboration with the German Government had started up a project to rehabilitate and increase the output of coconuts in Tanga Region more than a decade ago. The project is under the Tanga Intergrated Rural Development Project (TIRDEP). The project deals with research and seeding to develop high quality palms.

The Mafia coconuts which has its offices in Dar es Salaam though it deals with the development of palms in Mafia Island. This firm processes three types of waste from coconuts:

Coir - This is used to make ropes and mattresses

Shell - The hard shell is used in the manufacturing of mosquito coils

Polard - This is used for oxen feeding.

The research carried out *(BRU, WR No. 37)* **revealed under utilization of the coconut waste products especially in the building industry. Excepting the Mafia Coconut Company's trials, palm leaves is the only product used for construction. The leaves have and still are being used for roofing purposes traditionally, and courtyards fencing.**

Different tests have shown that coconut husk can be manufactured into particle boards are they are more resistant to termites attack and their slow burning gives them advantage over wood.

Coconut fibre boards if pressed and bonded with cashew nut resin become resistant to water, (due to water repelling properties of the cashewnut resin), and can further be plastered with lime mortars durability. Due to these properties coconut fibres are widely used in South India for various types of construction.

Husk and coir fibre, can be combined with portland cement to make a strong building panel or a corrugated roofing sheet. The research which was carrioud out in India (*Central Building Research Institute, Roorkee, India – Building Materials from Agricultural Waste, by D. Mohan and S.M. Singh)* **showed that the panel produced could be used for both walling and partitions. If compared with the fibre and particle board from natural timber work for the same size and thickness is by far much cheaper.**

The corrugated sheet must be treated on the exterior and could have a longer span of life if coated with waterproof resins or oils.

When the coconut coir fibre is being processed into mats and ropes, a large quantity of small particles are wasted when shoaring. These small particles of coir fibre, dust etc, can be bonded with adhesives to form slabs with attractive mottled appearance.

The coconut shells, can be grounded into chips and bonded with glue like urea formaldehyde to make high-grade building boards.

Cashewnuts

Cashewnuts are found mainly along the coastal strip of Tanzania. The plant is widespread in the Coastal Regions, Lindi and Mtwara Regions.

Two types of wastes from this product are obtained – shells and husks. The shell is the top layer covering the edible nut. The layer has quite a substantial amount of oily liquid. The kernel is then surrounded by a thin skin which is the husk. These wastes are burnt at the factories. During this burning process, 76 per cent of the total cashewnut is lost.

The weight is lost in the following manner:

-The extracted liquid is 7 per cent
-The shell and the inner skin 60 per cent
-Moisture content is 9 per cent.

There are eleven processing factories in the country belonging to the Cashewnut Authority of Tanzania (CATA), and are built in the following locations:

Area (District)	*Region*	*Quantity*

Kibaha	**Coast**	**1**
Pugu Road (Ilala District)	**Dar-Es-Salaam**	**2**
Mbagala (Temeke District)	**Dar-Es-Salaam**	**2**
Nachingwea	**Lindi**	**2**
Lindi Rural	**Lindi**	**1**
Mtwara	**Mtwara**	**3**

The total processing capacity of these factories is 20,000 tonnes; per annum. (10,000 tonnes per annum for each factory).

The nutshell has liquid resin which is excellent for coating roofing sheets. The shell contains oil which is useful in various manufacturing industries. Another product is glue, which is a good adhesive especially when manufacturing coconut fibre boards.

Though cashewnuts are in abundance in the coastal strip of Tanzania, no research has been done concerning the nut shell for the production of particles or fibre board. The liquid is a potential substitute as resin component but has not been utilized in Tanzania.

Straw
No good quality straw is wasted *(NAFCO)* **It is also used as cattle feed in their ranches.**

Straw can be collected from individual farmers who are scattered all over the country.

Research has been carried out in various countries on the potentiality of this waste. In India straw has been converted into rigid binderless building panels. As a result rice stalks and straw, are at present widely used in roofing slabs and wall elements.

The fibre, when pressed at 10 atmospheres can produce slabs of 5 x 122 x 3.0cm. These should, however, be finished at both surface with binder in order to obtain an even smooth surface.

Wastes from Timber processing
A number of wastes from timber processing can be used as and to form building materials. These include:

(a) *Slabs*
This type of waste is utilized mainly for fencing and as fuel. Slabs can also be *chipped* **and utilized in the manufacture of particle board, hardboard, soft boards, pupp and paper. Low cost wallings of houses can be made from slabs.**

(b) *Sawdust*

Sawdust are fine particles obtained after sieving timber chips or shavings, can be utilized by mixing sawdust with mud of which they use as building materials. This usually makes the wall very strong.

In Australia sawdust and chips are used to make hollow blocks. This is a well graded mixture of wood chips and cement. Sawdust can also be used in the production of clay bricks and manufacture of Magnesium Oxychloride flooring composing 30% sawdust.

(c) *Shavings*

Shavings are collected from carpentry workshops a product which is either burnt or dumped by all wood workshops. The waste is used for making ceiling boards. Shavings are cheap, easy to collect and available in reasonable quantities from small and large scale production units all over the country.

Baggasse **- from sugar cane processing.**

Apart from the small scale farmers producing sugar cane for selling there are four major sugar industries in Kilombero, Mtibwa, Kagera and Moshi with their plantations located around the premises of the factories themselves.

The sugar produced by these factories is for local consumption and for export.

The wastes obtained during sugar processing are of two types:

- **Baggaso fibre**
- **Molasses**

The two types of wastes are either burnt or dumped in the open air. At Mtibwa, Morogoro region, the mollasses are poured along the factory's roads so as to give a hard tarmac-like surface. The mollasses can provide very good cattle food, but this is not done due to having cattle ranches being far away and thus wasted.

The baggasso is used as fuel in the boilers. Baggasso offers an enormous quantity of ligno-cellulosic material. This stuff is burnt. This industrial by-product is of relatively low value and its fibre length ranges between 1.7mm to 2mm hence can be manufactured into boards, pulp and paper.

Softboards, hardboard and particle board can also be produced from baggaso.

CONVENTIONAL BUILDING MATERIALS

Introduction

These are the materials that are used globally. They are based on consent or practice following what is the norm globally. These materials were used in Tanzania by colonists; with their availability being produced in Tanzania and partially being imported.

As aforesaid three different sources of building materials in Tanzania are available. While traditional materials are predominantly being used in rural areas, the use of conventional materials in rural areas is mainly determined by affordability. These are natural resources that have not been given their deserving attention, but have a high potential to serve as a cheap source of building materials.

Tanzania has abundant natural materials that need some processing being put into use. Since they are available in Tanzania and their processing may not require complex technologies (in small scale production), it is worthy looking into their potentiality.

Conventional building materials are used both in rural and urban areas, and also by government, institutions, international organisations including people with means; but these materials are not affordable compared to the traditional materials. However, they are standardized and the technology to use them is readily available. Vocational training centres, technical colleges and universities teach the use of conventional materials.

In rural areas the majority cannot afford the prices of the conventional materials and thus use the traditional materials. And also the unplanned urban areas where regulations do not apply use the traditional building materials. Traditional materials are used due to the following reasons:

- **Materials are affordable and better still, can be found at no cost at all.**
- **Technology used and method of construction does not need formal training**
- **Easy to maintain and replace.**
- **Well suited for climatic conditions**
- **Readily available**
- **Aesthetically convincing.**

These factors support the use of traditional building materials, but they have one big disadvantage, they are not durable, nevertheless can easily be replaced. However, it is noted that some building materials built with traditional

materials still exist even 50 years after construction. (*The Housing Profile of Tanzania*).

The problem of durability should not be a cause not to advocate the use of traditional materials, there are possible treatments that can be applied to them so that they have a longer life. A good example *(stated under Timber),* **is the use of termite resistant poles, such as mangrove poles, preserving poles with anti-termite chemicals or adding preservatives in clay when constructing mud and pole walls.**

There is a notion that a good house is the one built using conventional materials, but looking at some public buildings in urban areas like Dar-Es-Salaam, Arusha and recreational centres, the use of traditional roofing material can be seen for instance, the thatch, slabs from the wastes of timber processing and bamboo, and this results in a structure looking aesthetically. Such buildings are coming up fast in urban areas, despite the regulations on fire hazards.

There has been a tendency among Tanzanians to build houses that are unique by using the most recent materials in the market with the aim of being seen different from other houses. This encourages the importation of building materials that are not found in the country and people use them without clear knowledge of their performance. This belief of some Tanzanians hampers the development of local traditional materials.

Conventional Building Materials Produced in Tanzania

There has been a number of factories producing conventional building materials in Tanzania, however, many of them have either stopped production due to high competition with imported materials or undergoing rehabilitation after being sold to private investors.

Basically the following are the major factories in Tanzania:

CEMENT:

Twiga Cement - produces Ordinary Portland Cement

Tanga Cement - produces Ordinary Portland Cement and Pozzolana Cement.

Mbeya Cement - produces Ordinary Portland Cement and Pozzolana Cement.

The total production of the factories suffices the requirement of cement in the country and some of it is being exported.

STEEL BARS:
-The Tanga Steel Rolling Mill
-MM Intergrated Steel Mills and SITA.

The production of these factories does not suffice the requirement and thus importation of the materials is necessary. And more so that the quality of locally produced steel bars rarely conforms to internationally recognised standards and therefore making them not being used where quality is important.

ROOFING MATERIALS:

-ALAF (Aluminium Africa) producing Aluminium Roofing Sheets galvanized steel sheets.

-Other Manufacturers – galvanized iron sheets

-Mbezi Tiles producing concrete roofing tiles and clay roofing tiles.

-Kisarawe Brick Factory – producing Clay Roofing tiles.

BRICKS
-Kisarawe Brick Factory, Dar-Es-Salaam

-Zuzu Factory, Dodoma.

-More bricks are being privately produced in some part of the country to a small scale.

PAINT:

-Gold Star Paints
-Berge Paints
-Kilimanjaro Paints
-Coral Paints (and Others)

Their production suffices the building requirements in Tanzania.

PIPES
GALCO - steel pipes
PLASCO)
Tegry Plastics)- Plastic pipes
Cotex)
Simba Plastics)

Their supply meets the building demand for pipes.

OTHERS:

There are a number of other factories that manufacture building materials. There are aluminium doors and windows assembling factories, steel casement doors and window manufacturer etc.; however major inputs for their production are imported.

The building materials production by the industries in the country amenable to small scale production and based on local resources include: cement blocks, compressed earth and burnt clay bricks, lime, pozzolime, acacia roofing sheets, timber products, precast concrete products, etc. The quality of some small-scale products is very low, and this is a result of a number of things, but mainly due to poor technology. There exists potential to promote production of other building materials based on local resources. SIDO has made considerable efforts to identify and promote facilities for small-scale production of building materials in some of the regions in Tanzania but still more can be done in this area. The number of units engaged in small scale production of selected items is shown in the table below:

	TERIAL	REGIONAL AND NUMBER PRODUCTION UNITS
	s	**s Salaam 3, Coast 2, Dodoma 3, Iringa 5, Mara 29, Kilimanjaro 2, Mbeya 5, ro 3, Mtwara 2, Rukwa 3, Singida 4, Mwanza 10, Shinyanga 5, Kagera 8, Tabora 4.**
		(Potential)
		ıza 2, Tanga 1.
		oro 1, Tanga 1.
		2, Mara 1, Mbeya 2, Rukwa 1, Shinyanga 1, Singida 1, Tanga 1, Kigoma 1, Arusha 1, Dar es Salaam 1.
		a.
	ıg blocks	

Production Units Engaged in Building Materials.

Housing Profile of Tanzania).

Production of selected materials from 1990 to 2000 (ten years span) as per table below indicates that the production of cement, iron and paint has increased with the ten years of production at the time. However, the production is very much hampered by the low priced building materials that in many cases are of inferior quality:

Production of Selected Materials from Year 1990 to 2000
The Economic Survey 2000. The Planning Commission, Dar Es Salaam, Tanzania).

Problems of Small Scale Materials Production

The production of building materials under Small Scale Industries has been encountering a number of problems that hinders their smooth production. These are:-

- **Inadequate facilities such as storage which makes production to be limited. Unreliable market for their products.**

- **Lack of technical and managerial skills and lack of envisaged extension service support.**

- **Poor quality control.**

- **Environmental degradation – destruction of forests for energy, open pits as a result of quarrying etc.**

- **Lack of appropriate small-scale production technology that leads to low productivity, health hazards and product wastage.**

With more research by research institutions such as BRA, TIRDO, TEMCO etc. the quality may be improved. Alternative sources of energy such as wastes may be put into use, and with the availability of capital through affordable loans, more facilities for storage and distribution will be available. Standardisation of the traditional materials by the Tanzania Bureau of Standards will enhance quality furthermore good market drive will facilitate more sales and thus more production.

The marketing of the small-scale building materials is encountering a number of problems that make the utilization of locally available materials unpopular. People abstain from using the materials due to:

- **Lack of information on locally available materials**

- **Lack of appropriate standards and technical guidelines**

•Use of inappropriate methods and obsolete technology

•Poor regulatory arrangements for quality control.

•High transportation costs coupled with poor transport infrastructure network making the availability to other regions uneconomical.

3.4.4. *Producers and Financier of Small Scale Materials Production*

Individuals, villages and/or co-operatives own most of small-scale industries for building materials. The production of most of the materials under these arrangements are sponsored by SIDO with finances from the government, local financial institutions and international organisations. Some few were financed individually. A number of the production units have failed due to reasons stated above, making the availability of these materials unsatisfactory.

However, with some education programmes, good advertisement, it is possible to popularize the locally available materials for use in Tanzania. It is important to dwell on the following:

Dissemination of information on available materials

Promotion of small scale production

Adoption of appropriate technologies in the production and utilization of construction materials.

Providing an enabling environment for the production of construction materials.

Selling goods in a competitive market such as the construction industry is a risky business: a firm's price can be undercut, the market is flooded with imported materials, other goods are perishable and have to be sold quickly, new competitive products can appear on the market without warning and so on. To mitigate this, it is important to have the following done:

Undertake market research to identify the wants and needs of potential customers.

Design advertisement and publicity literature to communicate with customers.

Employ forecasting techniques to predict changes in the composition of the market, and to help the firms to plan for change.

Monitor the activities of competitors in order to learn of changes in their prices or designs or other changes in their market strategy.

The problems faced in the production and selling of the small-scale building materials can be tackled through concerted efforts. Researchers and manufacturers need to be coordinated to have meaningful results. The research institutions involved in building materials and technology are numerous and the manufacturers are scattered all over the country. There is a need of having a coordinating body that will inform stakeholders on new innovations in the market. The government through its bodies/agencies can take the coordinating role for the success of small-scale building materials production. NCC, BRA or other government institutions can be entrusted with the coordinating role.

Intervention of Imported Building materials

The trade liberalisation has tended to de-industrialise the Tanzanian economy in the sense that major activities have not been in the production of goods but in trading of goods. This has led to the major influx of imported materials in Tanzania. While it is agreed that the importation has filled the gap of materials that were not available in the country it is also a fact that the importation is killing our factories and rendering it difficult to promote indigenous materials.

The importation of materials like ceramics, white cement, steel bars, glass etc. may not be necessary if the existing infrastructure and facilities are fully utilized. There were ceramic factories in Morogoro and Dodoma but they are all not producing ceramics now. Several of such infrastructure and facilities exist in the country. There is a great need to revive such existing facilities and use them to produce what they were producing so as to foster the use of local building materials.

EXTENT OF USE OF MATERIALS FOR HOUSING

Introduction

The use of building materials in Tanzania varies considerably when considering urban and rural housing. Conventional materials like cement, metal roofing sheets, dominate buildings in urban areas, but use of some modified traditional materials, like timber, may be found in unplanned areas. In rural areas most buildings are constructed using traditional materials like timber, poles, bricks from clay and thatch except for some few areas with high economic growth. The use of conventional materials in rural housing is a factor of economy.

Use of Building Materials in Tanzania 1968 – 1977

Two Housing Budget Surveys of 1968 – 1969 and 1976 – 1977 showed the use of building materials in urban and rural areas as per the Table below: - *Use of Building Materials in Tanzania, 1968 – 1977.*

	BUILDING MATERIALS	1968 – 1969	1976 - 1977
	ud blocks	**⁄o**	**⁄o**
		o	**o**
	concrete		
		o	**o**
		o	**o**
		⁄o	**⁄o**
		⁄o	**⁄o**
		⁄o	**⁄o**
		o	**o**
		⁄o	**⁄o**
	rtar		**⁄o**
		o	
		o	**o**
	ricks	**o**	**o**
			o
	S		
		⁄o	**⁄o**
	ones	**⁄o**	**⁄o**
		o	**o**

Table 4.5

It is observed that the utilization of locally available/produced low cost materials, including grass and tamped earth decreased by some 10 per cent. At the same time the use of concrete and cement, metal sheets and other related walling materials increased by an average of 4 per cent.

The information is more than 28 years old, considering the higher percentage of local traditional materials being used for housing, it is still higher to-date although with less variance. The Ujamaa Village (Refer at *Chapter Two – History o Housing Development in Tanzania, Arusha Declaration with Human Settlement)* **drive had an impact on the shift from traditional**

materials to conventional ones. Let one recall the *"Nyumba bora"* campaign of 1970s to gauge its influence.

It can be noted, therefore, from this information that the materials application has been rising in the proportion of households living in dwellings built with modern materials (concrete, stone, cement and metal sheets.

Position and Extent of Constructional materials

The following tables with information from the *2000/01 HBS* for the recent years – 1991/1992 and 2000/2001 confirms the position of constructional materials.

	Dar es Salaam Areas		Other urban		Rural areas Tanzania		Mainland	
	16.1	7.8	31.1	24.9	72.5	61.9	62.9	52.7
	11.3	6.8	27.7	22.9	11.2	12.9	13.6	14.0
	7.4	2.5	2.9	4.2	0.6	0.9	1.4	1.5
r	64.8	82.8	33.2	44.0	13.9	20.0	20.0	27.8
	0.4	0.1	5.1	4.0	1.8	4.3	2.2	4.0
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	14.5	6.7	44.6	38.3	90.8	86.6	79.2	74.0
	84.3	92.4	54.2	61.1	8.0	12.5	19.6	25.2
	1.2	0.9	1.2	0.5	1.2	0.9	1.2	0.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	3.4	0.9	5.7	5.3	23.7	19.3	19.8	16.0
	15.1	5.2	16.3	13.1	27.7	21.8	25.3	19.4
	2.0	2.2	11.1	12.1	14.6	18.1	13.3	16.1
	12.0	3.2	37.6	30.8	24.2	23.5	25.4	23.3
	4.8	1.3	11.9	15.9	8.1	13.7	8.5	13.2
ne	62.1	87.2	17.1	22.4	1.5	3.0	7.6	11.5
	0.7	0.0	0.2	0.4	0.1	0.6	0.2	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	1.1	1.1	21.7	14.3	63.1	55.7	53.1	45.8
	0.2	0.7	1.7	1.5	12.8	12.5	10.4	10.1
	3.4	3.6	0.7	0.5	0.1	0.0	0.4	0.3
ts	91.5	91.7	74.2	81.9	23.8	31.1	35.4	42.8
	0.1	0.5	0.0	0.3	0.1	0.0	0.1	0.1
	3.8	2.4	0.5	1.0	0.0	0.1	0.3	0.4
	0.0	0.0	1.3	0.5	0.1	0.5	0.3	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The Rural Areas improvement towards the use of modern materials stands out distinctively.

Use of Modern Building Materials by Households.

Regionally, percentage of Households in dwellings with roofs and walls constructed with modern building materials are tabulated below.

Singida, Shinyanga, Tanga, Coast, Tabora, with Lindi being the lowest, are regions applying modern building materials for walling their houses at the minimum.

Lindi, Rukwa, Singida, Kigoma, Tabora and Shinyanga are recorded as applying modern building materials at the lowest. Once again Lindi, Singida, Tabora and Shinyanga are at the lowest as in the case of applying modern building materials for walls of their houses.

Dar-Es-Salaam, Kilimanjaro, Mbeya Regions are noted to have used roofing and walling modern building materials for their houses more than any other regions.

All the regions noted to have excelled in the use of modern materials in their house construction are the leading in agriculture.

Table 4.7: Use of Modern Building Materials by Households, regionally (in %ge)

REGION	**OOFING**	**LLING**
	42	**10**
	98	**88**
	53	**18**
	33	**23**
	48	**28**
	21	**39**
	53	**13**
	24	**6**
	28	**11**
	43	**23**
	85	**39**
	53	**32**
	45	**28**
	42	**67**
	16	**4**
	41	**6**
	28	**11**
	33	**6**
	24	**6**
	16	**32**
	21	**7**

4.6 BUILDING MATERIALS WITH HOUSE PRODUCTION TECHNOLOGY

4.6.1 *Building Materials Technology*

The systematic application of knowledge/science to practical tasks in the system; or more so simply be defined as a scientific method of achieving a practical objective. With regard to building materials, technology refers to the know-how to production of materials and the know-how in converting them into a house or building.

Much effort has been exerted by the government in Tanzania towards achieving this practical objective, at least at the research level (Refer submission in this Chapter under *Agricultural and Industrial Wastes for Building Purposes* **and BRU practices).**

When the objective is a house in Tanzania conditions, then appropriate technologies must be sought to produce that house. Such technology should enable people to build houses that are secure, safe, durable and healthy by using mostly locally available resources.

There are three types of technologies which are now used to produce houses in Tanzania, namely (i) Traditional
(ii) Conventional (iii) Modern high technologies.

The application of building technologies differ by locations throughout the country although to-day they are rapidly intermixing such that technologies that were once exclusively used in urban areas are now being applied in rural areas as well.

Traditional House Production Technologies

Traditional houses production technologies successes are primarily based on the availability of building materials, and are the age old methods of producing the many indigenous house types which are predominant in this country. These indigenous technologies were and are still being developed by our rural population and are passed on from generation to generation and from father to son and so on without formal training. Although they use the rule of thumb and empiricism to generate houses in the rural areas they have the capability to assimilate imported technologies in order to improve performance.

Conventional House Production Technologies are the types of technologies that incorporate compromised technical, social, building material considerations, economic and environmental aspects and which are now accepted world wide; as practical solutions for delivering houses. In Tanzania an acceptable technology for producing houses, backed up with the availability of appropriate building materials, is the one that produces durable, safe, hygienic and above all affordable houses. The question of affordability,

therefore, plays a key role when a country decides which type of conventional house production technology to adopt.

Factors Influencing Choice of Technology

The choice of proper and appropriate technologies for producing house for people to live in, in Tanzania the following major factors will apply:

- **Availability of building materials and other resources.**
- **Climate, culture and lifestyles**
- **Skills and expertise**
- **Affordability.**

Building Materials Technology Transfer

The non-smooth process of the transfer of building materials technology from the research through the demonstration or pilot project, to its penetration into every-day housing and building practice is evident of the failure to utilise the research results in building materials. The successful transfer of such a new technology can be made better if the following factors are considered, as a suggestion:

- **Implementation of numerous pilot and training projects which encourage dissemination.**

- **A network of motivated institutions and people at the right levels, at the right moment of time.**

- **A non-sophisticated technology, easy to learn.**

- **A low-cost alternative in a specific context.**

- **A locally developed solution in terms of machinery, raw materials and skills.**

- **The attractiveness and high status of the materials.**

- **An income generating potential.**

- **A wide market range potential which eventually creates interest in private sector.**

- **Due emphasis on training programmes.**

In this perspective, private sector organisations such as contractors and producers of building materials, training institutions and local authorities will have to play a leading role. Improvements on the building materials through continuing research should be emphasized together with improvement of

the productive technique. The government has to provide an enabling environment to facilitate the achievement of the above factors through research, training and standardization as well as coordination, which is important.

Distribution of Building Materials Technology Transfer

The conventional building materials factories are located within the eastern and southern parts of Tanzania. This has an effect on distribution to other parts of the country especially when considering the poor infrastructure network existing. To get to the lake and Western zones, one would think of using the central railway as means of transport, however the railway is not in very good working order and the roads that could be an alternative are in pathetic condition.

The government is undertaking re-construction of the road network and the on-going privatization of the railway may help the distribution of the materials from where the factories are located to other places. This has an effect also on the small-scale producers. It is expected that small producers should be able to reach markets away from their locality. This is hampered by the infrastructure among other reasons.

Because of the distribution problems, prices of materials differ very much depending on where the source is. It is hoped that with the on-going re-construction, the distribution may be effective and eliminate the bottlenecks it is imposing on the distribution of materials.

BUILDING MATERIALS REGULATIONS AND STANDARDS

Introduction of use of Building Regulations, covering Standards, Code of Practice and other regulations in the rural areas is yet to be initiated and put them into application for the rural house development. Enforcement of the regulations in the rural areas, if introduced will be difficult. At the moment, as a *Code of Practice***, Architects and Quantity Surveyors' Act of 1997 plays a great role in giving designers powers to influence what materials to use for house construction especially in urban areas. All buildings to be constructed in urban planned areas have to be designed by a registered architect.**

The architects thus influence their clients on which materials to use. Building designers do not consider traditional materials because of lack of standards on them.

One way of promoting the traditional building materials is to have *Standards* **set, published and available to end users. Since material suppliers do not discriminate**

material customers, rural house developers will find themselves abiding to the set Standards as for the urban development.

Designers and Clients need to know the performance of the available materials so that they can utilise them in building construction. The Tanzania Bureau of Standards (TBS) has done some efforts in establishing the building standards, but they are mostly inclined to conventional building materials. (Also Refer at *Chapter Four* **of this dissertation). Very little if not nothing has been done on the local traditional materials.**

There is a need to have a concerted effort in promoting the traditional building materials for housing especially for people who cannot afford the expensive conventional materials. With Standardised traditional materials, it is evident that even the building regulations in urban areas will recognise them and allow them to be used for housing.

Fire Regulation legislated for urban use influences the use of building materials. The need to use materials with a defined fire resistance eliminates a number of building materials to be used in the urban centres. There are means of making the traditional material such as thatch, fire resistance, but the effectiveness and applicability of this needs more research.

Standardization has played a key role in reducing house production costs. It has raised the quality of houses and succeeded in reducing the quantities of building materials required to produce houses. Labour costs, material costs and maintenance costs has come down because of Standardization, allowing the reuse of standard components many times.

CONCLUSION

Tanzania has a potential building materials from the natural resources available. Tanzania has also a number of factories manufacturing conventional building materials. But there are problems that hinder the availability and affordability of the materials in other parts of the country. To ensure good availability of both conventional building materials (imported and locally made) and the traditional materials, there is need to look into the following:-

- **Dissemination of building materials research information to actor in the building/construction industry.**

- **Standardisation of the locally manufactured materials, especially those from small-scale industries that use the locally available natural resources.**

- **Promote the use of new technology in the production of building materials especially for small-scale production. The use of obsolete technology hinders the growth of the use of locally manufactured materials.**

- **Look into regulations that hinder the use of the traditional materials.**

- **Having a clear policy on the promotion locally manufactured materials, with stress on the use of natural occurring materials.**

- **There is a serious need to educate Tanzanians on their tendency to prefer imported materials over locally produced ones.**

Further research could look into:

- **Ascertaining the available production, especially or small scale production.**

- **Look into the ongoing research on building materials and problems facing the research institutions.**

- **Look into the available technologies in the production of building materials using the natural occurring resources.**

- **Get information on the traditional building materials used in different regions, their stock and improvement, if any, that have been applied to the materials to make them better.**

Establishment of materials regulations should be made for the materials – suppliers to abide; after some appropriate Legislative and Administrative Framework have been formed on the same.

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CHAPTER FIVE

5.0 ORGANISATIONS AND RESEARCH CENTRES CONTRIBUTING TO HOUSING DEVELOPMENT

The Ministry of Lands and Human Settlements Development

Among Central Government Ministries it is the Ministry of Lands and Human Settlements Development, which has the mandate and duty to ensure that good quality, and affordable housing is provided and properly maintained in both urban and rural areas. As a lead agency, the Ministry is charged with the following functions:

- Provide policy guidance and an enabling environment, including cross-sectoral coordination, for the different actors to perform their roles.

- Determine, prepare, monitor, evaluate and review the performance of the National Housing Programme as a strategy to implement the National Human Settlements Development policy.

- Facilitate a systematic and appropriate increase in the national allocation of the state budget to housing provision and maintenance.

- Develop strategic intervention frameworks, which can effectively respond to rapid urbanization amidst escalating urban, and rural poverty.

- Initiate the establishment of a funding framework for the implementation of the National Housing Programme.

- Facilitate access to mortgage facilities through clear land rights and tenure arrangements.

- Monitor national and local performance of shelter delivery.

- Promote gender and equity issues in housing development.

- Develop and set standards, regulations and procedures for land use planning and subdivision, building materials, construction technology and quality of shelter including the Building Regulations in Tanzania.

- Guarantee security of tenure to land and sort out land disputes.

- Account to the Parliament for the performance of the human settlements sector against set targets and efficiency parameters.

For proper executions of these functions the Ministry acquired the current name having been transformed from the Ministry of Lands and Urban Development.

This places it in a position of being a direct government body to facilitate adequate delivery of shelter and the development of sustainable human settlements in the country. The transformation involved the merging of the former Departments of Housing and the Urban Development into the new Department of Human Settlements Development. In order to streamline and capture the interdependent relationships between these sectors, and thereby develop an effective policy that emphasizes and clearly targets the essential elements of human settlement development needs.

The Ministry of Lands and Human Settlement Development in its endeavour to chart out strategies for the development of human settlement in the country has noted that Human Settlement development and shelter delivery are inseparable and require a coherent and comprehensive policy that links them in a common framework. The need to develop a national Human Settlements Development Policy arises from the Government's resolve to address and reverse the deterioration of human settlement's conditions in the country and its recognition and commitment to the decision of the United Nations Habitat Agenda II and the Instanbul Declaration on Human Settlements Development.

It is clearly seen, therefore, that the Government intends to facilitate adequate delivery of shelter and the development of sustainable human settlements in the country. The policy aims at harnessing existing initiatives investment by various actors in the public, private, informal and community sectors as well as guide the rapid growth and the transformation of the settlement pattern.

The ultimate and future vision of this policy is to have well organized, efficient, healthy, safe and secure, and easthetic sustainable human settlements. In particular, the future vision of this human settlements development policy is to have human settlements where everyone has adequate and affordable shelter which is durable, healthy, safe and legally secure, accessible and which matches with the culture and living habits of the occupants. Such shelter or housing includes all the basic services,

facilities and amenities. It should offer equal soci-economic opportunities to all members of the society for their material, social, spiritual and cultural advancement.
The Government through the Ministry of Lands ad Human Settlement Development has demonstrated that housing is a basic necessity. It recognizes shelter as one of the basic needs, and that's why after independence the Government took the initiative of addressing the issue of housing to its people as one of the main priorities, and further, taking several steps, among which include the following:

- Establishment of NHC by Act No. 45 of 1962.

- Establishment of Revolving Housing Loan Fund (through Staff Circular No. 8 of 1962) was in 1967.

- The Squatter of Up-grading and Site and Services Scheme was introduced in 1972.

- Acquisition of Building Act No. 13 of 1971.

- Establishment of BRU in 1971, now the Building Research Agency.

- Establishment of THB of Act No. 34 of 1972.

- Establishment of Ardhi Institute (Now UCLAS) in 1972.

- Establishment of the National Urban Development Policy 1980.

- Promulgation of the National Housing Development Policy in 1981.

- Establishment of the National Land Policy in 1995.

- Establishment of the Land Act No. 4 and Village Land Act No. 5 of 1999

- Establishment of the Human Settlements Development Policy in 2000.

Apart from the Ministry of Lands and Human Settlement Development charting out Policies and facilitating adequate delivery of shelter in the country with organizations as tools to carry out the plans, other

Government Ministries play part in facilitating the said development for its people.

Ministry of labour, Youth Development and Sports participating fully in training houses construction personnel through its Vocational Education Training Authority (VETA).
The Ministry of Science Technology and higher Education by having house development experts trained and carry out research in its higher institutions of learning.

The Ministry of Industries and Trade has the Tanzania Bureau of Standards (TBS) formulating standards and regulations of the products which includes building materials, (although mainly conventional materials), in the country.

Ministry of Works with organizations, public and private, designing and constructing buildings and civil works.

Ministry of Education and Culture with the Village Museum of Tanzania.

Ministry of Finance facilitates housing development by providing organizations such as the Government Loan Fund and Housing Finance.

Ministry of Local Government Services Commission facilitates housing development through urban councils including cities, municipalities and other urban authorities and district councils.

Ministry of Justice and Constitutional Affairs has Courts to provide a framework for conflict resolution in the area of land and housing development.

Ministry of Defence and National Service although trains school leavers to become solders, but also provides ample skills in the building construction, such as masonry, carpentry, farming and animal husbandry.

Ministry of Home Affairs has a building brigade under the Police of prisons for hire and for internal use of the Force.

Ministry of Communication and Transport has parastatal organizations with design/consultancy and building/civil works contributing to housing development.

5.2 ORGANISATIONS AND RESEARCH CENTRES UNDER THE MINISTRY OF LANDS AND HUMAN SETTLEMENT DEVELOPMENT

5.2.1 *National Housing Corporation*

Housing development prior to independence, 1930 Act of Construction was slightly amended in 1932 for the urban housing and not involving itself to the rural housing development.

Act of Parliament No. 45 in 1962, the National Housing Corporation was established for the purpose of facilitating the provision of houses and other buildings in the country by means of providing financial assistance and otherwise, and for matters incidental thereto and connected herewith which amount to:

- facilitating the landing or granting money for the purposes of putting up approved housing schemes to be undertaken by the local authority.

- making loans or guarantee loans made to any person or body of persons, corporate or unincorporated, for the purpose of enabling such person or body to acquire land and construct thereon approved houses or other buildings or to carry out approved housing schemes.

- to construct houses or other buildings and carry out approved housing.

To facilitate the availability of some of the essential building materials the Corporation established a number of subsidiary companies to deal with the production of clay burnt bricks, clay burnt tiles, aggregate and ***chokaa*** (white plaster).

Clay Burnt Bricks and Tiles produced by the ***Kisarawe Brick Factory Company Limited*** was incorporated under the Companies Ordinance on 30th March, 1993. The Company was wholly owned by as a subsidiary of the National Housing Corporation.

Two more National Housing Corporation factories producing Clay Burnt Bricks were built at ***Bihawana in*** Dodoma and at ***Kijenge Arusha.*** These have been privatized recently and that the Kijenge one is no longer in service.

There is a ***factory of lime at Mvumi (Dodoma District)*** and a factory of aggregate at ***Mkonzi,*** both in Dodoma, and are now privatized.

Tanzania Concrete Articles Limited (TACONA)

Tanzania Concrete Articles Limited TACONA) was incorporated under the Companies Ordinance (Cap 212) in 9965. TACONA having been a subsidiary company of the National Housing Corporation (NHC) since its establishment, got privatized in 1998.

The main business of the company, which has almost collapsed from when it was privatized, is to carry on the business of brick and tile manufacturing and the manufacture of pipes, pottery, earthenware china and similar goods or any other substitute used for building purposes.

The major programme undertaken by the National Housing Corporation during the 1960s was clearance and redevelopment of slums and squatter settlements to what was considered high standard of houses and the associated involvement, such as high compensation costs, social disruption and displacement of households, the National Housing Corporation stopped the programme in 1969.

In 1972 the housing policy was changed letting the people provide houses for themselves at their own initiative. Featuring of rural housing development.

In 1990 the National Housing Corporation mulgamated with the Registrar of Buildings but retaining the name of National Housing Corporation (NHC) with a new establishment of Act 2 of 1990. According to the National Human Settlements Development Policy, the basic function of the new Corporation is as for the former National Housing Corporation; that is to build houses for rental and sale and to provide engineering services and operating as a Contractor.

5.2.2 *Registrar of Buildings*

The ***Registrar of Buildings*** was entrusted to oversee the nationalized buildings carry out the same and build houses in the same principal as the National Housing Corporation. The organization was established by the Acquisition of Building Act 13 of

April, 1971. Initially, before it involved itself in housing construction, it emerged as an Act to empower the President to acquire certain Buildings in the Public Interest whose cost was more than TShs. 100,000/= (USD 100) at the time. This covered any building, whether used as residential, commercial, industrial or other purposes whatsoever and includes outhouses, sheds and other structures. No rural development gains are noted as a result of the Registrar of Buildings establishment due to nationalization of buildings carried out in urban centers; and no houses built in the rural areas to date.
Immediately after independence in December, 1962 a stream of government policies, political ruling party (***Chama Cha Mapinduzi – CCM)*** manifestos started flowing aiming at overall improvement of housing. This brought the establishment of the National Housing and Building Research Unit which in 1970 it became the National Housing Research Agency (NHBRA).

5.2.3 ***The National Housing Building Research Agency***

The National Housing Building Research Agency (NHBRA) is a Government executive agency in the human settlements development sector. It was established under Cabinet Paper ECC No.7 of 1970 as a division under the Ministry of Lands, Housing and Urban Development. The agency focuses on research and dissemination of building materials, technologies and different types of shelter, aiming at improvising housing conditions in both urban and rural areas.

NHBRA is working in various fields within the building sector, undertaking research geared to solve problems related to human shelter. The results of research are disseminated to rural and urban areas through reports, pamphlets, technical guidelines, data sheets seminars and demonstration houses where the local population is fully involved. The government of Tanzania and Norway through NORAD where the Norwegian Building Research Institute acts as consultant to NHBRU provides support from 1971 – 1985. With effect from 31st August, 2001 NHBRU became a Government Executive Agency (NHBRA) as a result of the Public Service Reform Programme (PSRP). This is in accordance with Executive Agency Act No. 30 of 1997. The Agency continues from where NHBRU had left, and continues to promote its services to its stakeholders.

The current functions of NHBRA are in line with the National Human Settlements Development Policy of 2002, the National Housing Development Programme 2002, Habitat Agenda of 1997 and the Tanzania's vision for 2005, which are primarily addressing:

Objectives:

In general, this includes research work, promotion, demonstration and production of building materials and ensure consistency of planning, legislation. Building Regulations and standards.

5.3 VOCATIONAL TRAINING UNDER THE MINISTRY OF LABOUR, YOUTH DEVELOPMENT AND SPORTS

5.3.1 *Vocational Education and Training Authority*

Introduction

The history of Vocational Education and Training in Tanzania dates back to 1940 when an apprenticeship Ordinance, Cap 81 of the Law was enacted to regulate the training of apprentices and other persons in the industry.

In 1974 the first Vocational Training Act was enacted to replace the apprenticeship Ordinance followed by the establishment of the National Vocation Training Division in September, 1975 within the Ministry of Labour and Manpower Development. Under the 1974 Vocational Training Act, a National Vocational Council was established charged with the main function of ensuring the existence of adequate supply of properly trained manpower of the levels in industry as well as to secure the greatest possible improvement in the quality and efficiency of vocational training in the country.

Throughout the period of its existence, the National Vocational Training Division (NVTD) established 18 National Vocational Training Centres and one Vocational Teachers Training College in Tanzania. A total of 34 trades were offered to equip young men and women with basic employable skills before they join organizations of various sectors of the national economy. (***Vocational Training Act 1974).***

THE 1994 VOCATIONAL EDUCATION AND TRAINING ACT

The shortcoming of the NVTD system triggered off the process of establishing a new legal framework for vocational education and training. This brought in the establishment of the Vocational Education Training Authority.

The Vocational Education and Training Authority (VETA) was established through a Vocational Education and Training Act No. 1 of 1994 with major missions of providing and regulating vocational education in the country ***(Guardian: 07/10/2002).***

This new Act, passed by the National Assembly in February, 1994 and implemented from 1995, sought to improve the provision of vocational education and training through new legislation as well as changes in the structure and administrative style. Central to the Act was the establishment of an autonomous Vocational Education and Training Levy and supervised by Vocational Education and Training Board. The focus of training policy was regionalized through the establishment of Regional Boards.

The government is making all deliberate efforts to let the Vocational Education Training Authority (VETA) spread (or be scattered) all over the country so that the majority of all Tanzanians are reached. So far VETA has managed to build and operate 20 colleges in 18 mainland regions. ***Guardian 7/10/2002)***

VETA has colleges in Mtwara, Tabora, Mikumi, Tanga, Mwanza, Dodoma, Moshi, Mbeya, Iringa and Morogoro. These ten colleges are known as Regional Vocational Training Services Centres (RVTSC). Those in Songea, Mpanda, Singida, Kagera, Ulyankulu (Tabora), Oljoro (Arusha), Dakawa, Kihonda and Morogoro are known as Vocational Training Centres (VTCs). ***(Guardian)***

The Vocational education and training authority in an effort to train teachers to meet her demands has one Vocational Teachers Training College. ***(Guardian)***

The 20 VETA Centres has a capacity to accommodate 6,000 and 10,000 students in long and short courses respectively at a go. (***Guardian)***

5.4 HIGHER EDUCATION AND RESEARCH IN HOUSING DEVELOPMENT UNDER THE MINISTRY OF SCIENCE TECHNOLOGY AND HIGH EDUCATION

5.4.1 Introduction

The Ministry of Science Technology and High Education carries out higher education and research in the housing development and building industry as a whole in the country by having its curriculum awarding degrees, diplomas and post professional qualifications addressing more on the urban development than the rural development. The programmes by the University College of Lands and Architectural Studies (UCLAS) and the Prospective College of Engineering and Technology (PCET) under the University of Dar-Es-Salaam, and the Dar es Salaam Institute of Technology (DIT).

These are noted to be providing Technical Services and Capacity Building for Housing Production. The knowledge might not appear relevant to the rural housing development at the moment, but some rural areas development in the country (Mbeya Region, Kilimanjaro and Dar-Es-Salaam Regions) and the country's way forward its essentiality is apparent.

Technical Colleges of Mbeya and Arusha produce technicians befitting urgent need of rural housing development.

5.4.2 *University of Dar-Es-Salaam*

The University of Dar-Es-Salaam was born out of decision taken on 25th March, 1970 by the East African Authority, to split the then University of East African into three independent universities for Kenya, Uganda and Tanzania.

Candidates are admitted at the University of Dar-Es-Salaam to pursue various degree programmes/courses.

Within the 1.625 acre – Main Campus there is the ***prospective*** College of Engineering and Technology (pCET) which gives notable contribution and advantage to housing development by providing high quality training in the relevant engineering and technology.

"To become and be considered by others to be, the leading institution in Engineering and Technology at national and regional levels".

To deliver high quality and competitive training in engineering and technology; research and technology development; and consultancy and services, that are recognized nationally and internationally, with a view to

enhancing efficient utilization of natural resources, entrepreneurship and innovativeness among engineers thereby stimulating sustainable development.

5.4.3 ***University College of Lands and Architectural Studies (UCLAS)***

The University College of Lands and Architectural Studies (UCLAS) had its origin as a Survey Training Centre in 1960 producing technicians to strengthen the Ardhi Ministry following the pronouncement of policies of decentralization and establishment of permanent villages in rural areas.

The sub-professional personnel were felt necessary to serve in the various areas of physical land development. In 1972 the Centre was renamed Ardhi Institute. ***"Ardhi"*** being a Kiswahili word for ***"Land"*** aiming at raising the training from the former technicians level in the area of land surveying to the sub-professional diploma level in the areas of land management and valuation, land surveying and urban and rural planning.

On 24/10/1974 an act of parliament established Ardhi Institute as a parastatal oroganisation under Ardhi Ministry (Ministry of Lands, Housing and Urban Development) whose course was structured to provide facilities for training and granting of professional diplomas in the existing departments with an introduction of Building Design (Architecture) training and re-establishing the Land Surveying technician certificate in 1976 with branches established in 1978 for technician course in Morogoro and Tabora.

The University College of Lands and Architectural Studies (UCLAS) resulting from the promotion of the Ardhi Institute by providing facilities

For training and awarding full professional degrees in the existing departments of Architecture, Building economics, Land Surveying, Valuation and Engineering was established in 1997 as a constituent College of the University of DSM under the Ministry of Science Technology and High Education.

The University College of Lands and Architectural Studies and Other Training institutions.

Research and training institutions such as UCLAS are expected to play leading roles in a number of activities in the

implementation of the National Housing Programme. The Institution among other things have it as at 5.2.3 and also organize conferences, seminars, workshops and symposia on housing experiences in both urban and rural areas.

5.4.4 ***Centre for Housing Studies***

Refer at Chapter six – Par. 6.3.2

5.4.5 ***Dar-Es-Salaam Institute of Technology***

The Dar-Es-Salaam Institute of Technology (DIT) was established in 1997 by the Act of Parliament. The DIT Act No.6 of 1997 to replace the Dar-Es-Salaam Technical College, which had a long history technical training in Tanzania; and which had all along specialized in training technicians, offering certificates and diplomas in engineering technology. The history dates back to 1957 when its predecessor, the Dar-Es-Salaam Technical Institute was established with the main task of providing vocational training in the country. The Institute later expanded its scope to also offer technical secondary school course and training for Technical Assistants before it was upgraded in 1962 to become the Dar-Es-Salaam Technical College (DTC) the first formal technical training institution in the country.

5.4.6 ***Arusha and Mbeya Tecnical Colleges***

Arusha Technical College

The College operates under the Ministry of Science Technology and High Education (Directorate of Technical Education and Training), whose main objectives are:-

-To provide adequate technical education training at FTC level.

and

-To impart technical skills and attitudes that enable technicians to be employed or self employed.

5.5. <u>**REGULATIONS AND STANDARDS UNDER THE MINISTRY OF INDUSTRIES AND TRADE**</u>

5.5.1 ***Tanzania Bureau of Standards***

The Tanzania Bureau of Standards (TBS) formed by the Government under the Standards Act No. 3 of 1975 for the purpose of formulating standards and regulations of the products in the country. Within the Standard Act requires inter alia the preparation and frame of Standards, collection, publication and dissemination of literature and other materials on standardization and other related subjects and to provide facilities for the members of the public to have access to such materials.

5.6 CONSULTING AND CONTRACTORS ORGANISATIONS UNDER THE MINISTRY OF WORKS

5.6.1 National Estates and Designing Corporation

The National Estates and Designing Corporation (NEDCO) was incorporated in 1968 as a Limited Liability Company under Companies Ordinance (Cap 212) known at the time as National Properties Development and Management Company Limited (NPDMC) – being a subsidiary Company of National Development Corporation (NDC).

In 1969 it was removed from NDC and made a subsidiary Company of National Housing Corporation where it remained until 1971 when it became an independent Parastatal Organisation under the Ministry of Works and its name was changed to National Estates and Designing Company Limited. In 1983 NEDCO became a Corporation by a Presidential order made under the Public Corporation Act 1969. The principal function of the Corporation is:

- to develop industrial and real property and to provide management services in relation to prefeasibility studies, full feasibility studies, architectural and engineering designs, specifications and bill of quantities and giving tenders for quotations, site supervision and allied services.

NEDCO Services are primarily offered in urban areas covering Feasibility Studies, Building and Civil works services to the general public, private individuals, parastatal organization and government projects:

Quantity Surveying services are offered for both pre-contract and post-contract.

Land Surveying services are offered by carrying out cadastral and topographical survey.

Projects carried out by NEDCO are ***Supervised*** during construction by well qualified engineers and technicians and this goes together with contract administration.

5.6.2 ***Mwananchi Engineering Construct Corporation (MECCO)***

The Mwananchi Engineering Construct Corporation (MECCO) was established in 1983 by the Act of Parliament under Public Corporation Act, 1969 – The firm is a ***Contractor.***

The functions of the Corporation are:

- to promote the development of the construction and allied industries;

And

- to conduct or engage in the business of building and engineering contractors

5.6.3 ***National Construction Council***

The National Construction Council (N.C.C) was established by Act No. 20 of 1979 enacted by Parliament of United Republic of Tanzania.

The history behind the formation of National Construction Council goes back to 1976 when the Government of Tanzania through the Ministry of Works in collaboration with Swedish International Development Agency initiated a study of the Construction Industry in Tanzania to identify problems and constraints in this sector.

The study revealed among other things that there was neither control nor co-ordination in the construction sector.

Furthermore, the report showed that the sector was plugged with a multitude of problems including shortage of building materials, insufficient construction capacities, lack of locally owned consultancy firms, escalating building materials, prices and lack of transport facilities.

The study report made a number of recommendations, one of which was the formation of the ***National Construction Council.***

Most important objectives for which the National Construction Council was formed are:

- To promote the development of the Construction Industry in Tanzania.

- To monitor construction costs and make suggestion for the control.

- To establish and monitor guidelines for tendering procedures so as to ensure fairness, speed and economy.

- To plan and co-ordinate the activities of persons engaged in the Construction Industry.

5.6.4 ***Tanzania Building Agency (TBA)***

The TBA is a Government Executive Agency under the Ministry of Works whose launching was carried out on 17th May, 2002 through the Executive Agencies Act No. 30 of 1997. The Agency is the tranformation of the former Building Department of the Ministry. The Agency deals with building consultancy services, real estates development and management for civil servants and government buildings.

The ***Vision*** of the Agency is to become the dependable source of accommodation of Government and public servants; and to become the centre of excellence through Consultancy and Real Estate Management.

Its ***mission*** is to improve accommodation to the Government and Public Servants.

The principal ***objective*** of the Agency is to increase supply of public servants houses, and coupled with the above objective is to develop affordable housing schemes to encourage employees to have their own houses before they retire.

5.6.5 *Registration Boards*

There are Registration Boards under the Ministry of Works. These Boards are:

- ***Architects and Quantity Surveyors Registration Board (AQSRB)*** responsible for registration of Architects and Quantity Surveyors, and their consulting firms.

- ***Engineers Registration Board*** responsible for registration of all types of Engineers and Engineering firms.
- ***Contractors Registration Board*** responsible for registration of all types of Contractors.

The formation of the above three registration Boards under the Ministry of Works, the Government had aimed to constantly monitor, regulate, educate and promote these persons and firms.

The success of the construction industry depends, to a large extent, on the competence of the local persons and firms involved in the sector. Since Engineers, Architects, Quantity Surveyors, Consultants and Contractors are key players in the industry, the Government has the role of ensuring that their performance matches the expectations of the general public.

By 2001 there were 157 qualified registered Architects, 76 qualified registered Quantity Surveyors, 4539 qualified registered Engineers and 2047 registered Contractors falling into five main groups:

- Building Works Contractors
- Civil Works Contractors
- Mechanical Contractors
- Electrical Contractors
- Specialized Contractors
- Architects Consulting Firms
- Quantity Surveyors Consulting Firms
- Engineering Consulting Firms.

Contractors Assistance Fund and Associations

The CRB in its endeavor to advance the construction industry, established with the Co-operative Rural Development Bank (DRDB), Contractors Assistance Fund (T.Shs.300,000,000/= equivalent to USD 300,000) to assist Contractors of low classes in paying Bid Bond and Advance Loan guarantees. Further assistance to the Contractors towards developing Industry is the formation of the Construction Industry Development Fund (CIDF). National Contractors Association. The National Contractors Association was established as a body representing the interests of all Contractors in Tanzania. ***(CRB Annual Workshop 2001 & 2002).***

Apart from the Registration Boards, Private Sector Initiatives have formed consultants and contractors associations which are seen to be key to the Development of the construction industry. These associations act as pressure groups to the government to protect the interests of their members.

In the country to-day we have several associations with well over 20 years old, such as:

TACECA - Tanzania Civil Engineering Contractors Association

TABCA - Tanzania Building Contractors Association

- Architectural Association of Tanzania (AAT)
- Tanzania Institute of Quantity Surveyors (TIQS)
- Association of Consulting Engineers Tanzania (ACET)
- Institution of Engineers Tanzania (IET)

(CRB Annual Workshop 2001).

5.7 VILLAGE MUSEUM OF THE NATIONAL MUSEUM OF TANZANIA UNDER THE MINITRY OF EDUCATION AND CULTURE

5.7.1 *Village Museum*

The Village Museum of the National Museum of Tanzania is an open air Village Museum also referred as ***Makumbusho",*** the Swahili word of ***Musseum*** located on the New Bagamoyo Road, 8 km away westwards from the centre of Dar-Es-Salaam city, covering an area of 4.5 acres. These are well kept grounds featuring 18 traditionally furnished traditional houses used in rural areas, from different ethnic groups and regions throughout Tanzania.

As per this dissertation, much of the ***Village Museum*** features out on Chapter Six of ***Research Objective and methodology (6.2)*** and Chapter Seven – ***Information Collected and Analysis.***

5.8 HOUSING FINANCE UNDER THE MINISTRY OF FINANCE

5.8.1 *Introduction*

Housing Finance in Tanzania

Before 1972, there was no proper housing policy. Both the Government and the private sector had been engaged in housing financing but to a limited extent, due to lack of policy. During the colonial period the colonial government, provided housing facilities to her senior and foreign employees, a habit which was adopted even after independence. Only a few junior African employees who could not return to their homes at the conclusion of their daily work were provided with accommodation.

However, the type of accommodation provided left much to be desired. Moffet reports:

> The wattle and mud hut whether of substantial or flimsy construction and frequently not water proof was the universal type of dwelling provided.

The justification he gives for this poor quality of accommodation is that:

> It was and still is a popular type of dwelling with the African worker, since it is the normal type of accommodation in native area, and the African is conservative in his outlook in such matters.

It is contended that, it is not true that the Africans did not want better accommodation. Their houses were of poor quality because of lack of resources and modern technology. The colonial Government was not concerned with the welfare of the Africans. However, in 1950 the outlook of the government began to change gradually:

> With certain exceptions, the government decided that it is not its duty to provide houses for its African staff in urban areas. In special cases, few in number of highly educated Africans, who expect and deserve a better standard of accommodation and who may expect to remain in their stations permanently, government will provide permanent higher standard quarters.

From the above, it is clear that the government was not ready to house the majority of the African workers. As an alternative, the government created loan funds for the African civil servants, while in the private sector, various credit institutions were formed for that purpose. Before examining the credit institutions, the government loan funds were examined first.

5.8.2 *The Government Loan Funds*

The African Urban Loan Fund

The African Urban Loan Fund was established in1954. It was financed from a revolving loan fund established by the colonial government. It was intended that through this fund Africans could be encouraged to build houses of improved standard, and constitute a stable house-owning class in the urban area. Loans were granted to assist those people who had the ability to accumulate a small down payment, but who were considered too large a risk for loans from the building societies.

The Urban Roof Loans Scheme

This scheme was established in 1961. Its creation followed a proposal given in the 1961/62 Development Plan:

> It is proposed to discontinue the existing Urban House Lands Scheme. Funds will be used instead for loans for construction of roofs of permanent materials. Since the loans will be small in amount and repayable over a short period, it will be possible to spread the funds over a larger number of people.

The Government was more concerned with the number of people to be provided with roof loans rather than the quality of the structures to be roofed. As a result a number of roofs collapsed due to weak structures.

Under this scheme, loans were extended to urban local authorities who in turn extended roof loans to individuals. The local authorities were responsible for the collection of repayments.

The Urban Roof Loans Scheme collapsed in 1965. The government thought it better to provide housing loans to its civil servants by way of a *revolving loans scheme.*

The Revolving Housing Loan Fund

It was established in 1967. Creation of his Fund was intended to provide civil servants with housing loans. The fund was established with a capital of shillings 12 million.

The objective of this fund was to provide loans to civil servants for construction and or purchase of residential houses in the urban areas. In order to qualify for a loan, the applicant was required to have an ascertained monthly salary from which repayments could be deducted. The borrower was also required to possess a long term right of occupancy which was surrendered as security for the credit advanced.

The majority of the Tanzanians who lived in the rural areas were neglected.

5.8.3 ***Housing Finance before 1972: Private Institute***

Building Societies

Prior to the establishment of THB in 1972, building societies were the first form of housing financing institution to be formed in Tanzania.

The first building societies were formed by members of the Ismailia Community. Twenty or thirty persons would form a society and agree to deposit a specified amount of money each month with financial institution . When each member had deposited an amount equal to twenty five percentum of the value of the house to be built, then the society arranged mortgage financing for the remainder. Most of these funds were disbursed through either the Diamond Jubilee Investment Trust or the Jubilee Insurance Company.

The first building society incorporated on permanent basis was the ***First Permanent Building Society.*** This was formed in Northern Thodesia (now Zambia) in 1949. It extended its activities to the East

African territories in 1956. The headquarters of the society were in Lusaka. This society was connected with the English building societies and was re-financed by the English banks and credit institutions operating in the East African countries and in Northern Rhodesia.

The functions of this society were, first to mobilize deposits and secondly to lend for housing construction in urban areas.

The society operated smoothly until 1960 when the outcome of the ***Lancaster House Constitutional Conference*** greatly affected the operations of the society. In that conference, plans for independence for the East African countries by Europeans and Asians who were the majority members of the building society. They made capital withdrawals from the society which led to its instability.

The Commonweath Development Corporation (C.D.C.) came to the rescue of the society. It gave credit advance to the society on the condition that the society be wound up and in its stead a company be formed. The proposal was accepted. This led to the formation of a limited liability company known as the ***First Permanent (East Africa) Limited.***

First Permanent (East Africa) Limited.

First Permanent (E. A.) Limited was established in 1961. The shareholders of the company were the three East African countries, that is Kenya, Uganda and Tanganyika who jointly held fifty percent of the shares of the company and C.D.C. which held the other fifty percent. The headquarter of this company was in Nairobi, Kenya.

The company took over the assets and liabilities of the First Permanent Building society. At first, the company did not make new residential mortgage loans but continued to receive payments on outstanding loans and to accept deposits from the public. In1963 when the financial position of the company improved it started lending operations.

In 1965, an agreement was made between the three East African countries and the C.D.C. to create three new companies to take over the business of the company. Following this agreement the First Permanent (East Africa) Limited was wound up and three separate companies for each of the East African countries were created. The first new company to be established was the ***Housing Finance Company of Kenya Limited (HFCK)*** which was established in 1965 and registered under the Companies Ordinance in 1965. ***The Housing Finance Company of Uganda*** was established in 1967 under the Companies Ordinance while in Tanzania the company established in 1967, was known as ***Permanent Housing Finance Company of Tanzania Ltd (PHFCT).*** However the three newly formed companies retained C.D.C. as shareholder in each, holding fifty percent of their share. In each country, the new company took over the liabilities existing and assets were divided in such a way that they corresponded with the liabilities.

As this study is confined to Tanzania, below we examine the PHFCT.

PHFCT: The Institutional and Operational Framework

Although PHFCT was incorporated in 1967, it started its operations in 1968. The initial share capital was shillings 1.2 million subscribed took over a part of the assets and liabilities of its predecessor, the First Permanent (East Africa) Limited, which were in Tanzania. When it started operating it had taken over some thirty three million shillings held by its predecessor.

The objects of the PHFCT were to mobilize public deposits and to provide loans for purchase and or construction of owner – occupied houses.

What can be noted about the various housing institution is that they did not help the poor. They were all directed to urban people in the high income bracket. Neither the building societies, the housing financing companies nor the government thought it important to finance housing for the rural people.

It was in 1969 that the Tanzania Government began to note the housing imbalance between the rural and urban areas. In the ***Second Five Years Plan*** it was observed:

The rapid growth of urban population can claim huge investment in infrastructure. This may lead to conflict between different objective. On the one hand, shelter must be provided for urban population while on the other ***Government is committed to*** redressing ***the imbalance between urban and rural areas***. A sound housing policy must therefore harmonise the apparent conflict.

The Government's commitment to redress housing imbalance between urban and rural areas was followed by the establishment of the Tanzania Housing Bank

(T.H.B). This Bank was enjoined to provide housing loans for both urban and rural population.

5.8.4 HOUSING FINANCE AFTER 1972: THB AND THE HOUSING FINANCE.

THB's Establishment and Sources of Funds.

THB was established under the Tanzania Hosing Bank Act, 1972. It took over the assets and liabilities of the PHFCT Ltd. All instruments to which the PHFCT Ltd. was a party continued in full force and effect as if the THB were substituted for the PHFCT Ltd. and all the rights and liabilities of the PHFCT Ltd. under every such instrument became vested in the THB.

THB commenced its operations on 1st January, 1973. Its authorized share capital was shillings one hundred million divided into one hundred shares, each having a value of one million shillings. All shares were held by the Government of the United Republic of Tanzania. The initial paid up share capital was shillings twenty million.

Besides share capital, THB had other sources of funds. One of those is public deposits. THB was empowered to operate savings, time and term deposit accounts on which the Bank pays interest. Over the years public deposits was the main source of THB loanable funds. As at 30th June, 1990, the Bank had total deposits valued at shillings 2,086,525,000/= . This indicates that the Bank relied heavily on public deposits for its lending operations.

Deposits had been increasing as years went by this has been possible through THB's lending policy which insists on every prospective borrower to have an account with the Bank, with a fixed minimum amount in the account for the duration of the loan.

Another source of finance were loans and grants. The THB Establishing Act permitted the Bank to borrow funds for its ordinary operations. THB could borrow funds from within and outside Tanzania. In June 1974 a Canadian commodity credit loan was granted to the Government (The Treasury). And also a loan from International Development Agency (IDA); 15.7 shillings from the World Bank. In 1974 it received a grant of shillings 5.5 million from the Government of the Federal Republic of Germany. Again in the same year, the Bank received a grant of T.shs 12.98 million from the Swedish International Development Agency.

However, from 1975 onwards no more foreign loans or grants were received by the Bank The Bank had been using its own resources, i.e share capital, and public deposits to meet the borrowing demands of its customers. This had compelled the Bank to be strict in its lending policy and required that repayments of the principal amount borrowed plus interest was effected according to the provisions of the loan agreement. The lending policy of the Bank was tailored in line with its objects and functions.

OBJECTS AND FUNCTIONS OF THE BANK.

The Tanzania Housing Bank Act outlined the objects and functions of the Bank. These were as follows:-

a. To mobilize local savings and external resources for housing development.

b. To operate savings, time and term deposit accounts and to pay interest thereon.

c. To promote housing development in Tanzania.

The Bank was required to promote housing development by making available loan and equity finance to individual persons, groups of persons and registered legal entities.

The Bank was also entrusted to do the following:

i. Make available technical and financial assistance for site and services facilities.

ii. Render technical, financial and other assistance to ***Ujamaa village*** in the preparation and implementation of building programmes.

iii. To render technical, financial and other assistance for the establishment and administration of institutions, co-operatives and other organizations engaged in housing development.

iv. To make loans or guarantee loans made by others to any persons or body of persons for the purpose of enabling such persons to carry out housing development.

Furthermore, the Bank had a duty to ensure the implementation of Government policy on housing and building. This was by encouraging the use of local building materials for construction of residential houses suited to the local surroundings. The Bank had also been required to find means of reducing, housing construction costs, prices at which houses may be sold and rents which may be charged.

The Tanzania Housing Bank (THB)collapsed in 1993 due to poor management and malpractices.

5.8.5 Other Financial Institution and Pension Funds.

Other institutions have been involved in financing the construction of rental housing for private individuals and companies. The National Housing Programme banks on continued interest in funding housing provision and maintenance from these institutions. They should work out different financing schemes for different types of developers.

Specifically the financial institutions are expected to carry out the following functions;

- Create seed capital to give loans to individuals or companies and associations in housing provision and maintenance.

- Provide mortgage finance for housing development and house purchase.

- Establish a secondary mortgage market.

- Invest in low cost housing.

5.9 LOCAL AUTHORITIES UNDER THE MINISTRY OF LOCAL GOVERNMENT SERVICES COMMISSION.

The main actors in this category are the urban councils including cities, municipalities and other urban authorities and district councils. The local authorities are expected to carry out a number of functions with respect to housing provision and maintenance.

5.9.1 *Village Councils.*

Village councils are there to play a significant role in facilitating the provision, improvements and maintenance of rural housing. To carry out these function each village council shall establish an organ to deal with housing matters at the village level. The organ shall have the responsibility of mainstreaming housing in the village development agenda and link the village with the housing services centres and to the housing office in the district as well as other relevant organizations in the area.

Specific functions with respect to housing provision and maintenance include:

- Keep a register for property rights in the village.

- Mobilize villagers and other investors to build new houses or improve the existing ones.

- Facilitate the establishment of self help housing programmes.

- Make by-laws on adequate shelter.

5.10 LOCAL COURTS – MINISTRY OF JUSTICE AND CONSTITUTIONAL AFAIRS.

Local Courts under the Ministry of Justice and Constitutional Affairs as established under the Land Disputes Court Act of 2000 are meant to provide a frame work for conflict resolution in the area of the land and housing development. The framework is made up of the following institutions:

The Village Land Council
The Ward Tribunal
The District Land and Housing Tribunal
The High Court (Land division)
The Court of Appeal of Tanzania.

Proper functioning of the land courts is likely to ensure that conflicts in access to land, services or housing shall be addressed promptly and that standard can also be enforced. Specifically the Courts shall deal with complaints from parties in respect of land and housing and mediate between and assist parties to arrive at a mutually acceptable settlement of disputes on many matters concerning land and housing. In addition, the courts shall also deal with matters related to compensation and shall have powers to enforce their decisions.

5.10.1 Private Sector Actors.

A substantial part of housing provision as well as housing services are and shall continue to be supplied by the private sector, mainly through individual initiatives. The National Human Settlement Development Policy 2000 recognises the contribution of the sector. The Housing Programme adopts the NHSD Policy and requires private sector actors, both individuals and companies to carry out the following tasks:

- Continue to participate in the construction of housing for all categories of the population particularly for rent.

- Engage in production and supply of building materials in the housing construction sector.

- Engage in infrastructure development in human settlements.

- Encourage and enter into joint ventures with central government agencies, local authorities, NGOs, CBOs or housing cooperatives, in providing building materials, services or shelter.

- Offer technical services to home builders.

5.10.2 ***Civil Society Organisation:*** NGOs, CBOs, Cooperative Societies and other Groups.

Actors in this category should be to carry out the following functions:

- Facilitate mobilization of individuals into groups and enhance their capacity of access resources for housing provision.

- Assist members to access land jointly as a group or individually, for housing development.

- Assist members to acquire funds, jointly or individually, for housing provision.

- Assist groups to establish building materials production workshops or industries, and to establish centres of shelter provision technology.

- Assist members to access training programmes to build their capacities in book keeping, financial management, accountability and openness in managing their organizations so as to build trust which was eroded by previous practices in some cooperatives.

5.11 *BUILDING AND CIVIL WORKS DEVELOPMENT PARTICIPATION BY THE MINISTRY OF DEFENCE AND NATIONAL SERVICE.*

The National Army under the Ministry of Defence and National Service has the *National Service Military Training Programme* which was established in 1960's as a ground to groom primary school leavers to become soldiers and also train them in a number of kills such as masonry, carpentry, farming and animal husbandry. It was later extended to encompass graduates from Secondary schools and colleges as a compulsory programme for military training.

The trained brigade in the building and civil works construction within the service is extensively used on national emergency projects. This includes building of \houses, offices, public buildings and construction of bridges and roads brought about by hazards such as water floods, tremors and the like.

The service has a pronounced design office composed of architects, quantity surveyors and engineers.

5.12 HOUSE BUILDING BRIGADE UNDER THE MINISTRY OF HOME AFFAIRS.

Much as it is appreciated that the Ministry of Home Affairs' principal mandate and duty is security and to maintain peace in the country for the people's welfare and property of the public and the state, it has a building brigade under the Police of Prisons for the public hire and for the internal use of the Force, but with no pronounced design/consultancy force. The brigade carries out building of houses and repair works by the application of the employed technical people, prison laborers,\ and trained prisoners in the building industry.

The Police of Prisons runs efficient building materials, production work shops and office uses. Building components produced are such as window frames, door frames, roof trusses and concrete block.

5.13 PARASTATAL ORGANISATIONS WITH DESIGN/CONSULTANCY AND BUILDING/CIVIL WORKS BRIGADES UNDER THE MINISTRY OF COMMUNICATION AND TRANSPORT.

The Tanzania Railways Corporation (TRC), the Tanzania Harbours Authority (THA) and the Tanzania Telecommunications Company Limited (TTCL) parastatal organizations under the Ministry of Communications and Transport, have civil and electrical engineering for buildings and infrastructure to suit the requirements of their organizations.
The established brigades have their involvement covering building and maintenance of their residential houses, offices, infrastructure within them and maintenance of operational services of the organizations.
The Air Tanzania Corporation (ATC), which all along had its building development, office buildings, employees residential shelters, airport terminals workshops and their associated infrastructure and services taken care by the central government through the Ministry of Communication and Transport. However, privatization of the Air Tanzania Corporation (ATC) is at an advanced stage towards its operations and development being handled by private hands.

5.14 CONCLUSION.

It has been noted that the majority of government ministries, in one way or the other, are placed in positions of participating in the provision of facilitating adequate delivery of shelter to the people and the development of sustainable human settlements in the country. This ranges from land management acquisition, research work of local building materials and construction techniques, training of design and construction experts carrying out feasibility studies, services providers formulating standards and regulations of the building products, building materials manufacturers, housing finance machinery to as far as legal bodies involvement to oversee a smooth delivery and utilization of shelters.

Most of the building and civil works designs and their constructions in the country are done by private firms, these are non-governmental organizations (NGO’s), and the government has let the NGO’s in particular the foreign firms, take up the development of the industry on expectation of the best results than the production of the local firms.

NEDCO as a consulting firm in the building and civil engineering industry and MECCO as a constructing firm, as submitted earlier on 5.6.1 and 5.6.2, the only pronounced government organizations, are now being fully privatized so as to become NGO’s .

Although there are firms and individuals who offer housing technical services, many would be customers of technical services do not know exactly when and how to procure technical services. Experience has also shown that many individuals do not appreciate the importance of technical services. As a result many houses, especially those built on self help basis are constructed by informally trained artisans (masons, carpenter plumber etc) most of whom do not have formal contact offices and have not undergone apprenticeship testing to ascertain their technical competence.

Also many would be customers of technical services opt for unqualified personnel because they want to save or pay as little as possible for technical services and advise. Often many homebuilders end up paying more because of shoddy construction work.

Technical services, which are required for housing development, have been catergorized into three groups:

- Professional level i.e. services offered by graduates from professional training institutions,

- Technicians from institutions training middle cadre technical staff,

- Artisans from Vocational Training Centres (VETA) both public and private and

Insitu trained craftsmen (Fundis) who are informally trained.

Professional Level Technical Staff.
Most of the land-based and housing professionals are currently trained at the University College fo Lands and Architectural Studies (UCLAS), prospective College of Engineering Technology (COET) of the University of Dar es Salaam and Dar es Salaam Institute of Technology (DIT). It is estimated that between 1980 and 1995 a total of 1,774 professionals graduated from the then Ardhi Institute, while the enrolment of the students between 1995 and 2003 was 9,153.

The composition of professional staff include land surveyors, valuers, urban and regional planners, quantity surveyors, architects, environmental engineers, civil engineers, and electrical and mechanical engineers. The Majority of these are civil engineers and land-based professionals trained at UCLAS.

Technician.

Currently in Tanzania technicians are trained at DIT, Mbeya technical college Arusha technical college and Water Resources Institute. A total of 2,827 technicians specializing in land and housing development related fields (Civil engineering, highway engineering, water resource engineering and architecture) graduated from these colleges.

The role of the graduates from technical colleges in housing promotion varies. However most of them are engaged in supervision of construction works while others are employed in professional firms working under engineers or architects. Graduates from technical colleges are some times engaged as site foremen. The number of graduate technicians is very low compared to the number of the professionals. In order to cope with requirement of a 4 to 1 ratio (professional to technician) there is a need of increasing the number technicians in the local training institutions.

Artisans

This is the largest group in the construction industry, which provides services in most construction sites. Artisans work or are hired either as individuals or group (gangs) and can be hired on temporary or permanent terms until a construction activity is completed. They may also be hired for specific component of a house. They comprise formally and informally trained workforce as discussed below.

Formal training.

As aforesaid at 5.3 training of artisans and craftsmen is currently carried out at the existing 20 public vocational education – training centers (VETA), which have been established in almost all regional headquarters and are estimated to produce 5,000 graduates yearly. Besides the public vocational training centers currently there exists 661 private vocational training centers owned by NGOs, religious organizations, parastaatals organization etc, which are estimated to be producing 20,000 graduates every year. It is said that within four years ago (1999 – 2002), a total of 100,000 artisans and craftsmen graduated from various vocational training centers in Tanzania. ***(National Housing Development Programme 2003 – 2013).***

Information training of artisans and craftsmen.

Beside the formally trained artisans, there exist also craftsmen who have been trained informally or on job. Such informally trained craftsmen include bricklayers, masons, carpenters, plumbers, electricians etc. in both rural and urban areas, this category of artisans and craftsmen has carried out a lot of housing development activities. Studies carried out in Dar es Salaam indicated that plumbers and electricians are often organized in groups and that they move in a group of 2 to 3 soliciting for jobs. Due to lack of a regulatory body (registration association/mechanisms for non-professionals) , often they do not have formal association or contact \offices, although many have premises ***(Kijiweni)*** where they can be contacted. Subsequently they are hired at client (house builder’s) risk.

One common and critical problem related to technical service provision by the artisans is that many homebuilders who have no technical competence to build or supervise construction of own houses have fallen victims of shoddy work, cheatings and some times thefts by the bogus artisan. The problem is a result of lack of regulatory body for the artisans on one hand, but on the other it is due to the fact that some would be customers of technical services do not know where to procure technical services or they don't appreciate the importance of proper technical services and advice in housing development.

Lack of competence or fear of not being awarded the job has resulted into the artisans bidding or compromising for the provision of technical services at a very low cost,. This has also at times resulted into shoddy products. In some cases the artisans have been unable to finish the job because of low quotations disappears leaving their customers demoralized and forced to incur extra costs to procure technical services to finish the job.

Institutional Arrangements.

In order to facilitate coordination and minimize duplication of the numerous efforts being put up and to optimise the available resources, it is important that an institutional setting that facilitate information flow and thus coordination among the different sectors is established and supported. The following arrangement therefore may prove worthwhile.

It is suggested that the implementation of the proposed National Housing Programme should be monitored and guided by a three –tier structure as below:

Ward/Village levels.

A ward or village level housing provision and maintenance committee should be established to monitor the implementation of the Housing Programme at local level.

In municipalities and cities a Mtaa level committee should be established. Although it is not realistic to specify the composition of the committee it is important to emphasise the need to have committee whose composition encourages the contribution of not only the village council, but also that of other actors including the private sector and village or ward level associations involved in housing provision and maintenance. The composition of the committee should therefore vary from one locality to another.

Apart from monitoring the implementation of the housing program

- Assist villagers and ward residents to access information on shelter standards and locally available building materials.

- Assist developers to access specific technical services and advice in selection of building materials and choosing suitable technologies.
- Assist individual developers to access shelter though construction of new structures or improving existing housing.

- Coordinate the use of, and / or exploitation of building materials available in the area to minimize environmental degradation.

District or Urban Council Level

There should be a District Housing Provision and Maintenance Committee, which should draw members from the main actors at the district level to include representatives from:

- The Private sector,
- NGOs and CBOs dealing with housing,
- Housing Cooperatives,
- Housing Service centres,
- Ward or Village Committee,
- District urban Councils.

The housing section in the local authority should become the secretariat to the committee.

Apart from monitoring the implementation of housing progamme activities at the district level, the committee should also link the district actors to the national level committee. Specifically the Committee should carry out the following functions:

- Assist the District or the Urban Council in facilitating collaboration and in monitoring and reviewing the implementation of the National Housing Programme within the area.

- Provide a form in which district level actors can jointly evaluate their performance, revise their strategies towards their contribution in the provision of housing provision.

- Provide context specific technical guide and support to the ward and village committees and the housing service centres within the district or urban area.

- Coordinate the control the use of and or exploitation of building materials available in the area to minimize environmental degradation.

National level.

In order to coordinate the implementation of the Housing Programmes a national steering committee should created. For the committee to perform well, it should draw members from strategic national level institutions.

While the Housing section in the Ministry of Lands and Human Settlements Development shall be the secretariat, the Ministries of Regional Administration and Local Government should also play a significant role in the national committee. In addition to drawing representatives from the two ministries the national level committee should also include members from Ministry of Works, the National Housing Corporation, Training and Research Institutions, TCCIA, companies producing and supplying building materials, representatives from the Association of Tenants, and house owners, and representatives from TANGO, especially from NGOs involved in housing related projects. The committee should also include representatives from financial institutions.

The Committee should carry out the following functions.

- Provide a forum in which national level actors can jointly evaluate their performance and revise their strategies in the provision of housing.

- Facilitating dialogue, coordination and collaboration in implementing the National Housing Programme.

- Monitor and review the implementation of the National Housing Programme.

- Provide context specific technical guide and support to the district and urban council level committees.

The Tanzania Investment Centre.
As a central government institution under the Ministry of Finance, responsible for attracting investments and granting Certificates, of Incentives to investors, it is proposed that the centre should also facilitate investments in the housing sector. In general, the TIC has in most cases concentrated on attracting investments in sectors other than housing. However, by including electricity, telecommunication and water services as its lead sectors, it does contribute in improving provision of municipal services in housing areas. The National Housing Programme proposes that the TIC includes housing as one of the priority sectors and thus encourage investors to invest in the real property including housing estates.

CHAPTER SEVEN

7.0 RESEARCH FINDING AND ANALYSIS

7.1 <u>INTRODUCTION</u>

The previous Chapter discussed the research approach, tools and methodology that was used in conducting this study. The definitions of primary and secondary data and their collection was reviewed and, the two types of data research: ***Secondary data*** and ***primary data*** have been used to source the information in this research. ***Secondary data*** which emanates from already existing sources or previous reports involves ***desk research,*** and this has been the first step in looking for information already existing sources. This is mainly through published materials found either in house or externally, using libraries or previous projects, newspapers, journal articles, government housing policies, acts of Parliament, materials from research centres, museum materials, Household Budget Surveys and reports from other agencies.

Secondary data refers to information originally collected from purposes other than the specific research project in hand. ***Primary data*** refers to data collected or generated through field research by a researcher for a specific project. It is said that this is “new” information first hand, and the various methods of its collection, including questionnaire design have been dealt with. Distinction was also discussed over ***Quantitative*** and ***Qualitative*** types of research on their basis of determining the nature of data, its collection, analysis, interpretation and presentation, and the rationale of essentially adopting both type of approach by the researcher discussed.

In the preceding Chapter consideration has been given to the objectives of the study and the nature of the research, and thus inn this Chapter the statistical method to be employed in the data analysis are frequency and percentage of the frequency. It is believed that fairly accurate judgement can be made using this approach on the nature of the research.

The findings targets the main research questions raised under the INTRODUCTION – ***Research Objectives*** and issues to be determined under the ***Relevancy of the Research (1.30).***

The findings of this research demands the following: Determination of type and shape of the contemporary traditional houses;

- the commonly used building materials and its proper use;
- the technical know-how and knowledge of house construction;
- traditional house arrangement of functional spaces;
- provision of adequacy of storage facilities;
- hygiene aspect and level of traditional houses and households;
- availability and provision of domestic utilities like water;
- the financing of traditional houses construction;
- whether the rural people are contented with the present conditions of their houses or not.

The present Chapter's objective is to present the findings obtained from the Secondary data sources mentioned above and the Primary data obtained through the designed and structured interviews that followed; by carrying out research as per methods given out in Chapter Five:

- the Village Museum of the National Museum of Tanzania
- the Institute of learning and Research Centres.
- desk research, libraries
- questionnaires
- interviews.

7.2 FINDINGS FROM THE VILLAGE MUSEUM,M CASE STUDY

7.2.1 Analysis of Houses by Tribes

(A) **SUKUMA:**

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Cone-cylindrical (MSONGE)	The interior of the house is divided into three rooms.	Height:	One door is provided with a small gape where the wall and roof meet to allow easy circulation of air	Hardwooden poles, fastened to the poles by small sticks and fibres (miombo) then wetted clay is pasted on the wall leaving a small ventilation gape where the wall and a grass roof meet.

Table 7.1

The Sukuma tribe – MSONGE

The Wasukuma, the largest single ethnic group in Tanzania, are believed to have originated from the north-western part of Africa. The Wasukuma is a tribe which live in Mwanza and Shinyanga regions located on the west and southern part of Lake Victoria, the World's second largest lake.

The Wasukuma are Bantu and keep a big number cattle. Their livelihood depends on animal keeping (of cows, goats, sheep), fishing, farming, and mining activities. They grow maize (corn), sorghum, potatoes, millet, cassava, beans, rice and cotton. Traditionally, the Wasukuma (and the Wanyamwezi) used traditional dances as a way of motivating and encouraging members to work hard when they are cultivating.

The traditional Wasukuma house is circular in shape (MSONGE) and thatched neatly with layers of elephant grasses like a series of terraces. First, the walls are constructed using hard wooden poles, fastened to the poles by small sticks and fibres (miombo). Then wetted clay soil is pasted to the wall, leaving a small ventilation gape where the wall and roof meet to allow easy circulation of air. (Refer Fig : 2.1 at Chapter Two)

An old traditional Wasukuma house is round with a tierd grass roof. The interior of the house could be divided into two or more rooms.

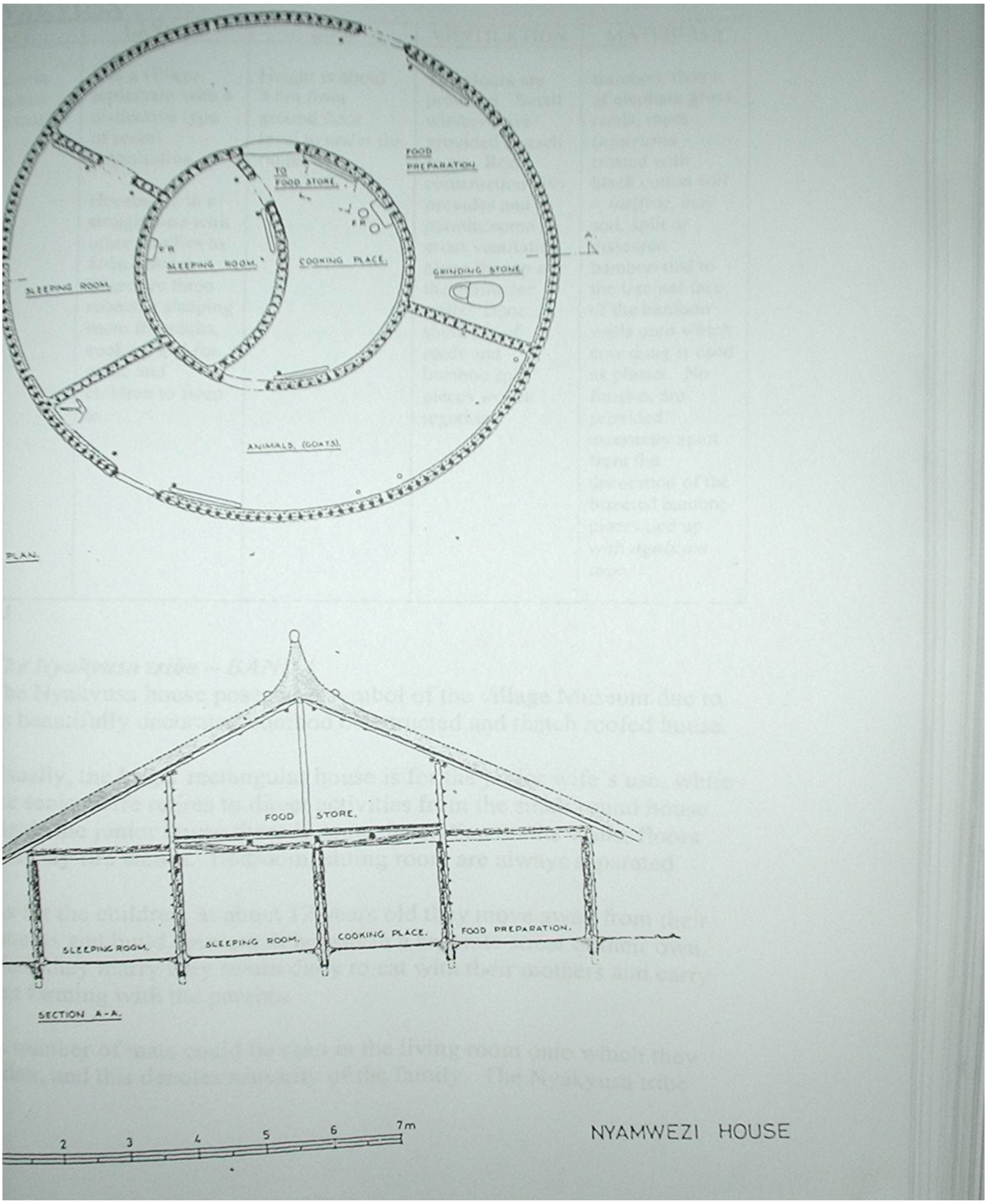
The roof detail is such that it is fitted with various decorations. Some people place snails shells on sticks above a worm out dish which holds the last tier

Inside the house, the rooms are partitioned, including a separate sleeping room for the daughters and a big veranda where women meet and talk. The kitchen is in the centre of the house opposite the parents' bedroom. On the far right side are boys sleeping room and storage area for cereals. In front of the house, there is a cow yard and, near the door, two little thatched huts with a single door each. These huts are used for offerings during ritual practices.

(B) **NYAMWEZI**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Cone-cylindrical	Two concentric cylinders. ***Outer ring*** is 4 meters radius, the inner ring is 2 meters radius. The outer diameter is 7.9 meters ***Inner Ring:*** 2 No. sleeping rooms, cooking place and fire place. ***Outer Ring:*** Food preparation room, sleeping room, fire place and animal keeping. ***Upper Floor:*** Food storage above the central accessible by simple ladder.	Inside house at peak is about 4.0 meters.	Two doors opposite to each other on the outer walls. Main entrance door facing north. No windows are provided. 1 or 2 per room small. Vent holes are made in the walls. Plugs are used to close the holes. Cross-ventilation is provided along the top of the perimeter.	(As per Sukuma tribe)

Table 7.2



(C) **NYAKYUSA**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Rectangular in shape, pitched	It is a village settlement with a	Height is about 3.6m from	Two doors are provided. Small	Bamboo, thatch of elephant grass,

and gable roofed	distinctive type of social organisation. Houses are in a straight line with other families to form a street There are three rooms: a sleeping room for adults, cooking and for cattle and children to sleep in.	ground floor level to under the ridge.	windows are provided to each room. Roof construction also provides and permits some cross ventilation along the top of the perimeter walls. Door shutter is of reeds and bamboo split pieces woven together.	reeds, ropes (***nguruma*** – treated with black cotton soil - ***lutifya)***, clay soil, split or dissected bamboo tied to the internal face of the bamboo walls onto which cow dung is used as plaster. No finishes are provided externally apart from the decoration of the bisected bamboo pieces tied up with ***nguluma*** rope.

Table 7.3

The Nyakyusa tribe – BANDA

The Nyakyusa house poses as a symbol of the village Museum due to its beautifully decorated bamboo constructed and thatch roofed house.

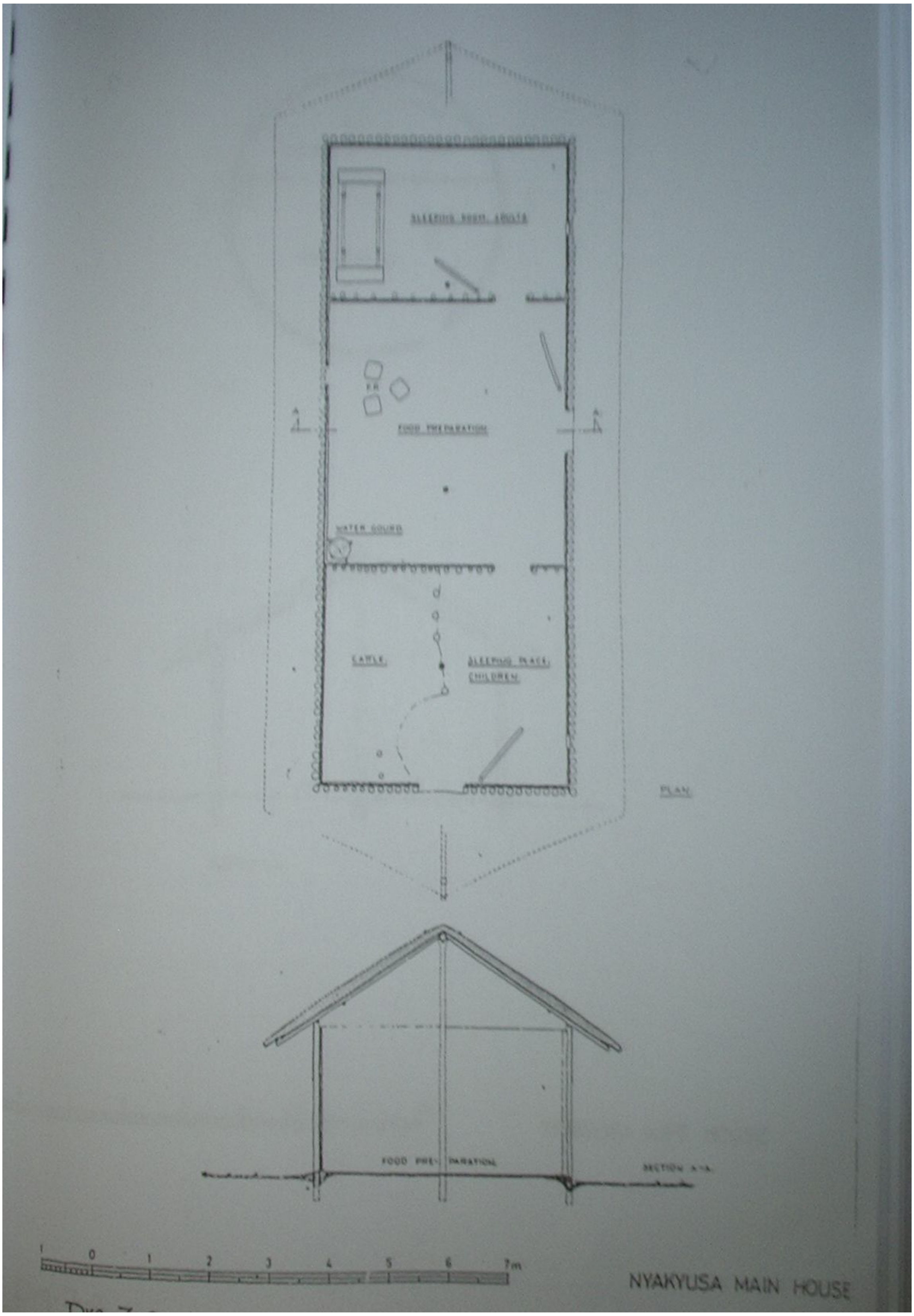
Usually, the larger rectangular house is for the junior wife's use, while the senior wife retires to direct activities from the small round house. Inside the junior house there is some decoration on the walls, floors and clay fire stones. Bedroom, sitting room are always separated.

As for the children, at about 12 years old they move away from their parents and build their small houses in a separate street of their own. Until they marry they return daily to eat with their mothers and carry out farming with the parents.

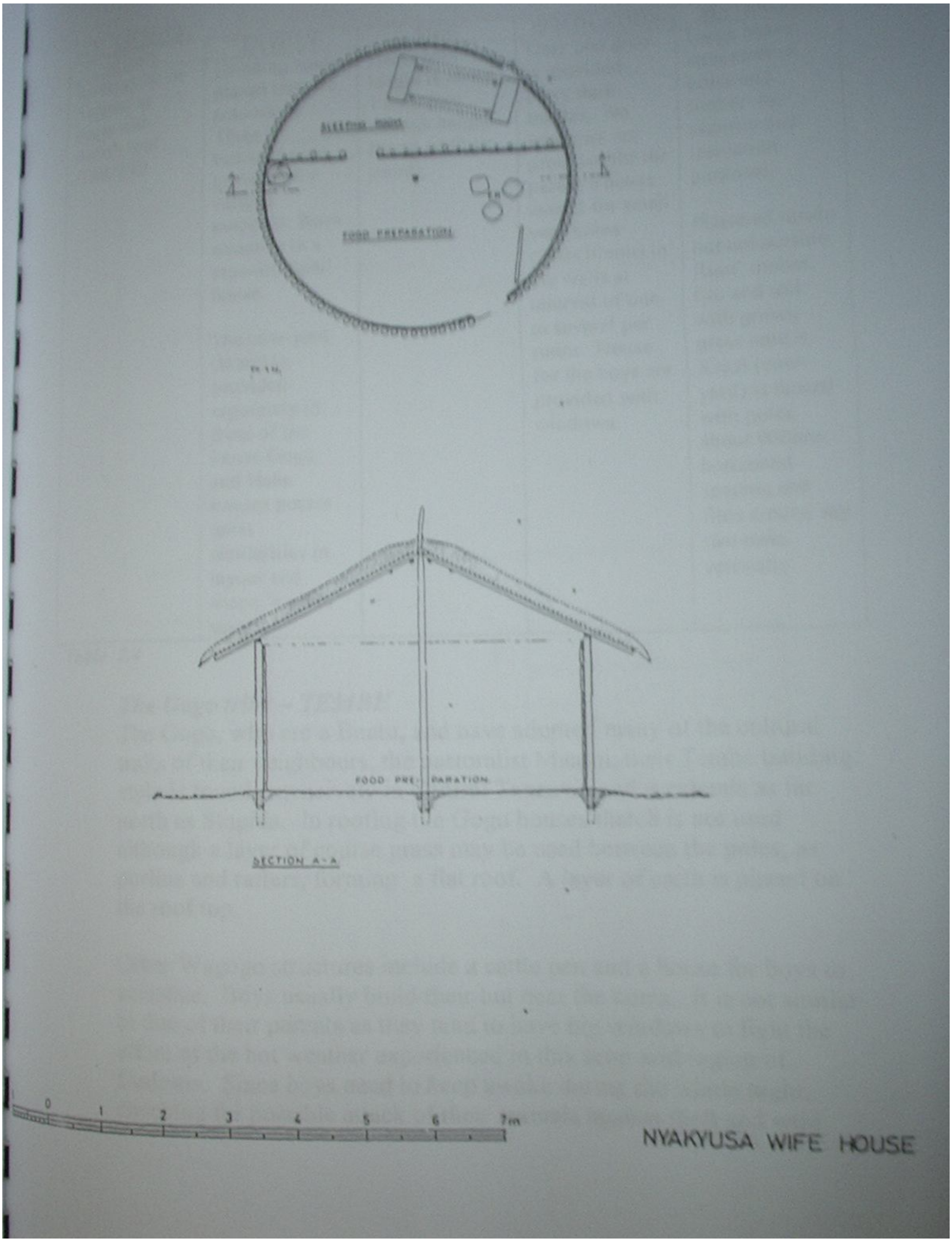
A number of mats could be seen in the living room onto which they relax, and this denotes seniority of the family. The Nyakyusa tribe have ample weaving techniques. The mats are woven by using dry banana leaves and some grass leaves ***(ukindu)*** distinguished by different colours.

Bamboo is the principle material of construction of all the parts/elements of the house all the way through without necessitating the application of any other building materials except for the application of kneaded clay soil/cow dung for the walls as plaster and floor; and thatch as roof covering material on bamboo rafters/purlins/battens.

The bamboo is split open to form a carpet like piece which is fastened to the bamboo wall with "***nguruma***" ropes onto which kneaded clay soil/cow dung is applied as plaster. Prior to the application of ***"plaster"***, the carpet like piece provides excellent ventilation to the house and as ***"bamboo gauze"*** for screening the wall openings against insects. Bamboo – (Chapter 33.2.1(b)



Nyakyusa Main House



Nyakyusa Wife's House

(D) <u>**GOGO**</u>:

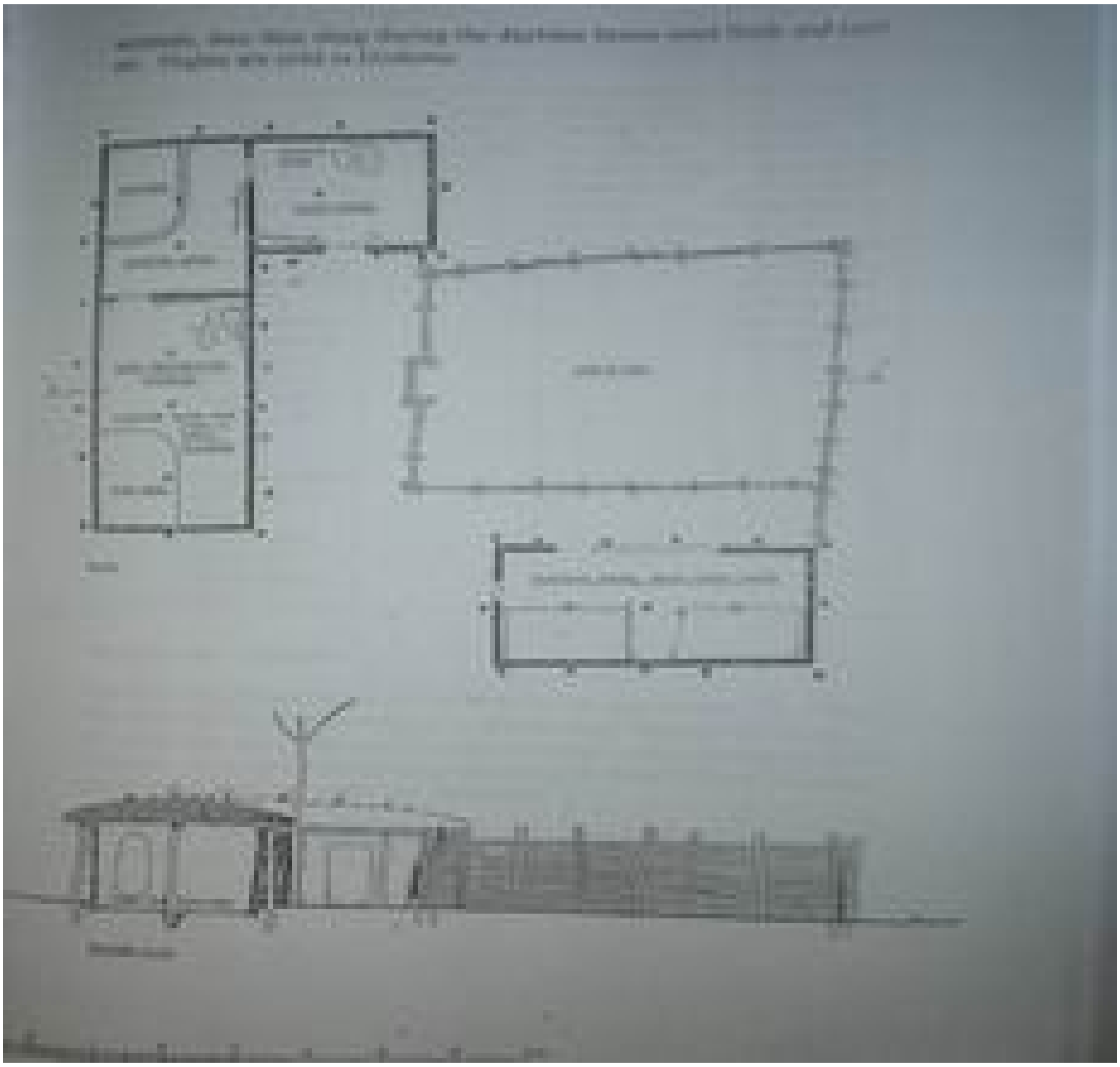
SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Rectangular or Angular in shape with flattish roof ***(TEMBE)***	Grinding stone placed into the ante-room. Three bedrooms are provided for various purposes. Boys socialise in a separate small house. The cow-yard (kraal) is provided separately in front of the house Gogo and Hehe houses posses great similarities in layout and shape, built in stages.	Headroom height is about 1.65m (not enough height for an adult to stand)	Only one door is provided (very dark inside). No windows are provided for the parent's house except for small vent holes (200x30mm) in the walls at interval of one to several per room. House for the boys are provided with windows.	Large heavy structures in poles and timber for security and insulation purposes. Plastered inside but not outside. Roof: timber, fito and soil with grown grass onto it Kraal (cow-yard) is fenced with poles about 900mm horizontal spacing and fitos around say two raws vertically.

Table 7.4

The Gogo tribe – TEMBE

The Gogo, who are a Bantu, and have adopted many of the cultural traits of their neighbours, the pastoralist Maasai, their Tembe building style is found extensively in Central Tanzania and it extends as far north as Singida. In roofing the Gogo houses thatch is not used although a layer of course grass may be used between the poles, as purlins and rafters, forming a flat roof. A layer of earth is placed on the roof top.

Other Wagogo structures include a cattle pen and a house for boys to socialise. Boys usually build their hut near the boma. It is not similar to that of their parents as they tend to have big windows to fight the effect of the hot weather experienced in this semi arid region of Dodoma. Since boys need to keep awake during the whole night, checking for possible attack of their animals against theft and wild animals, they thus sleep during the daytime hence need fresh and cool air. Nights are cold in Dodoma.



GOGO HOUSE

(E) **HEHE**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS

Rectangular or Angular in shape with a flattish roof (TEMBE)	Cooking place, visitors room, sheltered courtyard also for storage, parents sleeping room, room for receiving guests, two rooms for cattle and goats, two rooms for youngsters and adult members of the family, one room for cooking and one room for sleeping. Gogo and Hehe houses provide great similarities in layout and shape, built in stages.	About 90 square meters. Headroom height is about 2.5 meters.	Two external doors opposite each other. No windows are provided except for small vent holes at intervals of one to several per room.	Well kneaded clay is used for the walls (externally and internally). The arched roof is made from carefully curved wooden supports and the rood (tree) is then matted with clay, reeds and grass.

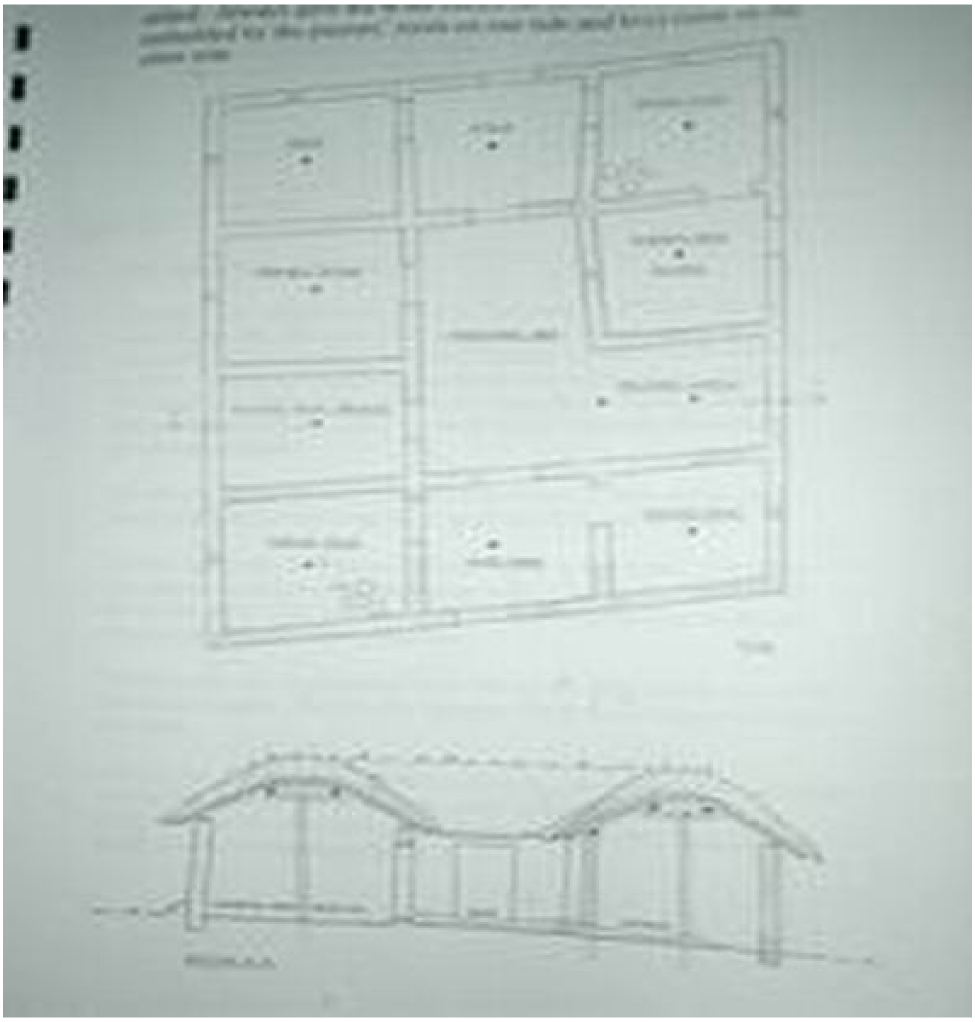
Table 7.5

The Hehe tribe – TEMBER

The Hehe traditional house is one with several apartments. The Hehe like other Bantu ethnic groups do construct their rectangular houses by using clay soil. The roof is neatly provided with a pressed layer of clay soil. Very little windows are provided of about 150mm diameter due to cold in Iringa where the Hehe live.

At a start a Hehe house is constructed by providing a sitting room at the centre with a sleeping room and kitchen on its sides.

As the family increases by having more children more rooms are added. Always girls are at the centre for obvious security reasons, embedded by the parents' room on one side and boys room on the other side.



HEHE HOUSE

(F) **NGONI**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Cone-cylindrical	Two similar half cylinders divided by partition. Fire place for cooking and food preparation, keeping animals, and sleeping room. The floor is provided with grass carpet.	Outer diameter is 5.4m. Inside height at the peak is about 3.5m.	Two doors opposite to each other. No windows are provided. Cross ventilation is through the top of the wall perimeter.	

Table 7.6

The Ngoni tribe – MSONGE

The Ngoni are said to have come to Tanzania from South Africa. They left South Africa in 1824 advanced northward crossing the Zambezi river to settle in Southern Tanzania around the Ruvuma river in 1935. The main reason of the movement was because of the Mfecane war. This was a tribe war arising due to land shortage an advancement of Boers from South to north. They are famous for maize and tobacco.

The layout of the Wangoni house is in line with their polygamy practise which is their traditional practice of family formation.

At best, as a start, a Wangoni family builds two houses. One of the houses with 2 doors is for the senior wife. The smaller house is for the junior wife. The husband and children sleep in separate houses, alternating between the two houses.

Traditionally, the large house has a hole in the floor which is used for urinating at night. Early in the morning the hole is cleaned out with hot ashes.

Third open - sided bwalo shelter is used for socializing and craft work by men (the Ngoni are famous as wood carvers) Outside the compound of the three fenced structures at the Village Museum is a small shelter for black smithing.

(G) **HAYYA**:

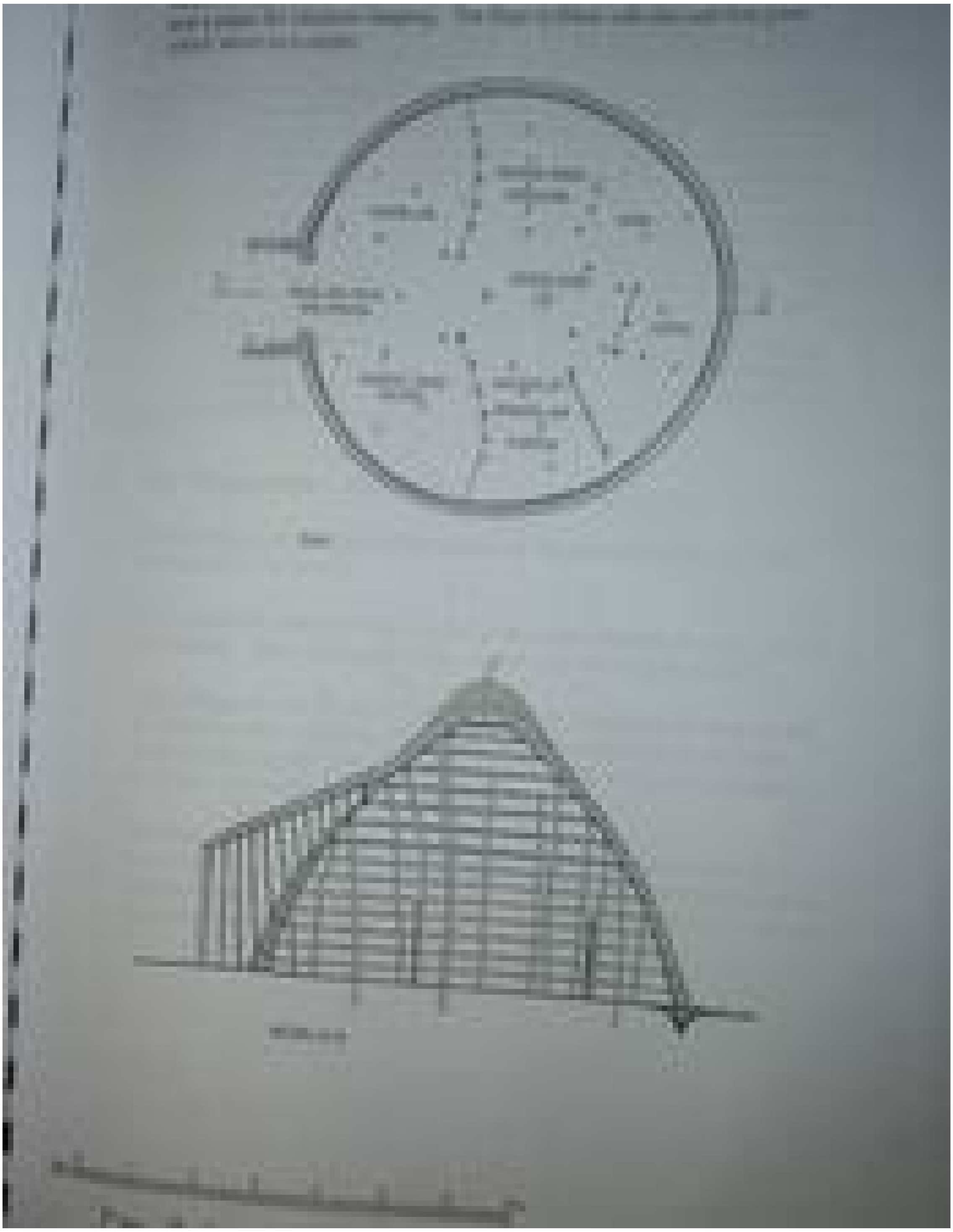
SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Conically shaped ***"MSONGE"*** The traditional "Haya" house is becoming unpopular to-day.	Sleeping area for parents and small children (right or central area) Sleeping area for grownups children (left of central area) Fireplace and food preparation and storage (central area) Space for friendly talking and "guest wing" Floor is covered with	Approx. 6.5m diameter with a height of about 4.3m in height.	Usually only one door is provided which is protrusive and arched. The arched door way or foyer extends outwards to make a long arch.	Thatched all the way through from ground to apex of a conical house. Closely parked bamboo, split bamboo pieces, sticks and reeds closely parked together as internal finish on place of plaster. Ropes of banana barks. Hewed strong columns with no nails. Strong poles used. Ample technical construction details is seen.

	dried grass. A "Ha" beehive "ngondano" traditional house is much used by old people even at present.			

Table 7.7

The Hayya tribe – MSONGE

The Hayya house is of distinctive "shaggy dog" appearance. It is entered through a long porch. The builder works from top to bottom, using closely-packed bamboo held in place by circle of sticks thatched with tough grass. Inside are many artefacts, including a bark bed cloth and gourds from which beer is drunk through the bamboo straw. There is a sitting room, bed room for parents, a church (Hayya used to preach in the house before going out side), kitchen, storage and a place for children sleeping. The floor is filled with this and fine grass which serve as a carpet.



HAYA HOUSE

(H) **CHAGGA**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS

Conically shaped MSONGE	Parents sleeping area, children sleeping area, cooking area, pen for cattle and goats. Food storage on the second floor. The Chagga used to share their homes with their domestic animals because of predators like leopards.	About 5.6m diameter Height measuring a total of about 4.9m (two levels)	Only one door is provided (rarely the second door is provided). No windows are provided.	House covered with grass work all the way through from ground to apex (for heat restoration) with "fito" inside woven closely together ("sochi" or "Okooyo") The Pare and Meru build this type of house.

Table 7.8

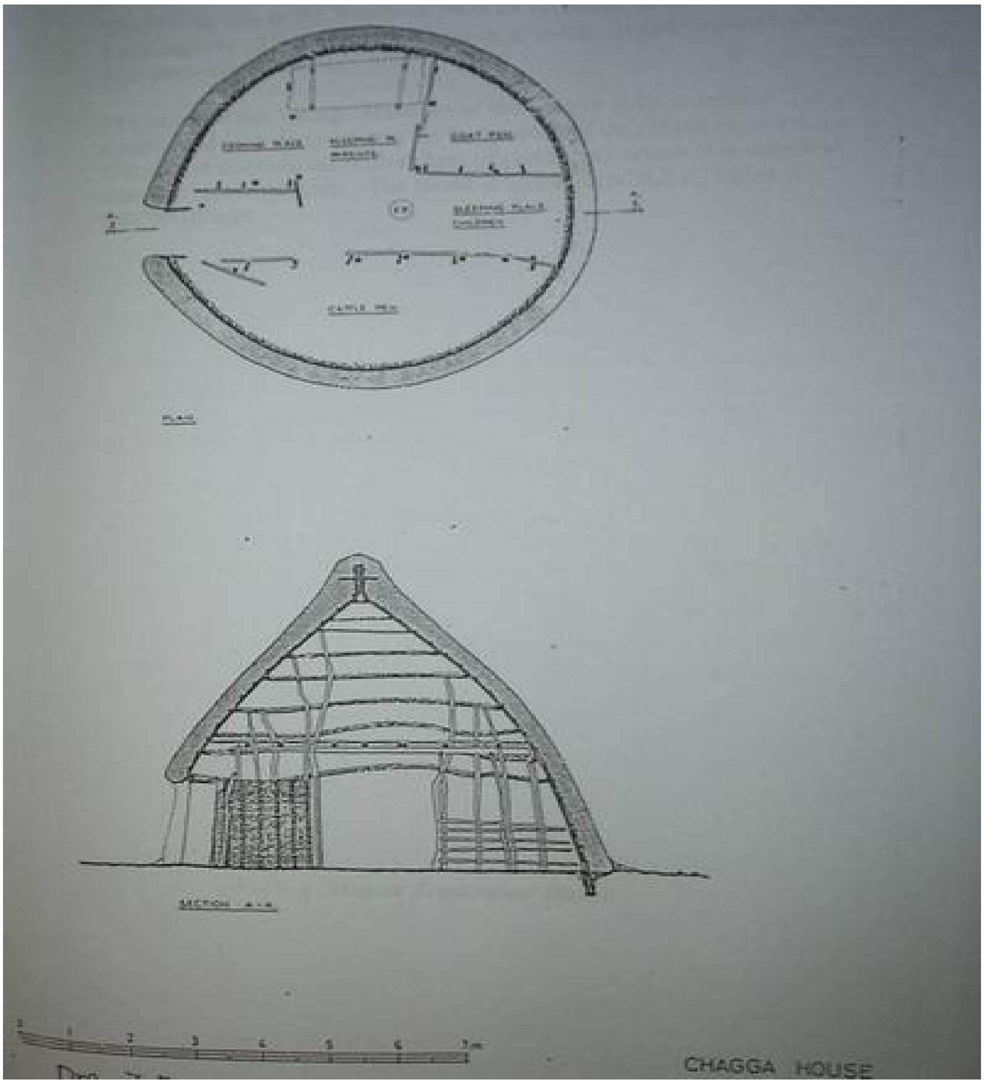
(H) The Chagga tribe – MSONGE

The Chagga live on the fertile slopes of Mount Kilimanjaro in the north east of Tanzania.

They practice intensive agriculture cultivating banana, maize, coffee and beans. They also keep cattle, sheep and goats as livestock.

The Chagga house at the Village Museum is made out of framework of flexible wood which is then covered with a thick layer of grass from bottom to top. The thickness of the thatch serves as insulation from the cool climate of the mountain area.

The layout of the Chagga house is such that one sleeping room is for parents, the second room is for children. Cattle and goats/sheep are in the same main house near where cooking takes place. Their livestock are fed in the house – zero grazing.



CHAGGA HOUSE

(I) The Makua tribe – MSONGE

The Makua live in the Southern parts of Tanzania in the Mtwara and Lindi regions. They cultivate cassava, groundnuts and cashewnuts as their main crops.

The house at the Village Museum of the Makua tribe is solidly constructed with earth plaster on framework of thin three supports. The roof is constructed with rafters of poles onto which it is thatched neatly in layers of grass. The house is circular (NDULE) being a MSONGE type.(Refer Fig, 2.2at Chapter Two)

(J) **SAMBAA:**

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Cone-cylindrical (MSONGE)	Traditionally, only one room is	12 – 15 square meters when the	Small holes are provided (about	Poles, fitos, grass as thatch,. A

	built with about 12 square meters. The house is divided into several rooms depending on the size of the house.	house is of only one room.	150mm – 300mm diameter) as windows. Only one door is provided.	wooden post (as column) is provided at the centre of the house as support of the thatched roof. Plastered inside and outside with clay soil.

Table 7.9

The Sambaa tribe – MSONGE

The Sambaa who are a Bantu of north- east Tanzania with Lushoto in Tanga Region as their major town have cone-cylindrical houses (MSONGE) as their traditional houses. They are of mud and pole and fitos construction and grass roofed.

In the 19th century the indigenous clans on the Sambaa namely Wahea, Washee and Wakinaturi inter-marriaged with foreign ethnic groups like Wambungu, Wataita from the North Wakwizu from Pare and Wakilindi from Nguu. Others were Wazigua from Zigua and Wabondei from Bondei (Chief Kimweri).

Such a composition has made the shapes, styles and constructional techniques evolve the Sambaa houses towards the rectangular or typical Swahili houses.

The Iraqw tribe – MSONGE

Iraqw **is the largest ethnic group which inhabits the Mbulu, Babati and Hanang districts in Arusha Region.**

Construction of their houses involves careful selection of poles to attain strong wood-work, and the houses are sited facing a valley.

The design, layout and siting of the Iraqw houses is dictated by their need of security as they are primarily agriculturalists who keep large heards of cattle, goats, poultry and often bee-hives, and also cultivate maize, wheat, groundnuts and beans.

The round house which is rare, known in the Iraqw language as *"Quri"* **was used mainly during peace time and has two storeys inside while the subterranean house ("Assemo") was primarily to defend against the Maasai raids. These subterranean houses built underground or cut across the hill were often interconnected by an underground tunnel that led to the central hide**

out – or through which they run with their cattle to the other side of the hill.

Currently Iraqw construct their houses with hipped roof. (refer Current House at fig 7.7)

At night children sleep on the upper platform, while cattle are kept below the platform. Parents and children sleep on one side.

The Iraqw cattle are nearly everything. With cattle they are assured of various provisions like clothing, bed sheets, and also being a symbol of authority and status. They prefer to live with cattle because cattle provide them with warmth. Both of these two types of houses are now rare in the region.

(L) **HA**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Conically shaped MSONGE), and More so dome-shaped. Small in size Before thatching the house resembles a large invented wicker-work bowl – typically known as NGONGLANO.	Sometimes the house is portable. No division or partitions are provided in the house.	Quite small in size measuring about	Only one door is provided. No windows or small holes for lighting are provided lighting by fire.	Sticks or quite thick and strong straws, not big woods or poles are used. The thatch, is very carefully applied, starting at the ground and working up to the top.

Table 7.10

(L) The Ha tribe – MSONGE

Ha is the largest ethnic groups to be affected by an artificial colonial boundaries. Only about 7.5 per cent of them live in the Kigoma Region of Tanzania and are known as ***Waha***, while the rest live in Burundi and are commonly called ***Warundi.***

The Ha traditional house placed on the south-east corner of the site of the Village Museum is dome-shaped house i.e. conically shaped (MSONGE). The layers of straw used in its construction are thick and strong.

The Ha are both fishers and farmers. The house is portable, letting them be able to move according to their activity. The movement of the house may also be influenced by death of a beloved one. They will remove the house on the belief that the area has an evil spirit. When carrying the house away, the head of the household will seek for assistance from friends, neighbours or relatives.

A “Ha” beehive “Ngondano” traditional house much used by old people even to-day

(M) ***The Zanaki tribe – MSONGE***

The Zanaki is an ethnic group of Bantu speakers and inhabits in Musoma Region, East of Lake Victoria.
(The first President of the United Republic of Tanzania,
Mwl. Julius Kambarage Nyerere belongs to this ethnic group)

Construction of the Zanaki house at the Village Museum comprise of poles and fitos for the walls and roof frames. The roof is grass thatched and the walls are plastered with clay.

The Zanaki house is traditionally provided with two doors. The main door of the house is used to get into the fenced area where many cores take place, while the small door is for security against thieves and wild animals.

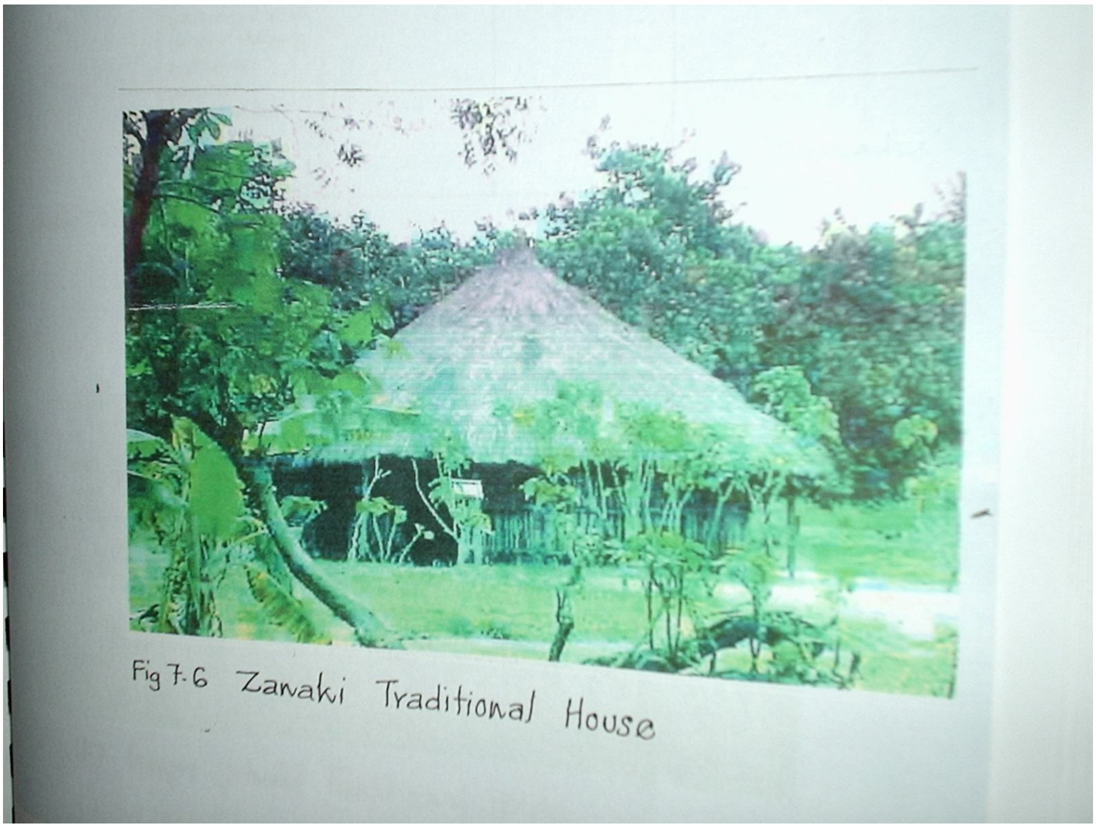


FIG: 7.6 zanaki traditional house

(O) **MBULU**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Rectangular and Angular in shape with flattish roof (TEMBE)	Men's place for meals and chatting at the entrance. Sleeping place for father and son. Working place for women and keeping cattle at night. Cooking and sleeping place for girls. Main cooking place and for women to take their meals. "Second" floor is used for mother and small children sleeping and storage purposes. Middle of the house is for	Usually very large house of about 110 square meters including verandah. Very low height.	No windows or window opening and no vent/hole. One door opening is provided.	Poles, reeds, fitos, soil, grass, ropes. It is semi-subterranean, which means it is partly dug into the sloping ground with only the front wall entirely free above ground.

	small cattle, sheep and goats.			

Table 7.11

At Figures 7.10 and 7.11 there are Iraqw (Mbulu) Traditional Houses

Fig: 7.7 Iraqw (Mbulu) House – Current

MBULU HOUSE

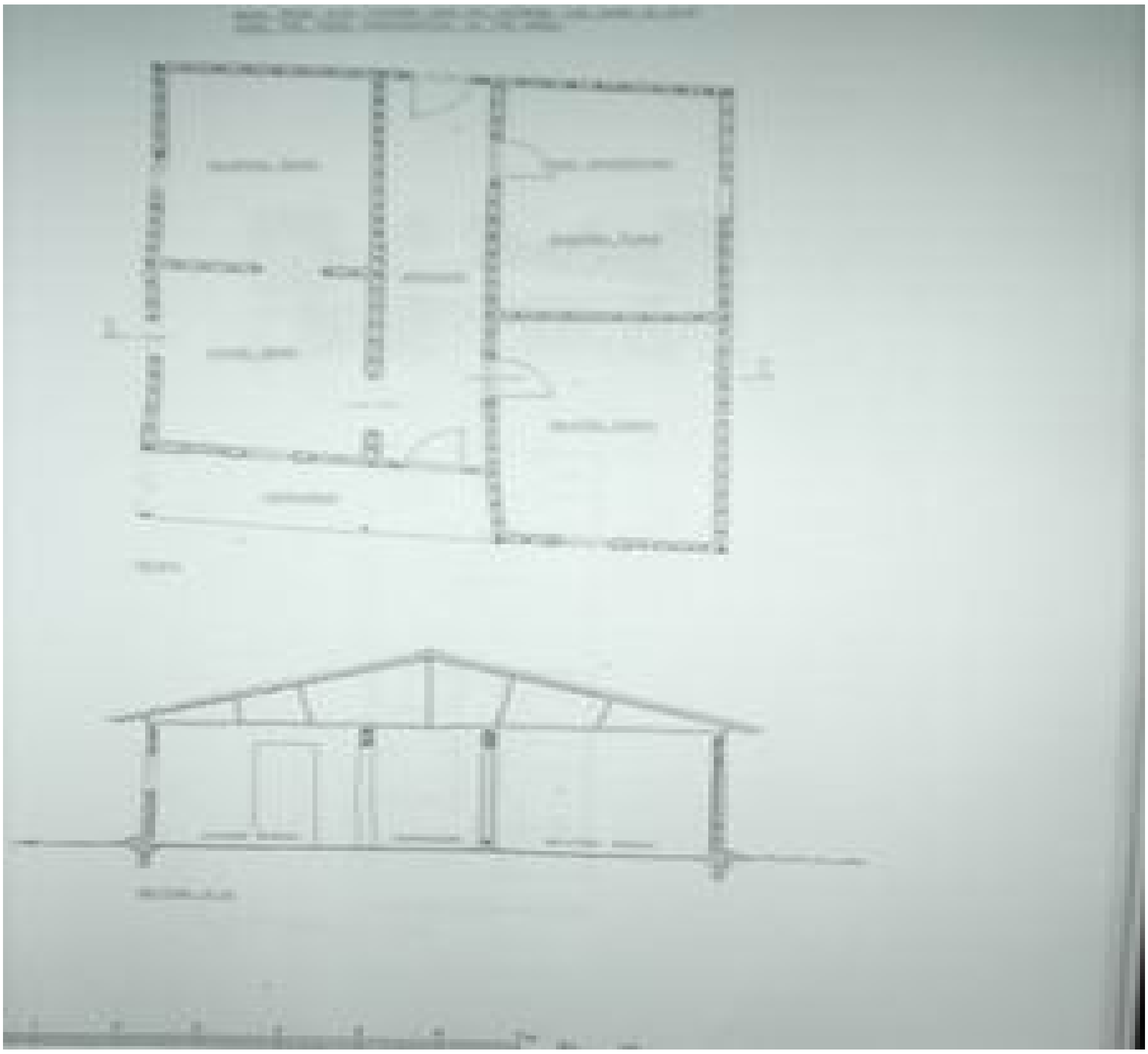


Fig: 7.11 Side view of a Mbulu semi-subterranean house, the orientation if these houses on sites depends on direction of the slope.

(P) **FIPPA and RUNDI**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Conically shaped (MSONGE)	Circular layout with no partition inside	2.5 – 4.0m diameter. Heights 2.5m at centre sloping evenly at the external round wall reaching 1.5m. Height for the Rundi house at the centre is 1.7m sloping evenly at the external wall up to 1.1meters. The size can differ depending on the purpose,	One door opening is provided. No windows or holes for lighting or ventilation are provided.	Poles, sticks, grass and earth mixture. The house is conical and thatched with long grass from top to bottom. The interior of the house is plastered with earth mixture.

		size of the family and household wealth.		

Table 7.12

The Fippa tribe - MSONGE

The Fippa live in the Southern Western highlands of Tanzania. They are agriculturalists, cultivating maize, groundnuts and millet and those who live by the shores of Lake Rukwa include fishing as one of their economic activities. The Fippa have also a long history of iron smelting. The small shelter-like unit displayed at the Village Museum acts as a moulding area for iron products.

The Fippa house on site of study is conical and thatched with long grasses from top to bottom. The interior of the house is plastered with earth mixture.

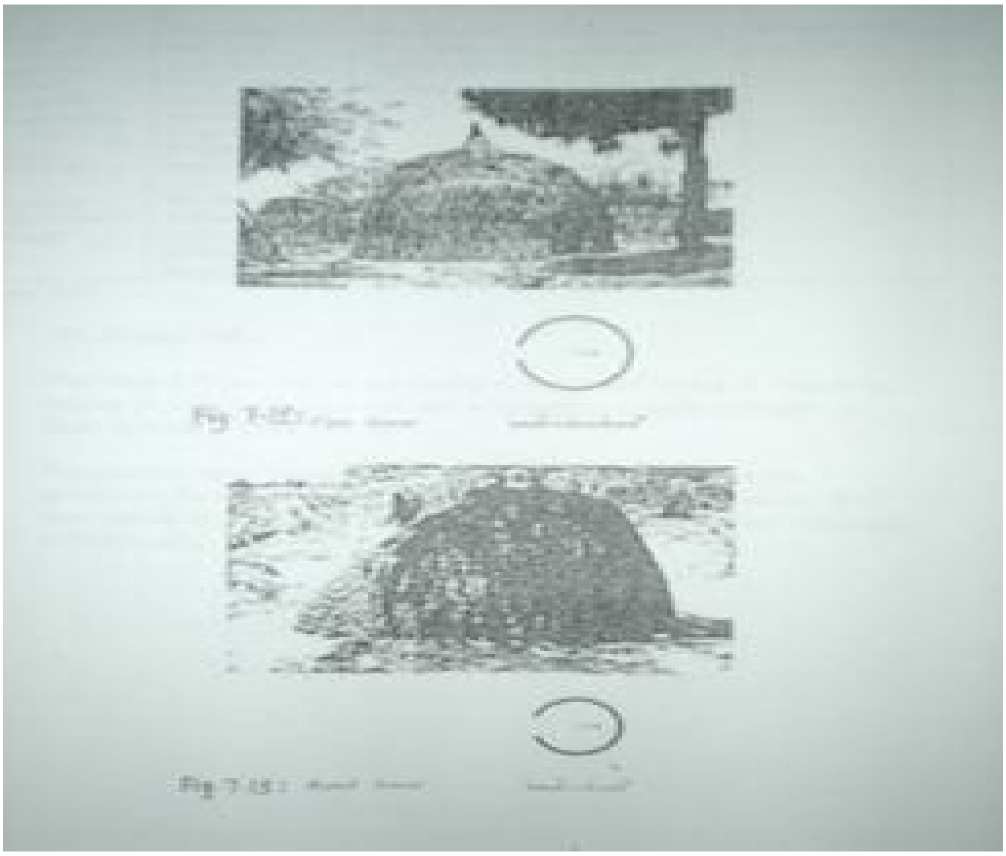


Fig: 7.13

(Q) **MAASAI**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Oblong. All corners and angles are smoothly rounded off (unique shape), and now adopting "MSONGE" The Maasai house is known as "engaji"	Two rooms with one "open" partition small fenced area for keeping goats and poultry, sleeping room, fire place and food preparation. The Maasai settlement is usually surrounded by a thorn fence.	Main house is 5m x 3.5m. Highest point is 1.75m	One door opening is provided, extending from the house like the opening of a snail shell. No windows are provided but a small vent hole near the sleeping place.	Made of wattle and daub.

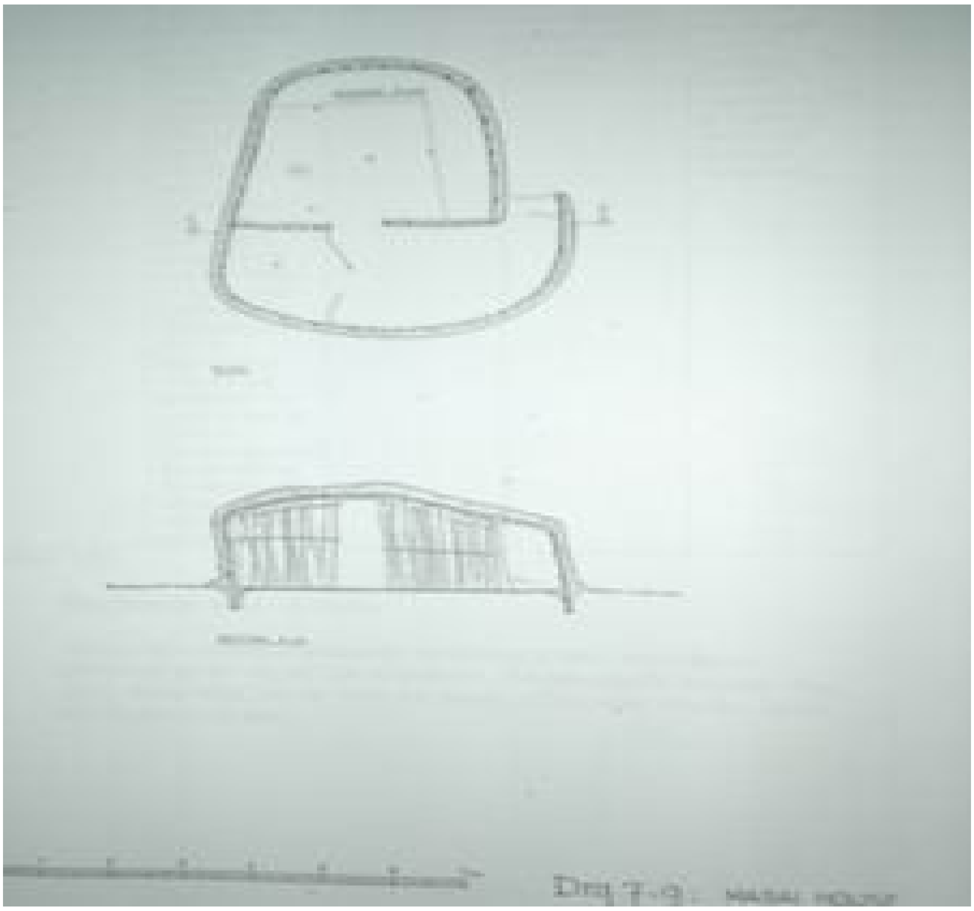
Table 7.13

The Maasai tribe

The Maasai house has no similarity to any other house in Tanzania, neither in layout nor in shape, even though it is made of wattle or daub like many other houses.

The house is constructed from earth mixed with cow dung to strengthen their building. The boma consists of several units. It is surrounded by a fence of throny twigs to encourage the intruders and wild animals.
The pattern of settlement of the Maasais is a circular cluster of between eight and sixty similar houses with an open yard in the middle.

The type of house is only used by the Maasai who number about 65,000 in Tanzania.



DRG 7.9 MAASAI HOUSE

ZARAMO

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Rectangular house with either gabled or hipped roof.	Two external doors are provided facing each other on the two long sides of the house of the house with passage in between. Verandah is provided as part of the main house. Usually 2- 6 rooms. A sleeping room from which a toilet room is accessible (not	32 square meters including verandah. Height from ground to ridge about 2.6 meters.	Originally no windows were provided thus ventilation depend on the two external doors facing one another at each end of the corridor.	Poles, fitos, reeds, makuti (coconut palm leaves) ropes, thatch. Original house of Zaramo is thatched all the way through (even its partitions). The thatch is supported or held in position by tying it with fitos/reeds horizontally.

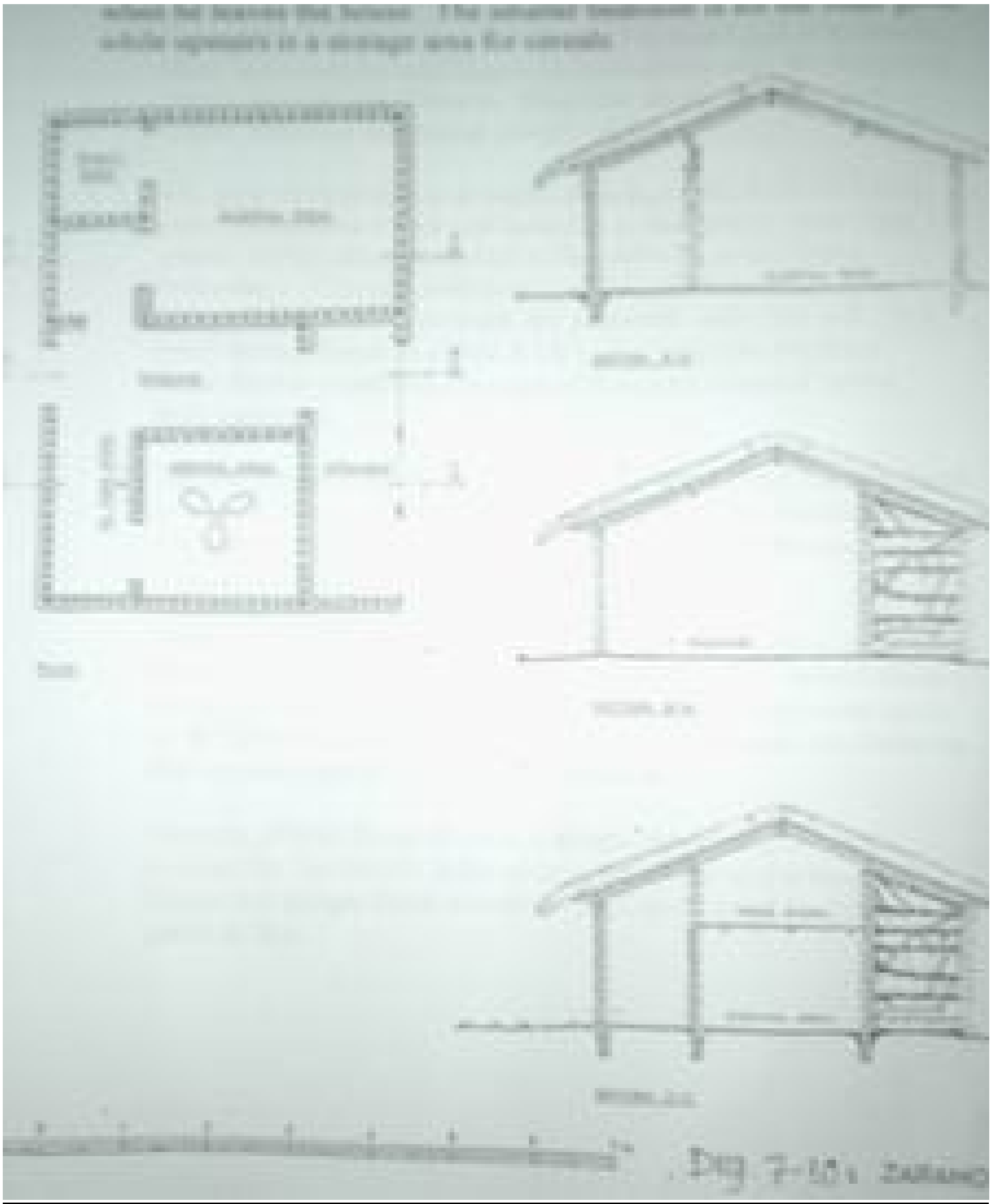
	common feature of design in the rural houses in Tanzania), and also the application of verandah and corridor for the Swahili house is favoured. Kitchen and store are provided on the opposite side of this. Used both in rural and urban areas.			

The Zaramo tirbe - BANDA

Zaramo are coastal community inhabiting an area immediately surrounding the city of Dar es Salaam. Predominantly moslems they share many other habits with the people of Zanzibar, Pemba, Mafia and Comoro Islands.

"*Dungu" –* **This is the original Zaramo house commonly constructed or found in the agricultural farms to guard their crops. It is always built at the field edges to scare away birds. The** *Rufiji* **people use similar houses. Their rice fields are often flooded during rainy season, so they live "upstairs" to escape from the water.**

The large traditional Zaramo house is made of grass tied to a frame by sticks. Farm tools and storage tub for rice are kept in the house. The larger room is the couples bedroom, with a separate bathing room for parents. It is the Zaramo habits for a father to clean the room when he leaves the house. The smaller bedroom is for the older girls, while upstairs is a storage area for cereals.



DRG 7.10 ZARAMO HOUSE

(S) The Kwere and Doe tribes - BANDA

Wakwere and Wadoe are matrilineal ethinc groups, who resides in Coastal Region in Bagamoyo and Kibaha districts and rural Morogoro district in Morogoro region. Wakwere and Wadoe are agricultural communities cultivating mainly millets and pulses with maize, rice and cassava.

They also keep cattle, hens, goats and practice fishing and hunting activities.

Culturally they share much with the Waluguru and Wazaramo. They have cultural and linguistic similarities with the foregoing ethnic groups and Wakutu. They also share the same clan origin, religious and social pattern of life.

he type of their house is called *Banda*, neatly built by using poles (*Misaraka* which are believed to last longer more than 50 years), small poles *(fito)* tied to the poles by using fibers *(miombo)*. The roof is thatched with small bundles of grasses called *ving'ondwa.* Its walls are plastered with clay soil. The small *banda* house is called *SAKA*, is a bedroom for boys. Boys always construct this type of house to reveal or prove their maturity.

he big house is for parents. There are two rooms, the left hand side is for the senior (eldest) wife and in case the husband marries another wife the other room will be used by junior (young) wife.

On the upper level of each of these two rooms there is a storage place for cereals *(sorghum and rice)*. More-over behind these two rooms there is another room for father or some times used by daughters. During the colonial rule fathers used this room as hiding place against colonial tax evasion.

Out side of this house there is a *dungu* for storing cereals (maize) for the family belonging to the father of the homestead. Under the *dungu* there is underground room used for keeping goats or hen.
ince time immemorial health care of Wakwere and Wadoe ethnic groups have been influenced with their social, cultural and economic life. They had preferred the traditional healing system. There are two miniature huts under a tree. The smaller one is called *Kinyamkera*. It can be compared with the district hospital available in the modern society. It is used for healing and making offerings to patients who suffers from illness or not critical sickness. The other one is called *satanic* hut for treating patients who suffer from evil spirits. In this case it is compared with a referral hospital. It cures critical sickness relating cases.

he height of the doors in this house are a bit low. Wakwere and Wadoe are short. But they feel so comfortable with the bending when they get in or out of the house.

<u>SWAHILI</u>

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Originally from the Zaramo shape, being rectangular with either gabled or hipped roof.	There is a corridor running through the centre of the house with 2 – 6 rooms on either side of the house arranged symetrically and	About 68.5m^2 including verandah Height from ground to ridge is 3.4m.	Ample ventilation is available due to provision of windows to each room and height of roofed Swahili house.	Poles, usually (mangrove), fitos, reeds, coconut palm leaves, clay soil and ropes.

	accessible from the passage. There is a verandah in front of the house and an enclosed courtyard at the back containing a small house with a toilet, storage and kitchen. House is mainly for sleeping rooms (equal numbers of rooms on either side) sometimes cooking/food preparation is done in the corridor. Any ***poultry***, washing, pounding, clothes drying lines are carried out in the enclosed courtyard.			

The Swahili tribe - BANDA

The Swahili house is very common along the Eastern African Coast, spanning from Lamu in the north through Mombasa, Tanga, Saadan, Bagamoyo, Dar-Es-Salaam, Lindi, Mikindani, Kilwa and Mtwara in the south of the country. And also Islands of Zanzibar and Pemba.

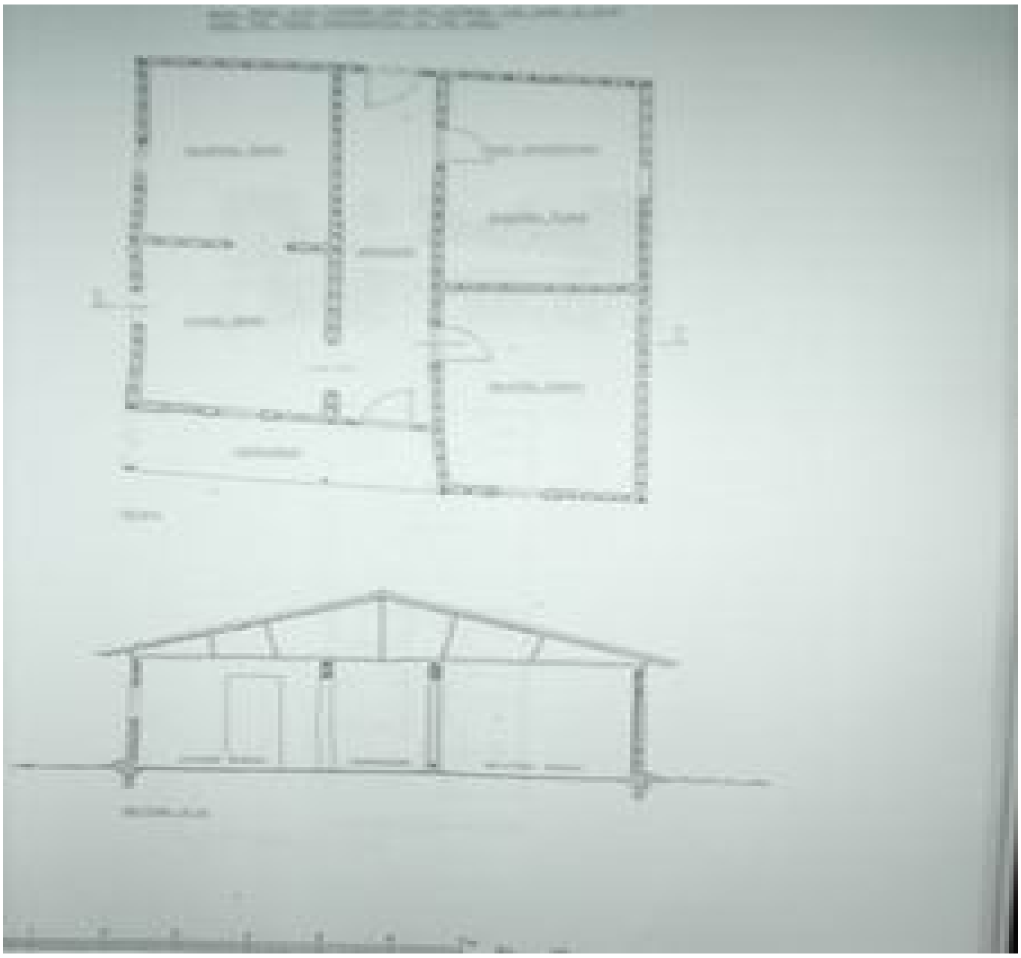
The *Swahili* **is a collective term for a community of people which inhabit the coast of East Africa.**

The Swahili house studied at the Village Museum is a rectangular house with a hipped roof. Its internal layout includes a central passage (corridor) and rooms arranged on both sides of the passage and accessible from this.

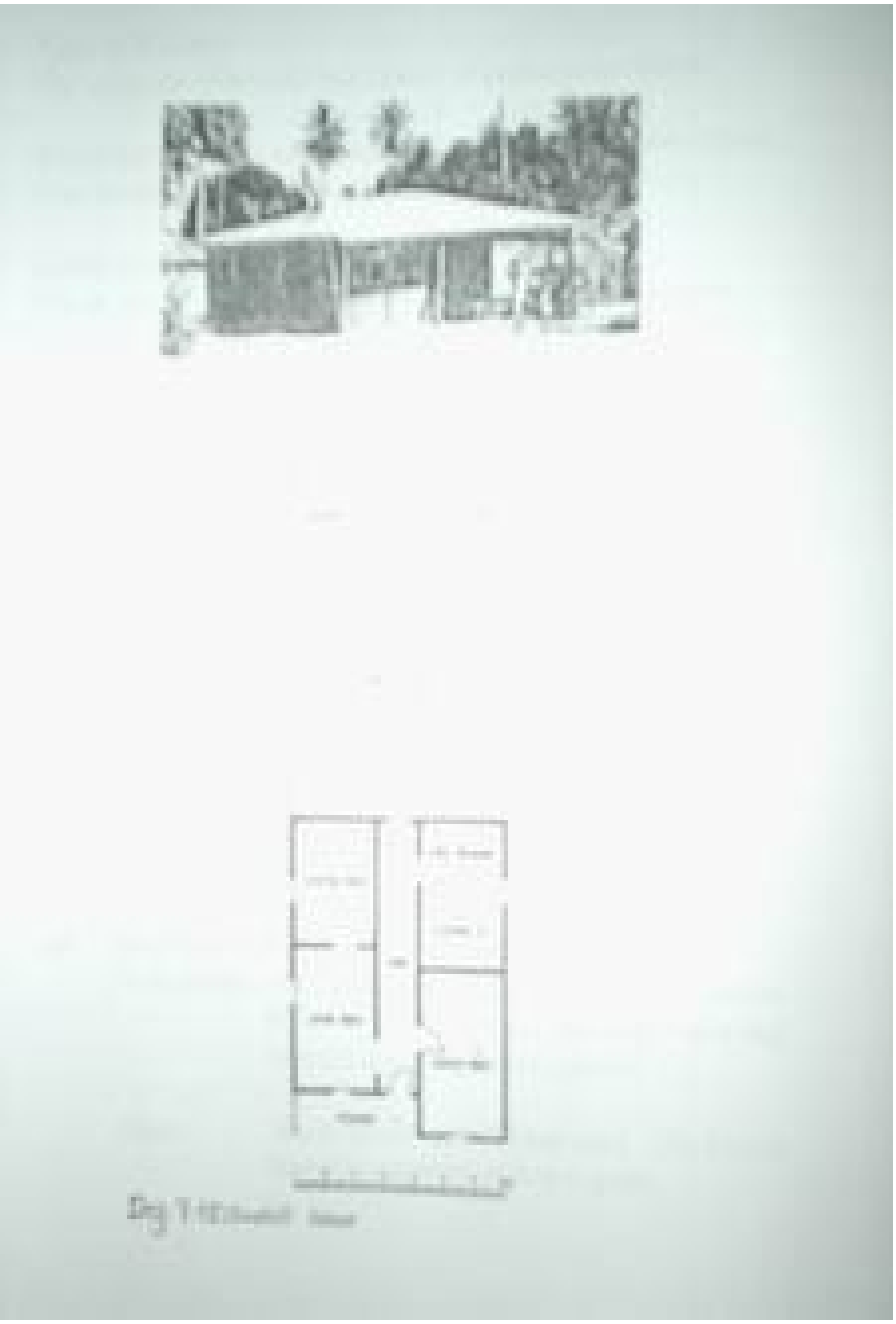
The house has a verandah in front and enclosed courtyard to contain toilet, storing and cooking facilities. Materials of construction are mangrove poles, fito, coconut palm leaves, clay. *(Chapter 1` (1.22) – History of Housing Dev. in Tanzania*.

Grading the Swahili House

As for the colonial rulers, materials such as mud and pole urban swahili houses were considered a temporary solution. It used to be named semi-permanent, non-durable, third class and temporary house. These terms reflected the attitude of the colonists in relation to native housing as unsanitary, cheap, uneconomic and ill-suited to modern methods of city planning.



DRG 7.11 4 – R SWAHILI HOUSE



DG 7.12 SWAHILI HOUSE

7.2.2 <u>Summary of the Case Study Findings</u>

indings gathered from the Village Museum Case study describes the house elements, layouts, shapes/types, building materials and their costs, services and functions.

ype of Houses
he majority of houses have plans of rectangular shapes.

hile the rest have round house plans, and one oblong house plan belonging to the Maasai tribe.

nside Layout of Houses
nside rooms arrangement of each house did not resemble; differing from one house to another depending on the ethnic group of the given tribe and the climatic environmental conditions it experiences; but all houses have rooms depicting intentions of separating functions carried out in the house. Some houses have verandah or potch at entry.

ain Use of the House
t was noted that all common activities covering food preparation, cooking, eating, sleeping charting and meeting visitors take place in the house.

pace for animals, such as cows, goats, calves, is not provided in the Village Museum. It was reported that they are kept both, indoors and outdoors in a fence or kraal depending on locality and culture.

(a) *Materials Used*

Foundation **-No foundation was noted to all the houses. Poles to form the walls are simply dug and erected upright into the ground.**

Floor **-Earth floor/consolidated mud. The Hayya house is carpeted with dry grass.**

Walls **- Poles, branches, fitos, mud, bamboo, reeds, banana ropes, creeping plants as ropes and cow dung as plaster.**

Thus ending up with a wall mud – structure which consists of straight poles dug into the ground. Split poles are tied horizontally on the outside and inside of these poles. Thus framework is then covered with mud, usually plastered on the inside. Sometimes the framework is parked with coral stones (coastal area for the Zaramo/Swahili house) before plastering.

Roof: **Poles, fitos, reeds, creeping plants as ropes and banana ropes forming up the roof structure; with grass, palm leaves (fronds) or mud as roof covering material on top of the roof structure.**

(b) *Ventilation:*

-small openings/holes on walls
-Doors
-Unplastered top end of walls as openings.

(c) *Finishes:*

Mud plaster on the inside surfaces for the walls. Five houses have their outside surfaces of the walls plastered.

(d) *Ceiling:*

All houses have no ceilings provided, except three houses have partial constructed ceilings being used for storage purposes. Their construction are of poles and fitos.

(e) *Services:*

-Cooking place – provided inside the house where chatting is done (sitting room).

-No electricity and water connection

-Storage – Small items are stored in the house, hanged on the walls, on ropes, under the bed and on the ceilings where provided.

-WC – No WCs/latrines are provided in the Village Museum except two toilets of European type for visitors of the Village Museum and Staff.

(f) *Shape:*

Walls: **Square/rectangular forming a four corner house. This shape came up with a** *Tembe* **and** *Banda* **Types.**

	Round	-	*Msonge* **Type**
	Oval	-	*Msonge* **Type**
Roof:	**Flat**	-	**roof not raised.**
			Tembe **type**
	Pitched	-	**four corner house**
			Banda **Type**

Conical/Pointed roof - *Msonge* Type

Construction materials used for the houses: bamboo, poles, sticks, grass, palm leaves (fronds), forest creeping plants and ropes of banana backs as ropes for tying up poles, bamboo and sticks together, cow dung as mortar, reeds woven together as door shutters. (No evidence of use of nails, screws/bolts, concrete blocks, burnt/unburnt bricks, sand, roofing metal/iron sheets and tiles.

Having gone through the houses of the 18 styles presented in the village. There is all convincing evidence that the building styles of the Museum are used in a contemporary society.

-*Common Room* **-This is noted and reached immediately one entered the house preceded by a verandah or potch.**

Kitchen - **Position and cooking facilities not at all related to the so called modern styles.**

-*Element* - **Sizes of the building (walls, windows, doors,) room sizes, constructional materials used for the building: poles, grass, fitos, palm leaves, cripping plants as ropes cow dung as mortar, reeds woven together as door shutter., rummed murrum as floor.**

Construction techniques:
o nails, screws/bolts but forest cripping plants as ropes, timber, poles, fitos used.

lo concrete blocks, stones, burnt/unburnt bricks, sand, roofing sheets, tile used.

ervices - **No electricity and water connections. In side the house always dark and no ventilation due to lack of openings as windows.**

lo traditional pit *latrines/toilets* **of any kind are provided in the Village Museum. Modern toilets (WCs) are provided for the Museum visitors' use.**

7.2.3 *Conclusion*

he result of house types and shapes being advocated are based on the survey carried out at the Dar-Es-Salaam Village Museum. This is supplemented by a number of research visits by the researcher in the rural areas and application of a structured questionnaire.

Out of the X No. houses found at the Village Museum in Dar-Es-Salaam "a" are round houses (MSONGE), (b) are and thus coming up to MSONGE, BANDA and TEMBE.

It has been noted that the three styles (MSONGE, BANDA and TEMBE) have emerged as a result of climatic conditions, environmental conditions, geographical conditions (topography), availability of materials, life/cultural style, security considerations and adoption from neighbouring countries through immigration.

TRADITIONAL HOUSE TYPES AND SHAPES

7.3.1 *Types of Traditional Houses*

The traditional houses in Tanzania can be identified into three main *types*

- **Banda**
- **Msonge**
- **Tembe**

The *Banda* **type of house is a four corner house and taking the lead in representing the housing styles used in contemporary Tanzania. Their layout and types are found in all regions in the country but originally used by a single group of tribes of the Zaramo and Swahili in the coastal areas. This type of house comprises the following:**

- **Rectangular House with** *hipped* **roof and entrance door on the long side of its four walls. Found in all regions of the country. It covers 40 – 45% of the rural houses.**

- **Rectangular House with** *gable* **roof and entrance door on the long side of its walls; and found in all regions of the country, covering 20% of the rural houses.**

- **Rectangular House with** *hipped* **roof and entrance door on the short side of its four walls. This is a "Swahili House", commonly found in the Coast Regions, covering 10% of the rural houses.**

According to the Household Budget Survey (HBS) 1969, the most common traditional shape of houses was rectangular with entrance door in long walls there were about 71%. Out of these, 36% houses had hipped roof, 19% houses had gable or curved soil roofs, and 2% houses had the roof sloping in one direction; 11% of the houses were rectangular with hipped roof and entrance in short walls and 11% was cone-cylindrical "*misonge*" Some 2.5% were of bee-hive type of roof structures without walls.

he *Msonge* type of house is a round house with a conically pointed roof and can further have their layouts and types divided into four groups (ethnic groups).

- **Fipa and Rundi House**
- **Chaga and Haya House**
- **Ngoni and Nyamwezi House**
- **Maasai House**

-Round con-cylindrical house.
Iorthern part of the country; also in few areas of Morogoro Region and Mbeya Region. It covers 5 – 8% of the rural houses.

Beehive houses.
Iorthern part of the country (West of Lake Victoria and eastwards along the border towards Kenya), and few in Rukwa Region. In 1983 this type house might have covered less than 1% of the rural houses in Tanzania.

Round bee-hive houses **(less common)**
Vestern border in Tanzania (Kigoma). Insignificant percentage of the rural houses in Tanzania.

he "*Mbulu*" semi-subterranean house in Arusha Region – Northern Tanzania falls into this *Tembe* group. The house is partly dug into the sloping ground with only the front wall entirely free above the ground. The orientation of these type of house depends on the direction of the slope. This type of house is now disappearing.

n the southern part of the country close to the Lake Nyasa a special variation of the rectangular gable roof house can be found with the roof at the gable prolonged at the top and with a separate support for the prolonged ridge beam outside the wall. In 1983 only a few houses might have been of this type. (Commonly used by the Nyakyusa tribe in Mbeya Region).

quare house with pyramid shaped roof
n most cases, even if the house plan was square, still the roof had a short ridge at the top. It is also possible that the coding for pyramid roofed houses in the HBS 1968 – 69 included such square houses with a short ridge and that such houses, more correctly, should have been classified as hipped roof houses.

he *Tembe* type of house has a roof which is not raised towards being flat, primarily of a four corner house; and can further have their layouts and types divided into two groups of tribes, which is a single ethnic of tribes:

- **Gogo House**

- **Hehe House**
- **Mbulu House.**

he Tembe type house comprises the following:

Rectangular Flat Soil Roof House.

Hot and Dry" and "Temperate" Central part of the country, covering 10% of the rural houses.

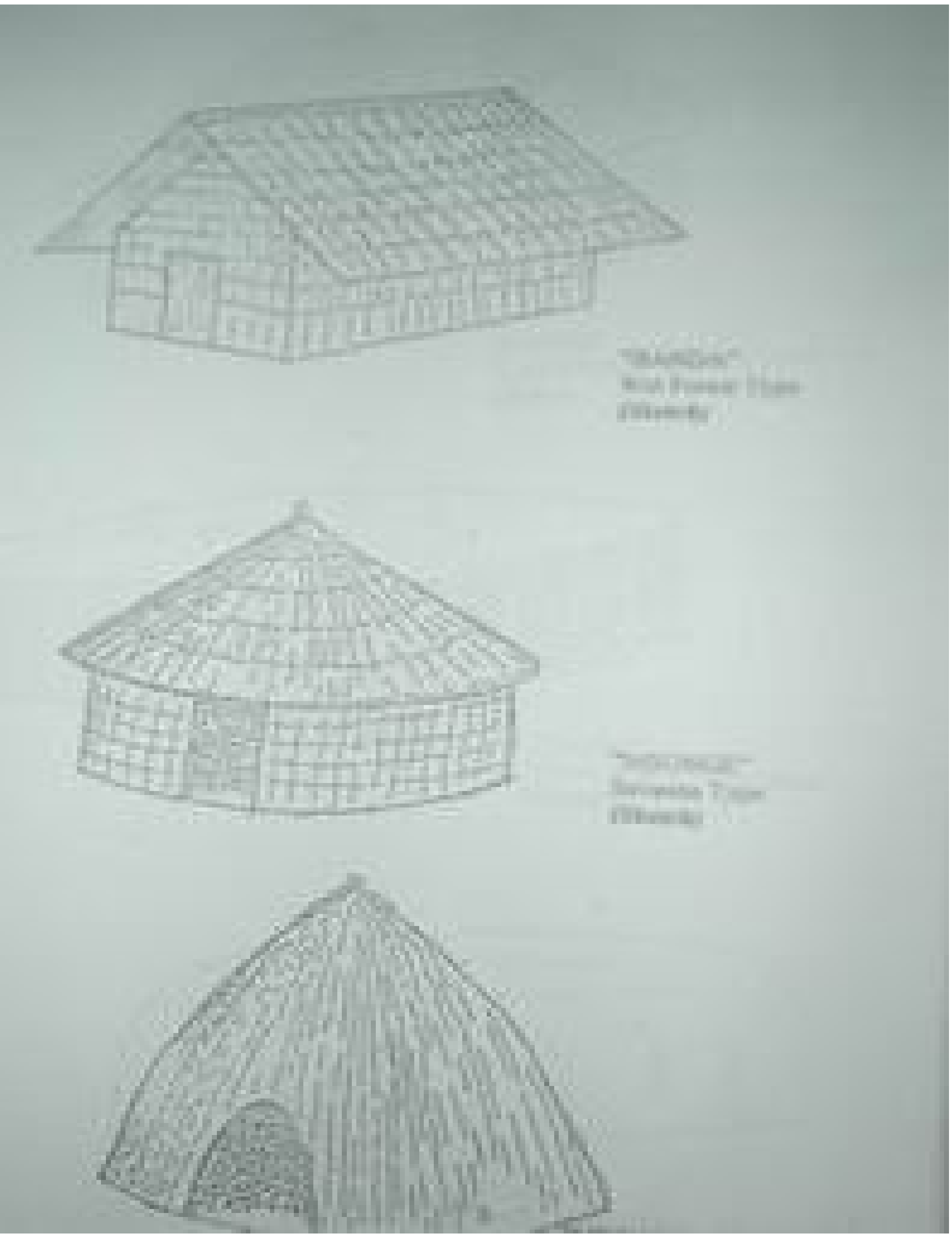
Long Rectangular House with vaulted roof

t is a curved roof built with insitu mud and grass, found in Iringa Region, covering 1 – 2% of the houses in the rural areas.

Oval Maasai House

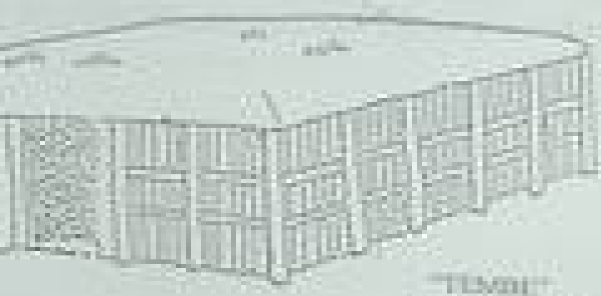
he Maasai House which resembles a long oval brown bread, is found in the Northern part of the country. It has a tunnelled entrance constructed in such a way that rain is prevented entering the dark interior (no windows). In 1983 this house type might have covered less than 0.5% of the rural houses in the country.

KETCHES OF VARIOUS TYPES AND SHAPES OF Traditional Houses are as below.



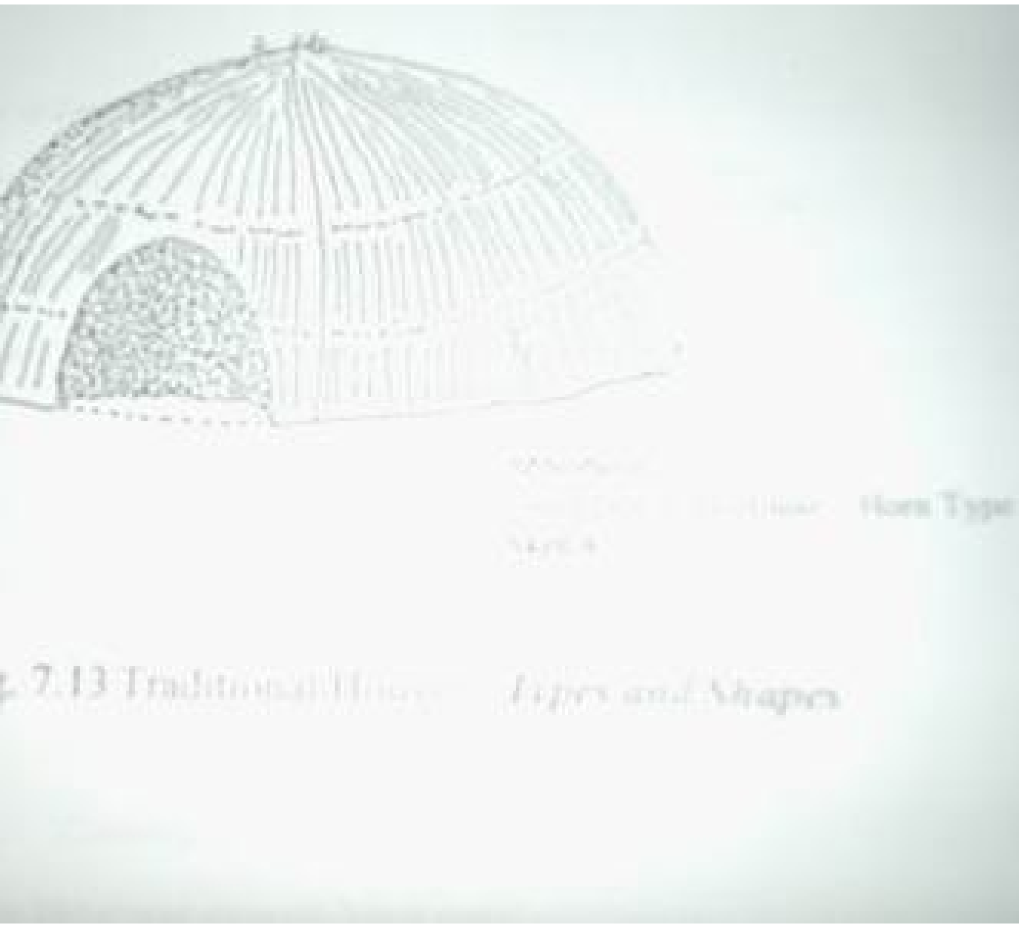
“MSONGE”
Round Cone – Cylindrical House
(Sketch)

"BANDA"
Zaramo/Swahili House - Coast type
(Sketch)



"TEMBE"
Tembe Type - Gogo Tribe
(Sketch)

"TEMBE"
Tembe Type [illegible]



Drg 7.13 Traditional Houses: Types and Shapes

Shape of Traditional Houses

Different types of shapes have been used spreading all over the country. These shapes have formed up themselves according to the ethnic grouping, with their cultures, coupled with the climatic condition of the given zone of the country (Village Museum).

According to the *BRU Working Report 68 the most common* **house shape is the rectangular house with hipped roof and entrance door on the long side and can be found in all regions of the country. The 1982 – 1985 survey records that this house type might have covered 40% - 45% of the rural houses in Tanzania.**

The *second* **most common house shape:**

- **Rectangular house with gable roof and entrance door on the long side.**
  - **Can be found in all regions.**
- **Covering 20% of the rural houses.**

'he *Third* **most common house shape:**

Rectangular flat soil roof house (Tembe)

- **Can be found in the "Hot" and "Dry" and "Temperature" in the central part of the country.**

Covering some 10 per cent of the rural houses.

'he *Forth* **most common house type:**

- **Rectangular house with hipped roof and entrance door on the short side (Swahili House").**
- **Found mainly in the coastal regions and Morogoro region.**

Covering 10 per cent of the rural houses.

'he *Fifth* **most common house shape:**

Round con-cylindrical house

Mainly found in the northern part of the country, in few areas of Morogoro region and Mbeya region.

- **Covering about 5 – 8 per cent of the rural houses.**

he *Sixth* most common house shape:

- **Long rectangular houses with vaulted roof covered with grass and soil.**

Found in Iringa region

- **Covering 1 – 2 per cent of houses in rural areas in Tanzania.**

he *Seventh* most common house:

Pointed beehive house

- **Found northern part of the country (West Lake Victoria and eastwards along the border towards Kenya) and few in Rukwa region.**

- **Covering less than 1 per cent (1983) of the rural house in Tanzania.**

Another less common house type is the smaller *round bee-hive house,* which can be found in the west border of Tanzania (Kigoma) in 1983, however, this house type might have covered an insignificant percentage of the rural houses in Tanzania.

The *Oval Masai- House* is a less frequent house type which can be found in the northern part of the country. In 1983 this house type might have covered less than 0.5% of the rural houses in Tanzania.

In the south part of the country close to Lake Nyasa a special variation of the *rectangular gable roof* can be found with the roof at the gable prolonged at the top and with a separate support for the prolonged ridge beam outside the wall (like a raised up tail). In 1983 only a few houses might have been of this type. In this survey no good examples could be found.

Another house which was used in the classifications for the Household Budget Survey (HBS) 1968 – 69 was *square houses with pyramid shaped roof.* In this survey 1982 – 85 however, very few houses of such houses were observed.

n such cases, even if the house plan was square, still the roof had a short ridge at the top. It is also possible that the coding for pyramid roofed houses in the HBS 1968 – 69 included such square houses with a short ridge and that such houses more correctly should have been classified as hipped roof houses.

As regards the house types (shapes) according to the House-Hold Budget Survey (HBS) 1969, the most common traditional shape of houses was rectangular with entrance door in long walls there were about 71 per cent. Out of these, 36 per cent units had hipped roof, 19 per cent units had hipped or curved soil roofs, and 2 per cent units had roof sloping in one direction; 11 per cent of the houses were rectangular with hipped roof and entrance in short walls and 11 per cent was cone-cylinder “*msonge*” shaped. Some 2.5 per cent

were of beehive type of roof structures without walls. Corresponding checklist was not different field studies in 1976 – 79 indicate that the main pattern in 1977 might not differ very much from the conditions in 1969. The only main exception might be that the number of round *"misonge"* **houses had decreased.**

The dome structure is probably one of the older forms of construction of a shelter, and the conical roof can be seen as a refinement of this basic form.

A common feature is the circular shape of the houses – with the exception of the Tembe being a more rectangular form. The round form has probably been adapted for practical reasons. A circle is the easiest way of setting out a house and needs only a string of a certain length and something to peg it down. Along the circle thus drawn, the uprights of the house are dug in, giving the basic structure.

It is obvious that most tribes choose to remain their circular mud-and-thatch structures, being the most simple form to construct, of temporary nature and materials locally available. But they are also at once utilitarian, comfortable and aesthetically pleasing. There is, however, little doubt that the long-term trend is, towards rectangular forms.

In East Africa's interior, rectangular forms did not become common until the 19th century. They became more apparent as commercial contacts increased between the Coast and the Interior, particularly among groups most deeply involved in long distance trade.

Swahili-type structures had appeared in North Eastern Tanzania at the outset of the 19th century. By the 1860's the Nyamwezi – as active long-distance traders to the Coast had begun to construct rectangular houses, reflecting designs of the Eastern Congo and the Coast, both areas serving as the Nyamwezi's extreme points of trade. The Usambara had begun to create towns as a defence against plundering Maasais from Kenya, and as a defence against Ngoni invasions in Central Tanzania, as well as a defence against belligerent Arab/Swahili slave traders, there were constructed stone fortress towns and central palisaded towns – Kalengas – which were also used against the German eruptions which followed.

Ujiji became a kind of architectural crossroad – Joseph Thomson wrote in 1881 that:

…. The houses represent almost every style of African architecture: The huge roofed Indian bungalow, the fat roofed Tembe, the quadrangular huts of the Waswahili with baraza in front and the beehive-shaped huts of most of the natives, with composite forms of every description …."

It seems that the most common house-type in coastal towns of East Africa today originates from the 16th century Arab-influenced stone buildings of the Swahili City states.

Round and Conical Houses Disappearance

Round and Conical houses have been used, even to a small extent, or used for small purpose, by almost all tribes in Tanzania as their traditional houses. These had been commonly constructed of poles fastened to small sticks, thatched with long grass or dried banana leaves, where available. For the conical houses thatch runs from top to the ground. In most cases the interior of the houses are plastered with earth-mixture with no pronounced windows. These types of houses are now getting absolete, remotedly spotted in the country, and the few still noted are used by peoples of advanced ages.

THE APPLICATION OF BUILDING MATERIALS.

House Elements Building Materials

(a) *Foundation Materials*

The preparation of the foundations of most of the rural houses is dependant on the firm soil as a foundation. Independent small holes of about 50 – 60 centimeters depth close to one another (15 centimeters apart) in a straight line are dug into the ground. Foundations are just firm as foundations. Each vertical is excavated into the ground and have the soil compacted, and at times with branches and grass. The poles are then inserted in these holes with compacted soil before the rest of the walls were erected.

(b) *Floor Materials*

Floor is merely a tamped soil as floor and more or less same level as the outside ground floor. The floor materials are the same as for the foundation materials as aforesaid to most of the rural houses, having been tamped to form the floor.

(c) Wall Materials

To most rural houses, mud, poles and bamboo together have emerged as the most common materials to the wall construction. Mud and soil is used to fill the rectangular openings between the poles and the reeds whose arrangement is brought about by the vertical poles arrangement in the centre of the reed on each side of the vertical poles. Proportionally, one will see more soil/mud in these walls than poles and reeds. Similar to this but with more poles than mud are also preferred with vertical poles erected close together with a few horizontal reeds, for the purpose of keeping the vertical poles together. The small gapes on the wall, between the vertical poles are filled up with mud or mixed up with ashes or

cow dung; and also acting as plaster to the internal and sometimes to the external wall. These two types of walls covered about 49 per cent of the houses in the rural area (1978 Census Survey).

he second most common group of wall materials is the mud block or mud insitu. Clay soil area up-country have taken advantage of mud block materials (18 per cent with this type of wall) while, the mud in-situ construction can be found in the examples from the Central and Southern Highlands (mud block and mud insitu material for rural areas housing - 20.8 per cent for rural areas in the Census Survey 1978).

he third most common wall materials are of poles, branches and grass. (This includes the Maasai house, although they are covered with a layer of cow dung on the outside and partly on the inside) – Census Survey figure: 15.7 per cent, HBS 1977: 32 per cent.

he Nyakyusa house of the Southern Tanzania extending down all the way to the northern tip of Lake Nyasa have used bamboo in all its house elements – walls, roofs and ceiling.

emaining alternatives for wall materials:

-Burnt brick walls - 3.5 per cent
-Concrete or sand – cement block walls – 1.5 per cent
-Stone wall - 1.0 per cent.

ensus Survey of 1978 figures are lower HBS. 1977 for all the remaining categories gives a figure of 7 per cent with a lower figure of 2 per cent burnt brick.

(d) *Roof Frame Materials*

ound poles as roof frame materials are used, and these present 87 per cent of rural farming households in the HBS 1977. Very little amount of sawn timber have been used in connection to corrugated iron roofing sheets. A small number of houses 7 per cent Census Survey – 7 houses out of 95 houses) with detailed architectural sections had full roof truss structures constructed with different houses with a mixture of round poles, round purlins, sawn timber purlins, trusses of sawn timber and sawn timber purlins all in connection with corrugated iron sheets as roof cover material.

n general roof frames are not based on roof truss principles.

(e) *Roof Covering Materials*

he most common roof covering material are grass. Palm leaves (fronds) is mainly found in the East Coastal locations. The three types of roofs cover 71 per cent as per Census Survey – 59.2 per cent as per rural areas according to the Census Survey 1978. Rural farmers in HBS 1977 – 71 per cent.

second group of roofing materials are flat or vaulted on gable soil roofs supported by different layers of poles, branches, shrubs and usually grass – 12% HBS 1977.

he third common roofing material is metal sheets - could be metal sheets from flattened tins or corrugated iron sheets – 15% for rural farmers: HBS 1977.

7.4.2 *Development of Building Materials*

tatistics available at the Building Research Agency (BRA) reveals as per table below (BRU working Report No. 6 –
977, 1990/1 and 2000/01 Household Budget Surveys.

			1
ıction of poles branches and grass)			
icks (dropping)			
ranches			
ks (increasing)			
ks, soil cement, concrete			
roofing			
sheets			
ɔundations			

Cost of Building Materials

omperative Costs of Alternative Materials Construction Components.

general list of unit costs for building materials (given below) expected to give the costs of the basic building materials commonly used in the rural areas, and those which can be introduced further in the rural areas, but currently extensively used in low and medium cost in urban centres.

		t)	
		)	
		) a	
	ets	)	

	ium Sheets		
	k	i)	
	ck	i)	

dations, Floors and Roofs

dated **ation**					
poles **er**					
afters **ch**					
te					
ks					
ocks					
locks					
n **ge)**					
ge)					

Soil-cement is a relatively new building material in Tanzania.

To facilitate a practical comparison of the use of the above building materials the cost of foundations, floors, walls and roofs have been separately calculated using each of the different materials.

The detailed labour cost is not reflected in this submission due to the fact that families in the rural areas in Tanzania build their hoouses themselves without any help from cash paid labour. This is as per the 1969 Household Budget Survey which counts for this Self Help System at 80 – 85%.

However, for the purpose of the research of equiping the reader with a set of information as a tool of developing models suitable for current Tanzania needs of the traditional and contemporary building styles an interview with a limited number of house-builders, fundis (craftmen), contractors and local building materials suppliers at the village museum and building materials market place was carried out.

Local building materials are obtained locally in the vicinity of the rural villages being transported manually on the head (for women), and on the shoulders (for men).

<u>HOUSEHOLD SPACE APPLICATION AND SERVICES</u>

Space Application

(a) *Sitting Room*

his is a socializing area where even the visitors can be let to sit and chat. In most cases cooking can be done in this space including food preparation, eating and storage of water, utencils, cooking pots and farming implements. Cooking in this area warms up the house and household occupants when cold. Smoke and hot air raising up to the ceiling helps to dry up the food storage (grains) and keeping away *dudus* **from destroying the maize, beans and other cereals kept there.**

he *sitting space* **activities can spread in many different spaces:**
ndoors, outdoors, including the front verandah and under surrounding trees, for the purpose of chatting, socializing, playing cards, playing *bao***, plaiting hair and the like. Men/ Women and children usually do not socialize together. Looking at the functions of this space, which includes preparation of food and also as an eating place, its size ought to be considerable, comparatively.**

(b) *Sleeping Space*

Probably the most respected and valued activity in a house is the sleeping space and thus the provision of safety, health and comfort ought to be adhered to. Some tribes in Tanzania position their sleeping places near where livestock are kept or at least where easily seen in case of rustlers. Storage of other valuables items like clothes hanged on a rope, boxes, radio, of the household members are put in the sleeping place. Where the house is not big enough the sleeping space is combined with other activities, just as much as other domestic activities may very well be either outdoors or indoors.

Not all houses have beds for sleeping. The village keepers reported that all house-hold members do sleep inside the house and all rooms can be used for sleeping even on the floor on mats.

(c) *Cooking*

Cooking is one of the most important activity requiring space in a house design. In rural areas depending on the climatic conditions, area and size of the house the activity may take place in-doors, outdoors in the open, under shades of trees or in a separate small house *("banda")* **in the backyard. When taking place in doors, the place for cooking and food preparation is in specially designed areas, that is the kitchen. Basing on the questionnaires 5.88 per cent cooking is carried out in the open and 35.29 per cent cooking is carried out in a separate small** *banda.* **56.86 per cent is carried out in the main house.**

According to the interview carried out at the

Mr. Sanusi Mussa firewood is used for cooking pot or sufuria placed on three molded clay boulders or stones raised about 20 centimeters above floor level leaving enough space below the pot for the burning of firewood.

Many will opt to carry out the cooking outside the house due to limited space inside the house, and accummulation of fumes and smoke for lack of chimnery, lack of cross ventilation and of environmental pollution which can pose serious health risks (Nystron 1994), although this also is inconvenient during sunny and rainy days. A specially designed area for cooking as a kitchen is necessary so as to improve the hygienic way of cooking food and crockery handling .

(d) *Eating*

Eating is another activity carried out in or out of the traditional rural house. In a traditional rural house it is not common that space is provided specially for eating, such as a dinning room where would be a dinning table and dinning chairs. It is common practise that the household members sit on a mat spread on the ground eating together using bare hands from a common dish or tray, with a jag of drinking water on the side.

(e) *Storage*

In as far as storage in t11he rural situation is concerned can be devided into two major parts: Storage in the main house and storage in a separate small hut (granary) away from the main house.

Household items like cooking utensils, water, food, and other personal belongings are stored in the main house in buskets and drums.

Drinking water, **in some areas like Mbeya, Iringa and Rukwa regions, is kept in clay pot containers (water becoming very cool if kept long enough). The pot or sufuria or bucket is slightly raised up from the floor, mounted/supported on a three forked pole, about one meter from the floor, alternatively, placed on the three stones, triangularly arranged, similar to the cooking style arrangement, about 20 centimeters from the floor level.**

Vater for other purposes like washing and cooking is kept in drums, clay pots, buckets outside the house.

Cooking utensils like plates, bowls, sufurias are kept on a straw rack (table) about a meter high raised from the ground. Any remaining cooked food is kept in the clay pot or *sufuria* **for future use.**

n most houses clothes are hanged on a drying line, tied on roof supporting pillars or locked up in wooden or metal or carton boxes, usually stored in a sleeping room with other items.

ome maize, beans and cassava are kept at the ceiling of the house, and at times hang the corn-cob on pillars supporting a house roof. This helps to dry them up. The storage of food cereals like beans, rice, maize, wheat in large amount reserved for future use – may be during famine due to draught – is stored in a granary away from the main house.

irewood for cooking are stuck outside the main house. A few pieces for immediate use or needing them to dry up in cold zones are laid up on top of the ceiling of the main house so that the heat of the fire from the floor below can assist to dry them up.

(f) *Animals*

Vhere ones animals are not much, say about two, are provided some space in the main house or either a kraal is built outside the main house. Like most tribes in the central semi-arid region of the country the young boys have a separate house from the main house entrusted with the responsibility of looking at the animals in the kraal or fence compound.

Chicken which are usually few feed freely in the near surrounding and let them in the main house in the evening and covered with a reed woven busket on a corner of the house. When many, but quite rare, are provided with a separate small hut outside the main house.

(g) Two major styles are used in keeping animals:

Kraal

Where the number of cattle is big (say around 50 cattle and above) the provision of a kraal is preferred. This is a simple unroofed fence of about 2 meters poles high construction with uneven spacing of about 400 centimeters for the verticals, and an average of three horizontal members around the fence with one opening which is shut by using three independent poles supported on the two sides of the jamb. The shape of the fence is always round or rectangular positioned in close proximity of about 5 meters away from the main house. Cattle, calves, sheep, goats is mixed up in one kraal, but not with pigs.

Where the number of cattle is not big they may be kept in the main house where the family live, but separated by a simple partition with a separate entrance or either be provided with a separate house, usually rectangular in shape within the proximity. In some areas, particularly in the Southern part of the country (northern Lake Nyasa), cattle are tied up with banana ropes on the timber stumps, fixed to the ground on a straight line on one side of the length of the pan. This is for discipline promotion of the cattle, while the calves are let free within the pan.

7-18: Cattle keeping in a separate house

(h) *Granary*

n agricultural areas where cultivation is carried out extensively, granary construction is a common feature for a long term storage of large quantities of food crops, such as maize, rice, beans, millet, and other cereals. Granaries are separate from the main building, built separately as an outdoor building.

'he common materials used in a granary construction are bamboos, poles, reeds and cow dung to an about 45 cm raised floor off the ground, usually a cylindrical small house with about 2 meter diameter wide, with an elephant grass conical roof. Small granaries are made of twings and mud or cow-dung. They differ in size but averagely they measure about 1.0 meter diameter, 1.5m high, looking like a big basket without any noticable cover as its roof but placed where rain cannot be a nuisance. Rectangular granary can also be found.

Vater/moisture and insects find it difficult to reach the storage due to having the granary raised from the ground and the impermeability promotion by the application of mud or cow-dung, or a mixture of the two, applied as mortar/plaster in and on its walls of the cylindrical structure.

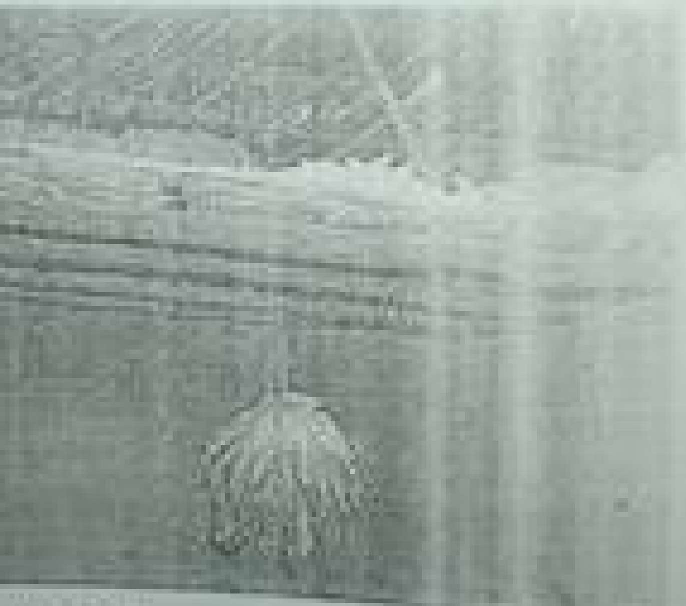
'urther, storage of food crops is kept on the ceiling of the main house. The ceiling is constructed of bamboo and poles. Smoke produced from the fire below in the room acts as a spray to the insects who may be vulnerable to the crops.

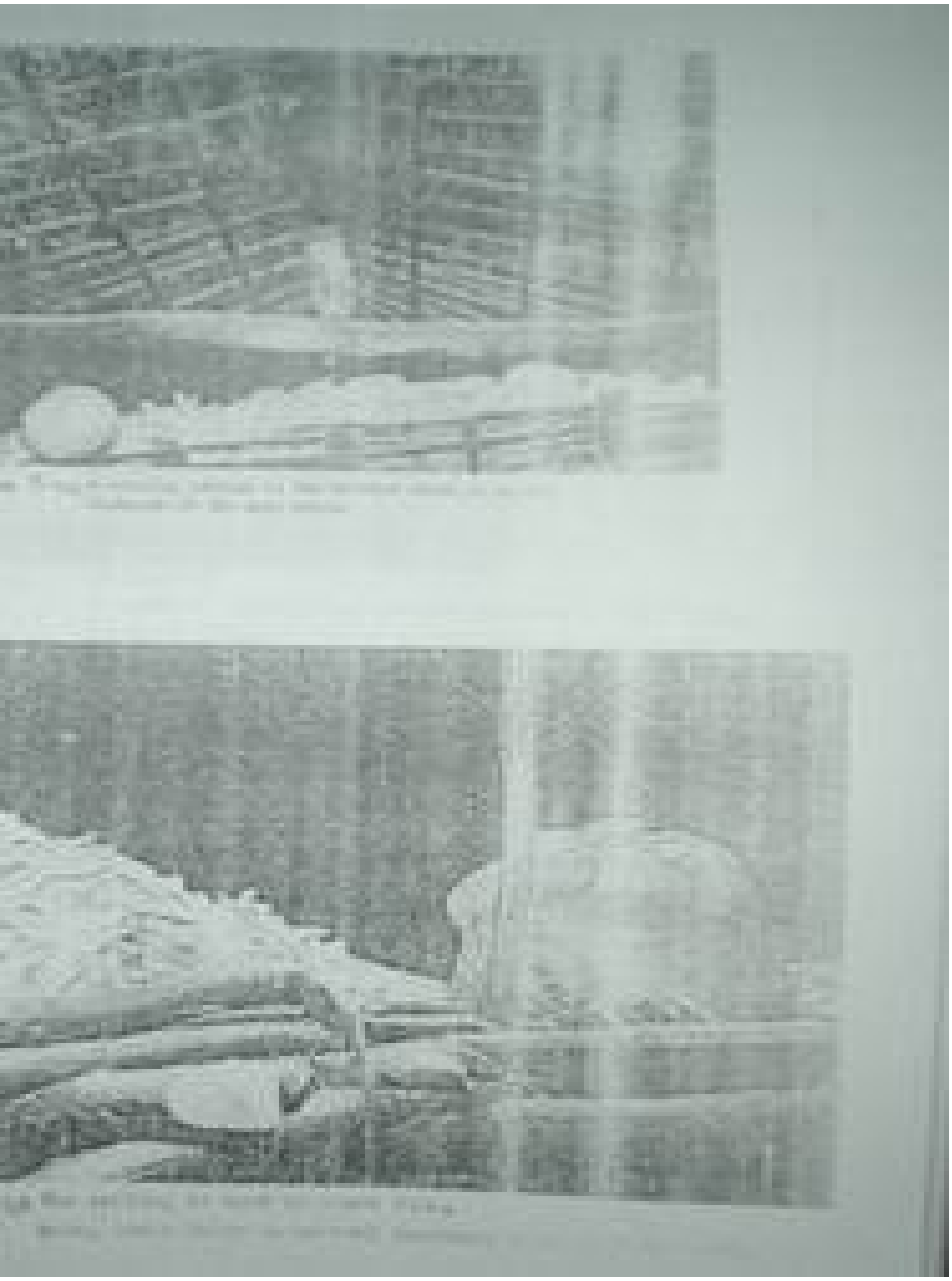
ometimes storage is right on top of a mud flat roof. This is common in the Central part of Tanzania where its climatic condition is arid.

Vhere the quantity of storage is small and usually for a short period, keeping around the kitchen is usual. It is common to see bags of various sizes containing all sorts of kinds, including foodstaffs hanging on a rope on the wall, or rope hanging from a pole or bamboo of the roof structure at any convinient position of the room.

-20: Granary.

Granary with ladder for climbing.
Apart from grains other things like pots can be kept at the top.





(i) *Pit Latrine*

No sample of traditional latrine is provided in the Village Museum. Modern latrines are provided for use by the Village Museum visitors and workers.

Traditional Latrine is never in the main house but separate small *banda* away from the main house – as far as 30 meters away.

Pit latrines are not of any standard, not clean and usually not roofed *banda*. The walls are of any organic materials ranging from branches and grass tied up to poles and fitos stuck into the ground. *Makuti* (palm fronds) are extensively used in the coastal areas. In some cases the pit latrines get full of waste quickly due to rain storm water entering the pit which is not covered and not

provided with appropriate care. When the pit is full the house owner digs another pit within the plot.

Fig. 7.26
Pit Latrines

7.5.2 *Rural Scene – Service Distribution*

The housing situation inn rural Tanzania serve for its poor state of construction, hygiene and house spaces functionalism, there is largely no shortage of houses in rural areas, where 90 per cent of all homes are privately owned, while in urban areas for over a decade over a third of the urban households rent privately (200/01 BHS).

The proportions of households using shallow wells, piped water or other water supply source increased from 40 per cent in 1969 to 65 per cent in 1977.

Additionally, from 1991/92 to 2001 (BHS) there had been an improvement in the proximity/availability of water source with the proportion of households depending on the unprotected supplies falling from 64 per cent to 54 per cent. The protected source has also improved from 10 per cent to 18 per cent.

At the moment indicators show that 60 per cent of rural households depend on wells for their water supply, 13 per cent have communal taps, 5.8 per cent are connected to

water pipes; while 21.2 per cent use other means, including natural rivers, springs, lakes and ponds. Only 0.3 per cent are connected to a sewer.

A boost of essential services has it that around 0.1 per cent of households are connected to electricity grid with 1.6 per cent reporting the use of solar electricity. The grid serves the urban population above all – 2 per cent of rural households report a connection. In rural areas solar electricity is almost as important a source as the grid.

Firewood is the most common source of fuel, and being used by over 90 per cent for the cooking for the rural households; followed by charcoal and minimumly parafin which also is used for lighting.

(a) *Latrines*

The number of households using pit latrines or other types of toilets increased from 50 per cent in 1969 to 78 per cent in 1977.

Further, improvement is noted in that some 93 per cent of households reported using a toilet of some type the vast majority using a simple pit latrine. In rural areas 90 per cent of households report having the use of a toilet, which is a high proportion by comparison with many developing countries. The proportion of households not using a toilet varies quite substantially by region, the highest proportions being in Tanga, Arusha and Mara (2000/01 BHS).

Research carried out in Lwifwa, Massoko, Rungwe District, Mbeya Region had it that 95 per cent households had pit latrines. The rest are said to be using neighbouring latrines, which is in violation of government advocacy which requires each household to be provided with the latrine. Inclusion of health and sanitary standards in a house design is essential. Six toilets visited in this area were not clean, not easy to clean and not ventilated. Lack of water in the house latrines cannot be provided in the main house, as flow of water for the purpose ought to be guaranteed.

Pit latrine away from my huose is alrighty. Using it at night allows me to check my compound (livestock which are in a pen outside), but quite a bother for my children, particularly if it rains (Mr. Lupaso Mwakipesile (57), Lwifwa, Massoko).

What is important and paid attention to is for the pit latrine to be easily cleaned and well ventilated to reduce ordour and have a lid to keep out flies as of now they are in

a bad condition not having ventilation pipes and are poorly designed for ease of cleanliness.

here is a big possibility that in non-mountainous areas, flat areas, like the coastal areas where water wells are the common water supply, there is a big possibility for the pit latrine to pollute the ground water through water perculation in sandy ground.

(b) *Trees*

he naturally provided trees in the rural areas surrounding the rural habitation or settlements contribute immersely to indoor comfort and thus their preservation is necessary and important

lanting of treees supplementing the already available naturally grown trees in the rural areas will always be a positive action as trees can filter sunlight, reduce air temperature by evaporation and reduce glare, and contribute the climatic comfort sought by the house occupants, notably in the rural areas where people (men) prefer to socialize in the open under shadows of trees.

7.6 RESEARCH FINDINGS FROM THE QUESTIONNAIRES SURVEY

7.6.1 *Introduction*

his Chapter presents the findings and analysis of data of the study and the interpretation of the results thereof.

n the preceeding Chapter 5 it was argued that primary data collection involve the collection of new information first hand for the particular research. The use of questionnaires was a data collection methodology discussed alongside the design approach for both qualitative and quanititative research data collection, analysis, interpretation and presentation. This *section's objective is to present the findings from the questionnaires* **survey, data synthesis and analysis to add to the secondary data findings to support the research hypothesis.**

he questionnaire was designed and constructed with the objective of collecting information first hand from the various stakeholders and knowledgeable people of rural houses. The questionnaire covered:

- **House types**
- **Storage facilities**
- **Kitchen facilities**
- **Latrine facilities**
- **Livestock**

•Local and conventional building materials with their cost

•Availability of manpower in the rural areas and cost of the house.

7.6.2 *Results*

a) *Preference of Type/shape of Houses*

	TYPE		
	NGE	**BE**	**ND**
	9	**0**	**1**
	8	**0**	**2**

From the questionnaire the *Banda* **have 62 per cent emerging as the most favourable traditional house. An average of 3 –4 rooms (3.45) featured out as the most common number of rooms applicable in a traditional house.**

Storage facilities

	LOCATION			
			8	

he results from the questionnaire has featured out that 69.5 per cent households kept their general storage in the main house. 25.39 per cent of the households have their storage in a separate minor house. These are mainly agricultural products in the agricultural practicing area. This could be a granary or small house constructed with the same traditional materials as for the main house. 14.28 per cent are households providing their storage both in the main house and in a separate minor house or granary.

Kitchen facilities

	LOCATION			
	IOUSE	NT HOUSE	DE	ER
	6	9		

6.86 per cent of the houses in the rural houses are provided with space for kitchen services. 35.29 per cent of households have kitchen services space provided in smaller houses where the household had more than one house. 5.88 per cent of the households have their kitchen services provided in the open.

This amounts to concluding that kitchen functions in the rural areas are accommodated inside the house. No household have a kitchen outside only. In cold areas …… regions of Mbeya, Kilimanjaro, Arusha, Ngara – fireplace is not for cooking purposes only but combat cold during cold seasons.

(c) *Latrine facilities*

	LOCATION			
	RINE	ERN	RN	ER
	5	6		3

1.25 per cent of the households are provided with pit latrines at an estimated average of 13 meters away from the main house (minimum –3.0m and maximum – 30.0m.

Western type closets appear in 4.16 per cent households; thus not being common in the rural houses/areas Eastern type closets are non-existant in the rural houses.

4.58 per cent households have no latrine facilities in their areas. Families lacking latrines in their households, by convenience visit and relieve themselves in the bush or neighbouring households.

(e) *Livestock*

	LOCATION			
	HOUSE	FENCED)	OUTSIDE	E
		5		

The questionnaires came up with the presence of 89 per cent of the households with livestock. These are cattle, goats, sheep, pigs and chicken.

1.8 per cent of the households have their livestock in a separate house.

3.6 per cent of the household have their livestock in fenced compounds outside with no roof cover, but within the household compounds.

.45 per cent of the households have their livestock both inside their houses and in fenced compounds outside; while 9.07 per cent of the households do not keep/have any livestock.

All chicken are kept in the main house at night and letting them roam around the compound during the day in search for food.

(f) *Building Materials*

	ATERIALS	ONV. ERIALS	CONVENTIONAL
	6	6	4
	.14	10.7	7.27

2.14 per cent of the households have their houses constructed with local building materials, while the conventional materials have been applied to 10.7 per cent.

.27 per cent of the households have their houses a mixture of the local and conventional building materials.

(g) *Cost of Conventional building materials*

Not much response was received on Part 11 of the questionnaire; could be because conventional materials like cement, roofing sheets, ceiling boards, prime, oil, paint, nails,

mosquito wires, butt hinges, latches, barrel bolts, and transparent glass sheets are remotedly applied in the traditional rural house construction. This is a discovery of the research worthy noting their application.

(h) *Availability of Manpower*

er		ry	g		

lasons **and** *Carpentry* **as Manpower for the house construction in the rural area is in abundancy showing 89.36 per cent and 87.2 per cent respectively.**

(i) *Labour most commonly used*

oour	ploy	elf	nily
	3	5	0
	.6	.2	.1

he questionnaires results show that construction of houses in the rural area have it that *self* **employed takes up 54.2 per cent;** *Family* **members is 36.1 per cent and 9.6 per cent is by** *Employment***.**

(j) *Cost Estimate of a traditional rural house*

Vorking out from the questionnaires the estimated cost of the rural traditional house comes to an average of TShs. 397,613/= (equivalent to 390 USD). The figures obtained from an average figure spanning between TShs. 50,000/= (50 USD) and 1000 USD.

(k) *The Source of Income*

ne source of income is agricultural activities and farming resulting into an average of TShs. 134,886/= (130 USD) as *income per capital.*

7.6.3 *A Summary of Research Findings from Questionnaires*

he philosophy of the design of the questionnaire was to find out the situation of the traditional rural housing development in the country covering construction approaches, extent of use of building materials, general use of space by the household and

facilities spartial provision arrangement and the economical position underlying the existing development.

'he questionnaires have come out with the BANDA type of house as the most favoured (62%). TEMBER and MSONGE taking almost equal positions – 20% and 18% respectively.

t has been found out that the development of the housing situation is wholly dependant on *agriculture and farming.*

'oor handling of *building materials* **by the untrained and unskilled labour whose application is over 81% underlies the current, not palatable situation of the rural houses.**

Iasons and Carpemters **are at the rural houses developers disposal (over 80%) to supplement the local people's efforts where over 90 per cent (54.2% self + 36.1 families) build for themselves without employing any one.**

Litchen **facilities has received notable consideration to the rural housing provision. More than 90 per cent are provided in the house.**

atrines **are mostly pit latrines positioned well over 10 meters away from the house of the household.**

torage **facilities has been positively considered. Storage of properties is mainly inside the main house (60%, but extends to outside facilities (25.39%) where agricultural products are in plenty.**

'he keeping of *livestock* **is both, in the house (41.8%) and 43.6% outside the house Rustlers are the main factor of this division. 14.28% is for the households who have their storage both inside and outside.**

'ost **of the rural house tends to vary notably (50 USD – 1000 USD) with an average of 400 USD. Variancy of building materials and the scale of agriculture and farming between regions determines.**

CHAPTER SIX

6.0 RESEARCH OBJECTIVES AND METHODOLOGY

6.1 INTRODUCTION:

The preceding four chapters have analysed and covered the historical background of traditional rural housing in Tanzania with all the principal factors and causes which had featured to their emerging into their existence and development. The human behaviour and requirement, environmental conditions and availability of natural resources have been appreciated to have played the role of the traditional rural housing development. This has been presented as literature review under Chapters: ***Introduction, History of Housing Development in Tanzania, The climatic Influence to Shelter*** and ***the Building Materials.*** Chapter Five of the ***Building Organisations and Research Centres Contributing to Housing Development in Tanzania*** paves and indicates the way forward towards positive housing development and models suitable for current Tanzania needs from the contemporary building styles used in Tanzania.

This chapter discusses the research approach, tools and methodology, whose research objectives were outlined under ***Introduction***, par. 1.30. Different theories on research data collection are discussed and justification on the adopted method given. This is because a researcher must possess considerable knowledge about a wide variety of tools and techniques and be familiar with each so as to be able to understanding the nature of data it produces, the advantage and limitations, the assumptions underlaying, the extent of its reliability, validity and objectivity

6.2 RESEARCH OBJECTIVES:

To find out:

- Types, shapes, use and layout of houses.
- Type, method of use, durability, availability and cost of building materials used.
- Functional spaces provided in the houses.
- Space provision, availability and use of utility services:
  - Kitchen
  - Latrine
  - Refuse Disposal
  - Water and Electricity
  - Storage.
- Space provision, availability and handling of livestock, and storage of agricultural products.
- Situation and availability of trained/skilled builders/artisans.
- Situation of House Elements:
  - Foundation
  - Walls
  - Roof

6.3 RESEARCH METHODOLOGY:

Research methodology has been defined as a systematic and logical procedure for solving a problem through the support of facts (Bless & Smith 1995).

Research involves the diagnosis of information and the selection of relevant inter-related variables about which **valid** and **reliable** information is gathered, recorded and analysed. (Zattman & Burger, 1975). Drawing from this statement, (Mountinho & Evans 1992) argue that to be able to plan a research, control and evaluate the findings, then the process must be structured along six stages namely:

(a) Defining and clarifying the research problem and determining what information that it requires.

(b) Determining cost effective sources of information

(c) Determining techniques for collecting information

(d) Data collection

(e) Data processing

(f) Communicating results.

(Mounrinho & Evans 1992) caution that the first stage should be based on a good quality brief of the problem area. According to (Smith, 1987) a good brief should contain a statement of problem area, other areas where information is required, details of the background leading to the problem the purpose to which research will be put.

6.3.1 ***Village Museum of the National Museum of Tanzania*** situated in Dar es Salaam chosen as a case study of the research. The village is reach of information of Tanzania rural human settlement data worth of taping it and researching on for this study.

The ***Village Museum*** was established and opened to the public in 1967 – then part of the Ethnography department of the National Museum of Tanzania. The initial cost of putting up the Museum came from the Tanzania Tourist Board (TTB). Thereafter the Museum had continued to receive government subvention to meet its day to day operation expenses. In 1993 the ***Village Museum*** has been semi-autonomous. It has its own Staff and Director.

The Museum had received grants from SIDA through the Swedish African Museum Programme (SAMP). This had helped much in building up the Museum capacity and improve its exhibit.

When carrying out the research, frequent visits were made at the Village Museum. This is an open air Village Museum (also referred as "***Makumbusho***," the Swahili word for ***"Museum"***) located on new Bagamoyo Road, 8 km away westwards from Dar-Es-Salaam City Centre.

These are well kept 4.5 acres grounds featuring 18 traditionally furnished traditional houses, used in rural areas, from different ethnic groups and regions throughout Tanzania.

The traditional houses are constructed as authentically as possible. For example the Museum café building, its plaster is natural pink clay used by some ethnic groups in Tanzania to plaster their houses and paint their bodies during special rituals.

This diverse provision of different kinds, styles and shapes of houses spread all over Tanzania, were studied by visiting each house with the aim of collecting information on the constructional materials used, functions of various spaces provided and take note of their arrangement/layout.

6.3.2 *Institute of Human Settlement Studies (IHSS)*

The Institute for Human Settlement Studies has its name originating from the Centre for Housing Studies whose its establishment was on the Ardhi Institute Campus (now UCLAS) in January, 1979. It was a joint Netherlands and Tanzania Government Regional Education Project on training, action research, documentation and information services in the fields of human settlements. The Centre is semi-autonomous educational project under the general umbrella of UCLAS.

The change of the name from the Centre of Housing Studies to the Centre for Human Settlement Studies (CHS) was among many others which were recommended during the strategic Planning Exercise which took place between June, 1992 and January, 1993. The revised mandate of the CHS, as a National Centre with a regional scope is to contribute to the improvement of Human Settlement Conditions in Urban and Rural areas. This mandate is to be achieved through Training, Research, Consultancy and Information Excange and dissemination. In so doing the Centre expects to meet challenges relating to human settlements in relation to:-

- Housing developments in terms of finance, building materials and policy
- Urban development studies
- Local Authorities Capacities in dealing with human settlement problems.
- Environmental issues and
- Gender considerations in human settlement;

and more so the ***nature and aims of Research*** of the Centre are committed and fully involved in research in low-income human settlement, with notable attention to rural housing and increase understanding of human settlements' development and housing production processes

6.3.3 Desk Research:

This covers research carried out by looking at the published works: books, journals articles, conference proceedings, internate resources and local newspapers.

6.3.4 Questionnaires Design and Construction:

A questionnaire is always regarded as a tool of research providing a link between the objective of the subject and the respondent's information. Basing on this questionnaires ought to be carefully structure, pretested, refined and subjected to the same evaluation criteria of validity, reliability and objectivity tests so as to accommodate the solutions to all ambiquities and social/personal/business concern/interests of the respondents of the questionnaires. Failure of which let some respondents do not pay enough attention to the required details, or more so learn on protecting own interests of aforesaid.

A well designed questionnaire ought to provide all the necessary information in line with the research requirements.

Questions to the respondents ought to be clear, concise arranged in logical sequency and easy to administer.

The questionnaire ought to be attractive to the respondent for him/her to respond with interest and motivation.

Basing on the above Van Dalen (1979) discusses three most common forms of questionnaires which will supply the required data – Closed Form, Open Form, Pictorial Form are briefly discussed below:-

Closed Form: This is a structured questionnaire containing a list of concrete questions and a choice of possible answers. The respondent picks the replies by making "yes" or "no" or tick one or more items from a list of answers, or rank a series of statements in order of their importance (1, 2, 3, 4 …..); sometimes they are asked to insert brief statements into blank spaces of lines. These types of questionnaires are easy to administer to large numbers, help keep the respondents' minds riveted on the subject, and facilitate the process of tabulation and analysis. They, however, have a problem of revealing the respondent's motives as no reason is given for the choice. In this situation the researcher sees it that it can be improved by providing room of some notes which also will improve the relevant answer, if need be.

Open Form: In the Open Form questionnaire the respondents are let to answer freely on their own words rather than to form them to choose between rigidly limited responses.

This avails them the opportunity to reveal their motives or at**titudes and to specify the background upon which their answers are based. In this type of Form the results may lack uniformity due to, in some cases, lack of competency and sufficient literacy in the area of research; and thus end up providing not useful data, consequently leading to a problem of data organization and analysis. This is a less reliable form compared to the closed-form.**

Pictorial Form: This type of questionnaires have drawings or photographs from which the respondents are let to choose answers, and the directions may be given orally. It is useful for gathering data from children and adults of limited reading ability. (***Salewi, 1993.)*** This form of questionnaire has not been used in this research.

The questionnaires used in the research to collect the primary data, have been designed within the combination of ***closed and open forms*** discussed above, validitating the responsiveness of the data obtained. (***Questionnaire at Appendix "Q")***

Aiming at obtaining a good data to test a hypothesis properly ***constructed questionnaires*** were made.

The following acted as guidelines in constructing a questionnaire (***Salewi 1993***).

•Wording and Framing a Question:

It is essential to explore the hypothesis, experiences, literature so as to frame the questions that measure the precise variable with probity and depth. Questions should be allocated in relative proportionality to the area of focus. Time required to fill-in should be considered. The wording should be clear and not to bias the respondents. The language used should be simple and clear. The questionnaire should not be windy and allow the respondents to give comments where necessary.

•***Arrangement of Questions:*** Questions should be arranged in psychological and logical sequency, ranging from simple, interesting, neutral questions proceeding to the crucial and difficult ones. There should be a transition from one group of questions to the next.

•***Format/Direction:*** Accuracy and an unambiguous answers can be obtained from design and direction of the format and design of the questions in the questionnaire. Categories ought to be structured in a way to facilitate specific scalings and data-analysis schemes that are to be used to report the findings.

•***Clearance of Worries:*** Questions should be structured or worded to allay fears, suspicion, embarrassment, or hostility on the part of the respondent. Guarantee on the confidentiality of the responses to be provided.

•***Questions Presentation:*** - A number of ways may be used in presenting questionnaires to the respondents. The researcher will choose those which are convenient to time, cost certainity of attention and collection. According to Van Dalen (1979) questionnaires may be presented to respondents in two ways: through mails or face to face technique.

Face to face situation was used by the researcher as all 54 questionnaires were delivered in Dar-Es-Salaam because of what has been stated in paragraph 6.3.5.

Collection was by the researcher in person. All questionnaires except 2 were filled-in and collected; 2 questionnaires were not collected, to date, due to change of the fixed aboard and whereabouts of the respondents.

6.3.5 *Extent of Questionnaires Distribution:*

A 21 questions questionnaire was prepared specially designed to close up the gaps in the existing published materials I had gone through. A total of 54 questionnaires were distributed to the following:

(a) The Director and the Assistant Director of the National Museum of the National Museum of Tanzania.

(b) Craftsmen/Builders of the Village Museum.

(c) The Director of the Building Research Agency (BRA)

(d) The Director of the Centre for Housing Studies (University College of Lands and Architectural Studies – UCLAS)

(e) Vocational Education Training Authority Staff (VETA)

(f) National Estates and Designing Corporation Staff.

(g) 4 No grown up individuals from each of the eight cultural groups of the population of 34,568609 people of the country.

(h) Nos a – d were given questionnaires and collected them all as planned.

(i) Individuals in No. 7 were interviewed

Gaps which needed further research were as below covering in face-to-face interview:

- Accommodation of Activities and arrangement of functional rooms.

- Area of keeping animals (catle, goats, sheep, chicken etc.).

- Area of waste disposal (Latrine and waste water disposal)

- Treatment of some of the local building materials (grass, reeds and palm leaves).

- Household Budget Survey (To show the earnings of families who owned houses).

- Rural Area earnings/salaries.

6.3.6 *Interviews:*

Realising that some people are more willing to communicate orally than in writing and therefore may promote data more readily than on a questionnaire which may be considered to be rather impersonal. The face to face meeting may encourage respondents to probe deeper into a problem with further clarification from the researcher. The facial and body language of the respondents may give additional information which would have been otherwise not reflected in writing. Interviews are useful tools, but require more time, money and energy than administering questionnaires. Interviews may be ***structured*** or ***unstructured.*** Structured interviewed are rigidly standardized and formal having the same questions presented in the same manner and order whereas unstructured interviews are flexible and few restrictions are imposed on respondents' answers.

The researcher delt more on the unstructured interview because of flexibility. In-depth interviews by the researcher picked the households which were considered ***traditionally built in the rural area,*** constructed with traditional building materials – poles, fitos and mud for walls and roofed with grass. Storage facilities, latrines and kraals were also delt with.
In line with Cohen and Manion (1989), as below, open-ended questions provided an opportunity to the researcher to get more information and probe specific responses that are not as detailed as required.

- Allowing the interviewer to probe so that one may go into more details.

- Encourage rapport.

- Allowing the interviewer to make an assessment to what the respondents really believe.

- Providing room for flexibility in terms of the format of interviews.

In actual fact, this was mainly used to confirm on the issue of major findings from the data obtained and which could influence the conclusions and recommendation of the thesis.

In-depth Interview

It is submitted that interviews are the most important source of case study information - Yin (1994). Three forms are identified:

Open – ended - One can ask house owners facts concerning their opinion on the need and necessity of improving traditional rural houses.

Focused interview – Head of the household is interviewed for a short while openly with some discussion.

Structured and Unstructured interview –
Structured questions are rigidly standardized and formal, and present in the same manner and order; whereas unstructured interviews are flexible and the respondent is let to give his answers freely.

Oral interviews are essential source of case study evidence because most case studies are about human affairs. These human affairs should be reported and interpreted through the eyes of interviewees and well-informed respondents can provide important insights in its situations
(Yin (1994.89, and Huba M. Nguluma).

This study focus on the improvement of ***rural traditional houses*** and thus concerns the views of the users and builders how they use space, affordance satisfaction and limitations, if any.

Interview method had been used to supplement not distant administration of questionnaires. In-depth interviews were conducted in six households in order to fully grasp the above situation.

The main target for in-depth interviews were the heads of households trusting that they are more convensant with the traditional rural houses, history, cultural behaviour of users and general households situation.

Aiming at ironing out information collected, informal discussions with members of the households were carried out.

Face-to-face interviews were also conducted to permit freedom of speech, expression and openness to the interviewees.

The rural housing written materials, which includes books, articles/papers and reports written on Tanzania Housing Research Agency NHBRA (formally Building Research Agency – BRU) and the Institute of Human Settlement Studies – IHSS (formally Centre for Human Settlement Studies – CHSS) of the University College of Lands and Architectural Studies – UCLAS were studied. The existing publications covered the subject of the dissertation in that modern low cost constructional techniques of traditional and contemporary houses used in Tanzania were addressed giving an opportunity to devise the promotion of maximum use of affordable local building materials commonly found in the rural areas used in Tanzania.

-Desk Research.

PERSONAL INTERVIEWS

The researcher carried out interviews with the personnels of the Village Museum individually, seeking for information and other details, particularly for those which lack or have insufficient representation at the Village Museum such as the way ***animals are kept, crops storage and the disposal of the wastewater.*** A total of 12 individuals of the Village Museum and 9 individuals picked randomly from various villages of 8 regions of the country spreading all over the country representing the cultural groups in existence (Dodoma, Kilimanjaro, Mtwara, Mbeya, Dar-Es-Salaam, Mwanza, Mara, Arusha, Dodoma) were interviewed.

The Director and the Assistant Director of the Village Museum were also interviewed independently.

6.4 RESEARCH DESIGN:

6.4.1 *Introduction:*

The research of the study was primarily of a case study technique. Case study is defined by Yin (1994:23) as "an empirical inquiry that seeks to understand a contemporary phenomenon in its real life context, especially when the boundaries between phenomenon and context are not evidently clear and in which multiple sources of evidence are used". Bell (1993:8) is in agreement with Yin's submission stating that case studies as explanatory,

descriptive or explanatory. An explanatory case study seeks for new ideas or insights on the phenomenon being studied; and seeks to develop or unveil the cause – effect of the studied phenomenon. A descriptive case study deals with issues or events which have or are taking place.

The main aim of this study is to find out how the traditional rural houses as contemporary building styles used in Tanzania can be improved/developed to much the current Tanzania needs without affecting the traditional or cultural requirement applicability of the local people. The study *explores, identifies* **and** *studies* **as submitted under the Chapter of INTRODUCTION,** *Research Objectives – Specific Objectives* **(1.30). This assignment seeks to understand the current position of the traditional rural houses, how they are built, materials used and how they are applied, house shapes, people's attitudes to housing modernasation and use of space. This has been carried out by studying one case of a Village Museum called the Village Museum of the National Museum of Tanzania – Dar Es Salaam, Tanzania(more information on the village is as at 6.2.1 and 6.3.1)**

The major themes in this study are housing, people, indoor and outdoor space, people's daily activities, income, and the interaction between themselves or social touch. This observation demands a direct encounter between the researcher and the house users; as such understanding of people's values, economical position, cultural interests and aspirations, in the process of housing improvement to the current people's needs is important.

A study of this kind calls for *qualitative* **and** *quantitative* **approach whose submission is provided under 6.4.2 (a)(i) of this dissertation –** *Quantitative and Qualitative Research Methods.*

Research Design **will be delt with under four sub-headings:**

6.4.2 *Choice and Justification of Research Strategy -* **Selection of research strategy will be presented so as to appreciate its adequacy having focused on and towards the intentions of the study, goals to be attained and availability of resources.**

The selection of research strategy is very important, for it may affect the validity and reliability of data. Levise (1996 – 1998) points out that "a properly selected research strategy has real life practical value". Therefore the choice of method is determined by a number of factors, which include, the purpose of the study, the level of house improvement required and the availability of resources. The basic issue in this research is first to understand and discuss the process of the existing real rural life, style of living and activities of the rural person.

(a) *Rationale of the Methodology Employed*

Research Methodology has been defined as a systematic and logical procedure for solving a problem through the support of facts (Bless and Smith, 1995; Leedy et al**, 2001). According to Walker (1997) research can be classified into different approaches depending on the methodology employed to generate knowledge, on the nature of data required for the research or on the method employed to generate the data. Classifications of research considered by the author ara:**

- **Qualitative and Quantitative research;**
- Case Study research
- Deductive and Inductive research; and
- Opinion, empirical, archival and analytical research.

(i) ***Quantitative and Qualitative Research Methods:***

Two principle approaches to research are identified, and these are ***Quantitative*** and ***qualitative*** approaches (Nachmians 1997, Patton 1987, Denzin and Lincoln 1994).

These methods of research are used as a basis to determine the nature of data, the manner in which data is collected, analysed, interpreted and presented.

According to Gilham (2000:10) ***qualitative*** research focuses on what people tell the researcher and what they do. In line with this, according to Holt (1998) he empounds that a ***qualitative approach*** means to "employ subjective methods very often based on personal opinion, perception or feelings." It therefore strives to gain insights and to understand people's perception of things surrounding them. Methods used to gain data using this approach include open questions surveys, process observation, unconstructed interviews and opinion or expression. Qualitative research views the individual or organisation in a holistic manner rather than a reduced isolated variables.

Quantitative Approach is generally concerned with measurements and is characterized by a more structured and standarised data collection. Empounding on this ***quantitative research*** methodology as defined by Kerlinger (1986) is "the systematic controlled, empirical and critical investigation of natural phenomena." This approach unlike the qualitative approach seeks to gather factual data and studying relationships between facts and how such facts and relationships agree with the theories and findings of previous researchers. Important factors of concern of this kind of methodology are the size and magnitude of the situation being studied and due to this fact its data collection engrosses making measurements. Therefore according to Holt (1998) methods for data acquisition includes physical experimentation, structured surveys and structured interviews and symbolic models.

(ii) ***Case Study Methodology***

The term ***"case study"*** has multiple meanings. It can be used to describe a unit of analysis or to describe a research methodology. Case Study as a research methodology focuses on understanding the dynamics present in a management situation (Eisenhardt 1989).

There are many definitions of case research and these definitions encompass a wide range of definitional components.

Generally case study method of research is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. They are normally descriptive, qualitative, exploratory and explanatory and are dependant on inductive reasoning.

There are two types of case study research namely; ***single case study research and multiple case study research*** and are discussed below:

Single Case Study Research – According to Mc Kinney 1996; Smith 1988 and Yin 1989, single case study research is applicable when the case is:-

- critical or unique or where the researcher is able to access a previously remote phenomenon,
- critical for testing a well formulated theory; and
- an exploratory study or pilot study; shown to be representative of a large population.

Multiple Case Study Research – Multiple case studies provide a purposive sample and the potential for generalizability of findings (Patton, 1990; Miles & Huberman, 1994). Additionally, including multiple sites increases the scope of the investigation and the degrees of freedom (Miles & Huberman 1984, Bonoma 1985; Eisenhardt 1989; Patton 1990).

Multiple case studies provide a more rigorous and complete approach than single case study research due to the triangulation of evidence (Bonoma 1985; Eisenhardt 1989; Neuman 1994; Stake 1994; Yin 1994). Additionally, triangulation of data in the context of multiple case studies provides differing research sits and data sources to satisfy theory generation and verification (Denzin 1978; Patton 1990). Finally, multiple case studies are appropriate as they provide for a rigorous methodology for replication logic (Yin 1993) Multiple case studies provide for theory confirmation through literal and theoretical replication (Bonoma 1985).

By the look of it, this research may be said that ***Single Case Study Research*** has been employed, but in practical terms it also fulfills a Multiple Case Study research, as the Village Museum 18 traditionally furnished traditional houses used in rural areas are from different ethnic groups and regions throughout Tanzania; and that's why it was selected.

(iii) ***Deductive and Inductive Research***

The paramount aim of research is to contribute to knowledge either by contributing imparting new knowledge or testing an existing theory. ***Inductive*** research is that kind of research which aim to generate a new theory whereas ***deductive*** research aims to testing existing theory. According to Buckley ***et al.,*** (1976), deductive research are guided by hypothesis and are either accepted or rejected during the course of research as a result of prior knowledge upon which to build the hypothesis is essential. On the other hand inductive research is guided by a scientific inquiry and the researcher's efforts are concentrated on the procedures to obtain and analyse data and focus the analysis to the generation of a new theory. Some researchers consist of both inductive and deductive type of conducts. This is due to the fact in generation of new theories hypothesis are portrayed and these may require testing through the deductive mode. Likewise deductive research may raise a need for a detailed inquiry into a certain aspect of a problem, in which induction is applicable.

This research was predominantly deductive in the sense that it did not aim to generate a new theory but sought to cross-check and test hypothesis put forward under ***Introduction 1.30*** (Research Objectives with Specific Objectives – To explore, to identify and to study). Basis for formulation of the hypothesis was the literature relating to house improvement in the construction industry. In particular this research strives to look at the existing traditional and contemporary building styles used in Tanzania and analyse them towards developing models suitable for current Tanzania needs.

(iv) ***Opinion, empirical, archival and analytical research***

Depending on whether the research is unductive or deductive, four (4) research strategies as cited by Buckley et al., (1976) exist. These strategies are sorted and named as per nature of their data and the process by which they are found and analyzed. These strategies are as follows:

•***Analytical research*** whereby internal logic by the user is required to solve the research problem and therefore there is no necessity for explicit reference to external data. According to Buckley et al., (1976) the problem is usually divided into its component parts to discover its true nature and casual relationships among its variables and thereafter solved rationally or philosophically.

•***Opinion research*** in this approach the researcher seeks views, judgment or appraisals of other persons with respect to a research problem. Interviews, questionnaires and opinion poll are famous tools used to carry this kind of research.

•***Archival research*** is mostly concerned with the assessment of recorded facts either in their primary, secondary or physical form. The difference between primary and secondary data from physical data is that both primary and secondary data can be obtained through written records, tapes and other form of documentation whereas physical data like archaeological data is obtained from physical observation.

•***Empirical research*** is based on observation or experience by the researcher through experimentation or fieldwork. This approach calls for the researcher to actively participate in the observation, instead of relying on the experience of others. Empirical research, unlike opinion research examines what actually happens as opposed to what people say has happened or may happen. This research was carried out using opinion, empirical and archival research strategies (par. 6.4.4 of this Chapter and Chapter Seven).

(b) ***The Selection of the Village Museum as a Case Study***

The Village Museum of the National Museum of Tanzania, as already submitted elsewhere is this dissertation (par.6.3.1) with rich information of the traditional rural houses found in Tanzania embracing cultural values of all ethnic groups found in Tanzania.

The Village comprises 18 furnished traditional houses from different ethnic groups and regions of Tanzania. It has a beautiful site with many crops, plants and trees depicting the rural scene atmosphere and outlook. Residents artists and craftspeople, at work; and dance performances most of the afternoons as per natural local villages routine in the Tanzania.

During the pick season of house construction and maintenance at the Village Museum – around November when cultural tribes competition is normally held – more artisans and craftsmen come to the Village from the local areas to participate in the activities of the Village development.

Original traditional building materials are imported into the Museum from the home areas of a given tribe, so as to maintain the houses originality, accompanied by experts to handle the materials.

6.4.3 *How the Research was conducted:*

A number of methods have been devised in this study. Yin 1994:78 states that "data collection for case studies rely on many sources of evidence like documentation, archival records, interviews, direct observation, participant observation and physical artifacts." He further notes that there are other source of evidence like films, photographs and videotaps.

In this research, data collection has been conducted in three phases. The first phase involved collection of information from the ***Village Museum*** by observing houses details, construction techniques, materials used, spatial arrangement and application. This was carried out in January and February, 2003 by measuring of spaces, documenting and photographing.

The second phase, as fieldwork, carried out after the Village Museum research part, which involved visiting and interviewing residents of the traditional rural houses in various regions in the country away from Dar-Es-Salaam and other urban areas. The main objective was to widen the areas of study and fill-in the gaps not covered in the first phase. The issues included the social economic conditions of the rural people, spatial qualities and their application and people's views with regard to housing improvement and/or modernization.

The remaining of the time, prior to report writing, study of documents, books, building research institutes, use of library, internet, journals, newspapers, seminar materials and structured questionnaire has been taken as the third phase or approach to research work.

18 traditional houses at the Village Museum were observed. 12 households in various regions in the country were visited and 9 members of the Village Museum were interviewed. This being of Open-ended questions was achieved by making sure that the response to a question put forward by the interviewer was provided with adequate time to narrate their knowledge and experience (Qualitative approach). Specific issues that were addressed included household cultural and social background data, trusting that this has direct influence to the original designs of the traditional houses, general information on house improvement and how the space is used at plot and house level.

The two principle approaches of ***Qualitative*** and ***Quantitative*** research methods spread their application as follows:

-Observations and Discussions were carried out including analysis of the literature of the Village Museum houses (Qualitative approach).

-Structured Questionnaire were employed in the research (Quantitative approach).

Study of Documents: Basing on Yin 1984 – 81 where he submits that documentary information is likely to be relevant to most case study topics, in this study the researcher used books, journals, newspapers, seminar materials building research institutes library and bulletins (Qualitative Approach).

Photographs were taken so as to document the real life situation, spartial arrangement, house elements and structural condition. Photographs taken included elevations, inside rooms and roof structures where some light permitted to take photographs. (Quantitative Approach).

Internate Source (Qualitative Approach)

Measurements were taken and sketched buildings where necessary particularly in the Village Museum so as to get and document sizes of various functional spaces, including plans, elevations, indoor spaces, spartial organization, house furnishing, house elements, structural members arrangement and application of building materials. 18 houses of different ethnic groups at the Village Museum were measured as afore reported. 12 households from various regions in the country were simply observed and measured where necessary to supplement the Village Museum findings. (Quantitative Approach).

Face-to-face interview *(Personal interview) with Open Ended Questions (Qualitative Approach).*

The Quantitative data provided this study with essential statistics, while Qualitative data enriched the research discussion towards interpreting the results from statistical data.

With this, findings are derived from more than one method of investigation, consequently this research adopted both ***Qualitative*** and ***Quantitative*** approaches.

6.4.4 *Method of Data Collection*

Source of Data

According to Toh and Hu (1991), data can be collected from internal and external sources. Internal data may come from corporate records, accounting statements etc. External data is the information from organizations that originally collected them i.e. a Central Bank and disseminate them through bulletins for example. For broad categorization, the range of data sources are put under the headings of ***secondary and primary.*** According to Moutinho and Evans (1992), ***secondary*** sources involve information that already exists, such as company records or previous reports, government statistics, newspaper and journal articles and commercial market research agency reports. This is the preferred ***first resort*** for data collection before proceeding to the more time consuming programme of collecting 'new' information using 'primary' research option by reviewing various studies, evaluations, publications in leading journals, newspapers, conference proceedings, problem cases documented to obtain key information. The advantage here has been inexpensive gathering of information, provision of necessary background data, and assistance in designing of the questionnaires for primary research.

Although this approach was used by the researcher, caution was exercised to align currency of the information, homogeneity, consistency and even errors. Admittedly, secondary data has sufficiently been used. Given the time available to the researcher, it was a good source of information for the background work and in the design of the questionnaires for primary data collection.

Primary sources on the other hand, involved collecting new information first hand for the particular research.

Five methods of ***Data Collection*** are devised in the study:

-The Village Museum of the NationalMuseum of Tanzania situated in Dar-Es-Salaam city taken as the Case Study of the research.

-Two Institutes of learning and research were the source of some of the data collected:

- Institute of Human Settlement Studies within the Campus of the University Collect of Lands and Architectural Studies (UCLAS) in Dar-Es-Salaam.

- National Housing Building Research Agency (NHBRA), formally known as Building Research Unit (BRU),
  Dar-Es-Salaam.

-Designed Questionnaire
Relevant firms and individuals were identified to whom distribution of structured questionnaires were made ***(as submitted at 6.3.6)***

-Personal Interview
Interviews were carried out face-to-face with open ended questions to the targeted people ***(as submitted at 6.3.6)***

6.4.5 *Methodological Problems encountered*

During the course of this research some methodological problems were encountered. Aiming at widening the area of study, beyond the ***Village Museum*** case study, I had planned to interview some residents of houses in various regions in the country away from Dar-Es-Salaam. I had done this when on official duties of my employment by the building industry consulting firm. In some instances house owners refused to respond to the questions. In other instances some residents were willing to respond to interviews but declined to allow me (the researcher) inside their houses. The following were identified as the main reasons behind these reactions.

- During the visit to the village most houses had their owners (parents) away from home, attending shambas and cattle heading. Children and old parents are left at home.

- In some cases where women were at home, were unable to respond or give permission to go round the household, ask questions or take photographs unless they secured permission from their husbands.

- Some people feared, for unknown reasons, to have their houses photographed.

- Some people felt some kind of privacy interference, especially when asked for permission to go inside the house and analyse issues of partial qualities and constructional arrangement and details.

6.5 SAMPLING FORMATION IN RESEARCH:

A sample can have it that each unit is selected in a specified way under controlled conditions.

The researcher ought to attend to the following – Van Dalen (1979):

- define the population

- procure an accurate and complete list of units in the population.

- draw representative units from the list, and

- obtain a sufficiently large sample to represent the characteristics of the population.

The above have been looked at and handled. A representative and adequate sample was obtained. It can be said here that a considerable sample was representative of the entire population as possible.

Moutinho and Evans (1991) have it that there is a close relationship between the choice of data collection method and research instrument, and the selection of respondent, or sample design. Bless and Smith (1995) encourage a researcher to choose samples that do best represent the whole population for an accurate generalization of results. According to Toh and Hu, (1991) the definition of the ***population*** stands as the universe or totality of all the elementary units or objects under study and a sample as simply as subset of the population.

As it can be appreciated, it is not easy and possible for a researcher to test, interview or observe each unit in a population under controlled conditions. Basing on this, sampling tools help researchers to ***select representative units*** from a population and ***draw inferences*** about the position of the entire population; resulting into accepting that what is true of the sample, will be true of the population.

This also covers far beyond what Van Dalen (1979) observes that in a ***descriptive research,*** a sample of 10 to 20 percent of the population is often used. This goes beyond in observing that in experimental research, a sample of 30 subjects permits the use of ***large sample statistics.***

In this researchwork all ethnic groups of tribes in Tanzania has been represented in the case study of the ***Village Museum;*** and consideration by the researcher in deciding on the number and type of questionnaires to be issued to the different classes of respondents ***(More submissions at paragraphs 6.3.1 and 6.3.4)***

6.6 CONCLUSION:

This Chapter has delt with the Objection and Methodology of the research in question.

Research Objectives **as at 1.30 under** *INTRODUCTION* **-** *Specific Objectives* **has sought to understand the current position of the traditional rural houses addressing how they are built, materials used, their shape, spaces sizes and users attitudes to housing modernization, and thus the study which** *explores, identifies* **and** *studies* **to lead us into solving the problem of housing as at paragraph 6.2 of this submission.**

Research Methodology **applied had** *Village Museum of the National Museum of Tanzania* **as the** *case study* **of the research. To further accomplish the systematic and logical procedure for solving a problem of housing as required, as at paragraph 6.3 of this Chapter the Institute of Human Settlement Studies (IHSS) was a source of information on Desk Research, Closed and Open forms of Questionnaires and Unstructured Interviews which gave** *valid* **and** *reliable information.*

In submitting the *Research Design,* **Choice and Justification of Research has been delt with at paragraph 5.4.2 of this Chapter and has it that the strategy has been built to appreciate the adequacy for the purpose of siting out a number of factors which include the purpose of the study required and the availability of resources; focusing on the intentions of the study, goals to be attained and resources availability. Understanding the process of the existing real rural life, culture, style of living and activities of the peasant.**

Rationale of the Methodological Employed **covering Qualitative and Quantitative, Case Study, Deductive and Inducive, and Opinion, Empirical, Archival and Analytical researches has been discussed towards appreciating the methodological employed for the suitable move of the study.**

Both Qualitative and Quantitative research methodology in this study has been devised. Single Case Study research has been employed being backed up by the Multiple Case Study research principles according to the nature and set-up of the case study taken.

Opinion, Empirical and Archival research strategies has been carried out in this research.

How the Research was Conducted (6.4.3)

-A number of methods have been devised in this study and two principle approaches to research are identified: *Qualitative* **and** *Quantitative. Secondary* **data and** *Primary* **data are the two types of data used to source the information. This emerges with the Study of Documents, taking Photographs, Internet Sources, taking Measurements of houses, Conducting Face-to-Face Interviews (Personal Interviews) – Open ended questions, Observations and Discussions of and at the Village Museum, and the use of Structured Questionnaires.**

Method of Data Collection **(6.4.4) – by visiting libraries of the University College of Lands and Architectural Studies (UCLAS) and the Building Research Unit the Village of the National Museum of Tanzania; carry out face-to-face interviews with open- ended questions to targeted people, and distribution of structured questionnaires to identified relevant firms and individuals.**

Methodological Problems Encountered **(6.4.5)**

In some instances house owners refused to respond to the questions put forward to them.

Some residents were willing to respond to the planned interviews but declined to allow me (the researcher) inside their houses.

In most cases photographing was not permitted, at times only when negotiated for payment to be made And sometimes failed to photograph inside the houses due to darkness.

Privacy interference was highly guarded by, in most cases, not being allowed to enter the houses.

Sample Formation **in this research (6.5) has been delt with obtaining a representative and adequate sample. A considerable sample was representative of the entire population as possible.**

The above submission leads us to the next Chapter – *Chapter Seven* **- which will deal with the** *Presentation and Interpretation of Data.*

CHAPTER SEVEN

7.0 RESEARCH FINDING AND ANALYSIS

7.1 <u>INTRODUCTION</u>

The previous Chapter discussed the research approach, tools and methodology that was used in conducting this study. The definitions of primary and secondary data and their collection was reviewed and, the two types of data research: ***Secondary data*** and ***primary data*** have been used to source the information in this research. ***Secondary data*** which emanates from already existing sources or previous reports involves ***desk research,*** and this has been the first step in looking for information already existing sources. This is mainly through published materials found either in house or externally, using libraries or previous projects, newspapers, journal articles, government housing policies, acts of Parliament, materials from research centres, museum materials, Household Budget Surveys and reports from other agencies.

Secondary data refers to information originally collected from purposes other than the specific research project in hand. ***Primary data*** refers to data collected or generated through field research by a researcher for a specific project. It is said that this is "new" information first hand, and the various methods of its collection, including questionnaire design have been dealt with. Distinction was also discussed over ***Quantitative*** and ***Qualitative*** types of research on their basis of determining the nature of data, its collection, analysis, interpretation and presentation, and the rationale of essentially adopting both type of approach by the researcher discussed.

In the preceding Chapter consideration has been given to the objectives of the study and the nature of the research, and thus inn this Chapter the statistical method to be employed in the data analysis are frequency and percentage of the frequency. It is believed that fairly accurate judgement can be made using this approach on the nature of the research.

The findings targets the main research questions raised under the INTRODUCTION – ***Research Objectives*** and issues to be determined under the ***Relevancy of the Research (1.30).***

The findings of this research demands the following: Determination of type and shape of the contemporary traditional houses;

- the commonly used building materials and its proper use;
- the technical know-how and knowledge of house construction;
- traditional house arrangement of functional spaces;

- provision of adequacy of storage facilities;
- hygiene aspect and level of traditional houses and households;
- availability and provision of domestic utilities like water;
- the financing of traditional houses construction;
- whether the rural people are contented with the present conditions of their houses or not.

The present Chapter's objective is to present the findings obtained from the Secondary data sources mentioned above and the Primary data obtained through the designed and structured interviews that followed; by carrying out research as per methods given out in Chapter Five:

- the Village Museum of the National Museum of Tanzania
- the Institute of learning and Research Centres.
- desk research, libraries
- questionnaires
- interviews.

7.2 FINDINGS FROM THE VILLAGE MUSEUM,M CASE STUDY

7.2.1 Analysis of Houses by Tribes

(A) **SUKUMA:**

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Cone-cylindrical (MSONGE)	The interior of the house is divided into three rooms.	Height:	One door is provided with a small gape where the wall and roof meet to allow easy circulation of air	Hardwooden poles, fastened to the poles by small sticks and fibres (miombo) then wetted clay is pasted on the wall leaving a small ventilation gape where the wall and a grass roof meet.

Table 7.1

The Sukuma tribe – MSONGE

The Wasukuma, the largest single ethnic group in Tanzania, are believed to have originated from the north-western part of Africa. The Wasukuma is a tribe which live in Mwanza and Shinyanga regions located on the west and southern part of Lake Victoria, the World's second largest lake.

The Wasukuma are Bantu and keep a big number cattle. Their livelihood depends on animal keeping (of cows, goats, sheep), fishing, farming, and mining activities. They grow maize (corn), sorghum, potatoes, millet, cassava, beans, rice and cotton. Traditionally, the Wasukuma (and the Wanyamwezi) used traditional dances as a way of motivating and encouraging members to work hard when they are cultivating.

The traditional Wasukuma house is circular in shape (MSONGE) and thatched neatly with layers of elephant grasses like a series of terraces. First, the walls are constructed using hard wooden poles, fastened to the poles by small sticks and fibres (miombo). Then wetted clay soil is pasted to the wall, leaving a small ventilation gape where the wall and roof meet to allow easy circulation of air. (Refer Fig : 2.1 at Chapter Two)

An old traditional Wasukuma house is round with a tierd grass roof. The interior of the house could be divided into two or more rooms.

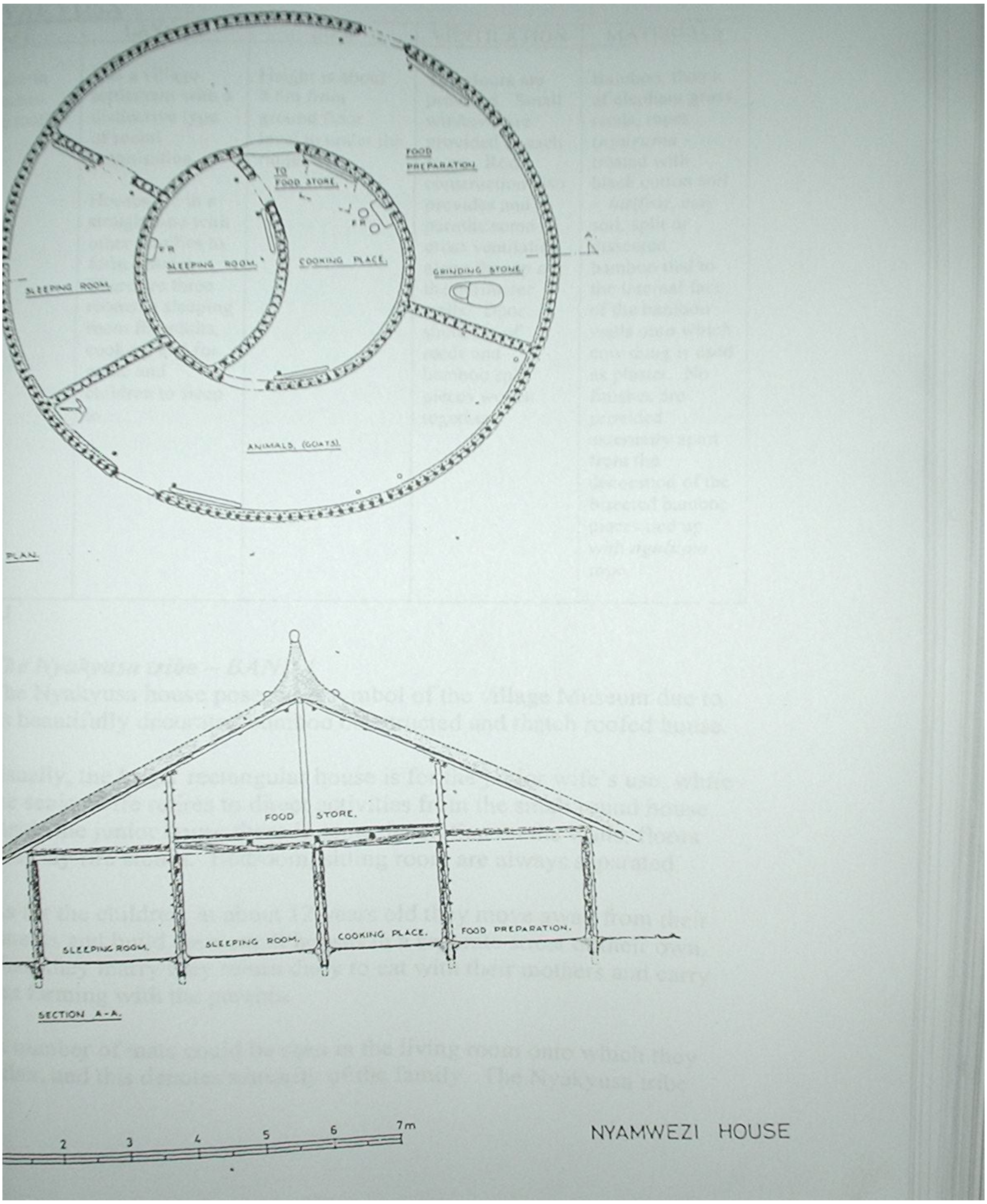
The roof detail is such that it is fitted with various decorations. Some people place snails shells on sticks above a worm out dish which holds the last tier

Inside the house, the rooms are partitioned, including a separate sleeping room for the daughters and a big veranda where women meet and talk. The kitchen is in the centre of the house opposite the parents' bedroom. On the far right side are boys sleeping room and storage area for cereals. In front of the house, there is a cow yard and, near the door, two little thatched huts with a single door each. These huts are used for offerings during ritual practices.

(B) **<u>NYAMWEZI</u>**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Cone-cylindrical	Two concentric cylinders. ***Outer ring*** is 4 meters radius, the inner ring is 2 meters radius. The outer diameter is 7.9 meters ***Inner Ring:*** 2 No. sleeping rooms, cooking place and fire place. ***Outer Ring:*** Food preparation room, sleeping room, fire place and animal keeping. ***Upper Floor:*** Food storage above the central accessible by simple ladder.	Inside house at peak is about 4.0 meters.	Two doors opposite to each other on the outer walls. Main entrance door facing north. No windows are provided. 1 or 2 per room small. Vent holes are made in the walls. Plugs are used to close the holes. Cross-ventilation is provided along the top of the perimeter.	(As per Sukuma tribe)

Table 7.2



NYAMWEZI HOUSE

(C) **<u>NYAKYUSA</u>**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Rectangular in shape, pitched and gable roofed	It is a village settlement with a distinctive type of social organisation. Houses are in a straight line with other families to form a street There are three rooms: a sleeping room for adults, cooking and for cattle and children to sleep in.	Height is about 3.6m from ground floor level to under the ridge.	Two doors are provided. Small windows are provided to each room. Roof construction also provides and permits some cross ventilation along the top of the perimeter walls. Door shutter is of reeds and bamboo split pieces woven together.	Bamboo, thatch of elephant grass, reeds, ropes (***nguruma*** – treated with black cotton soil - ***lutifya)***, clay soil, split or dissected bamboo tied to the internal face of the bamboo walls onto which cow dung is used as plaster. No finishes are provided externally apart from the decoration of the bisected bamboo pieces tied up with ***nguluma*** rope.

Table 7.3

The Nyakyusa tribe – BANDA

The Nyakyusa house poses as a symbol of the village Museum due to its beautifully decorated bamboo constructed and thatch roofed house.

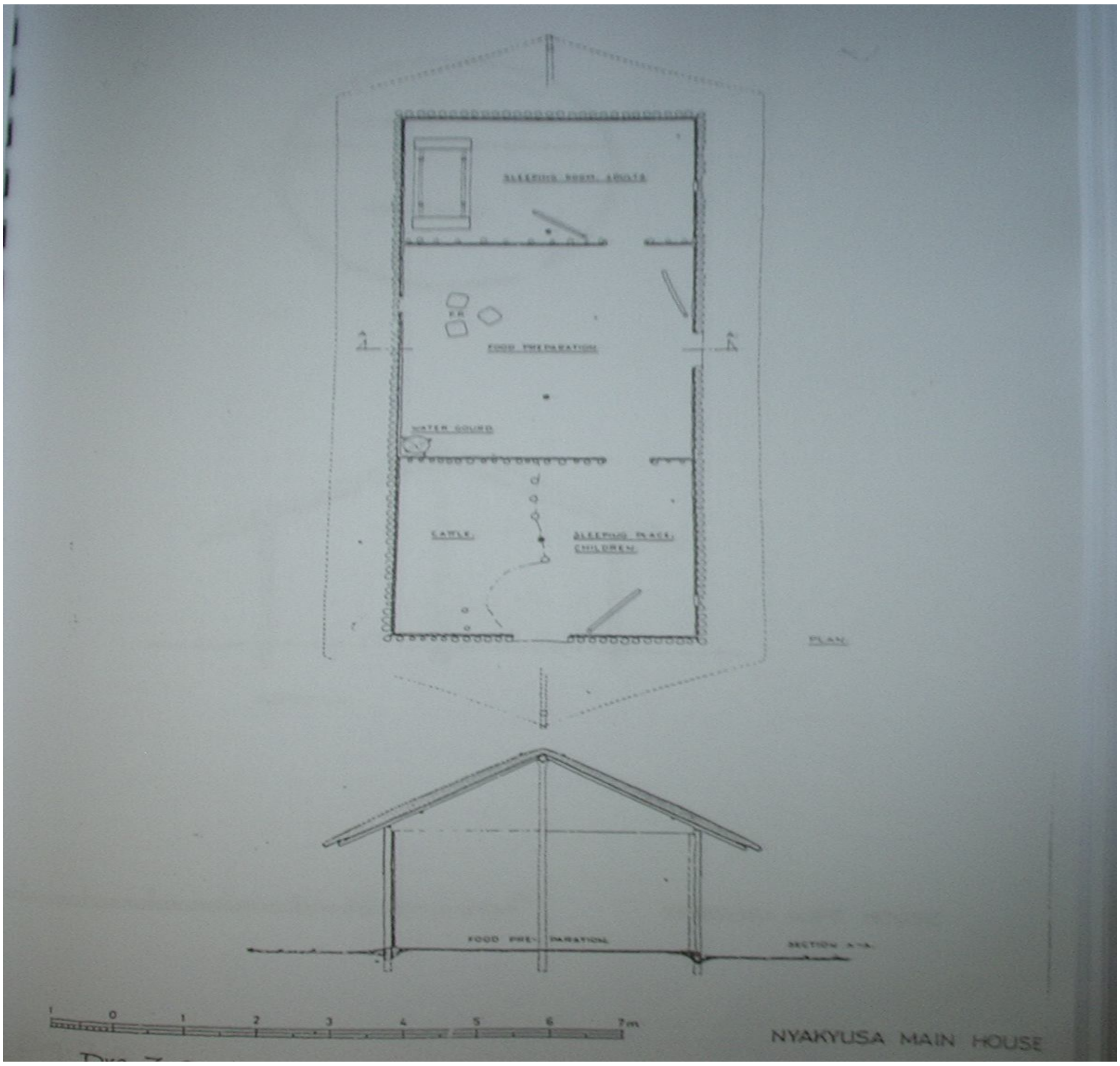
Usually, the larger rectangular house is for the junior wife's use, while the senior wife retires to direct activities from the small round house. Inside the junior house there is some decoration on the walls, floors and clay fire stones. Bedroom, sitting room are always separated.

As for the children, at about 12 years old they move away from their parents and build their small houses in a separate street of their own. Until they marry they return daily to eat with their mothers and carry out farming with the parents.

A number of mats could be seen in the living room onto which they relax, and this denotes seniority of the family. The Nyakyusa tribe have ample weaving techniques. The mats are woven by using dry banana leaves and some grass leaves ***(ukindu)*** distinguished by different colours.

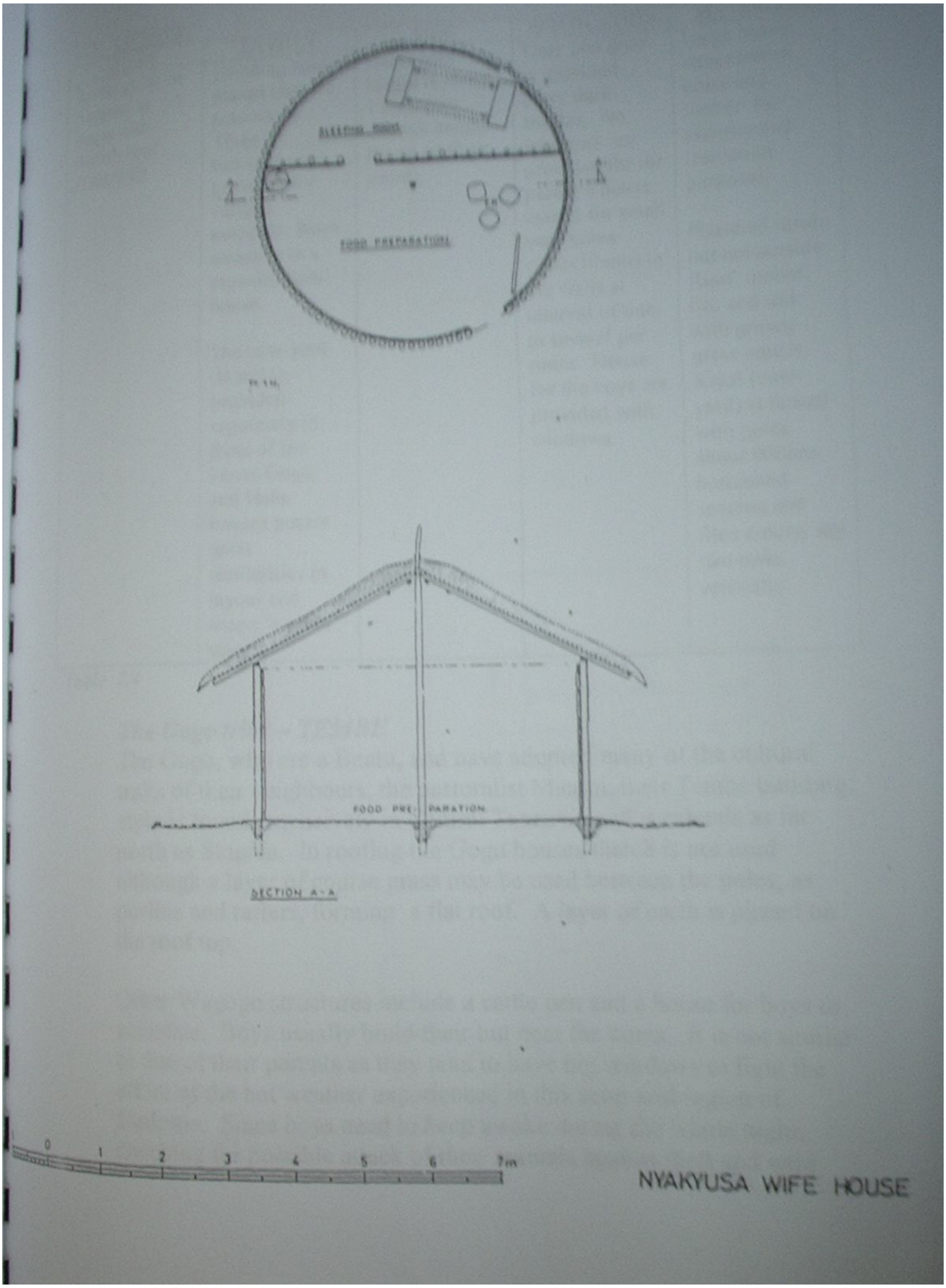
Bamboo is the principle material of construction of all the parts/elements of the house all the way through without necessitating the application of any other building materials except for the application of kneaded clay soil/cow dung for the walls as plaster and floor; and thatch as roof covering material on bamboo rafters/purlins/battens.

The bamboo is split open to form a carpet like piece which is fastened to the bamboo wall with "***nguruma***" ropes onto which kneaded clay soil/cow dung is applied as plaster. Prior to the application of ***"plaster"***, the carpet like piece provides excellent ventilation to the house and as ***"bamboo gauze"*** for screening the wall openings against insects. Bamboo – (Chapter 33.2.1(b)



Nyakyusa Main House

Nyakyusa Wife's House



Nyakyusa Wife's House

(D) **<u>GOGO</u>**:

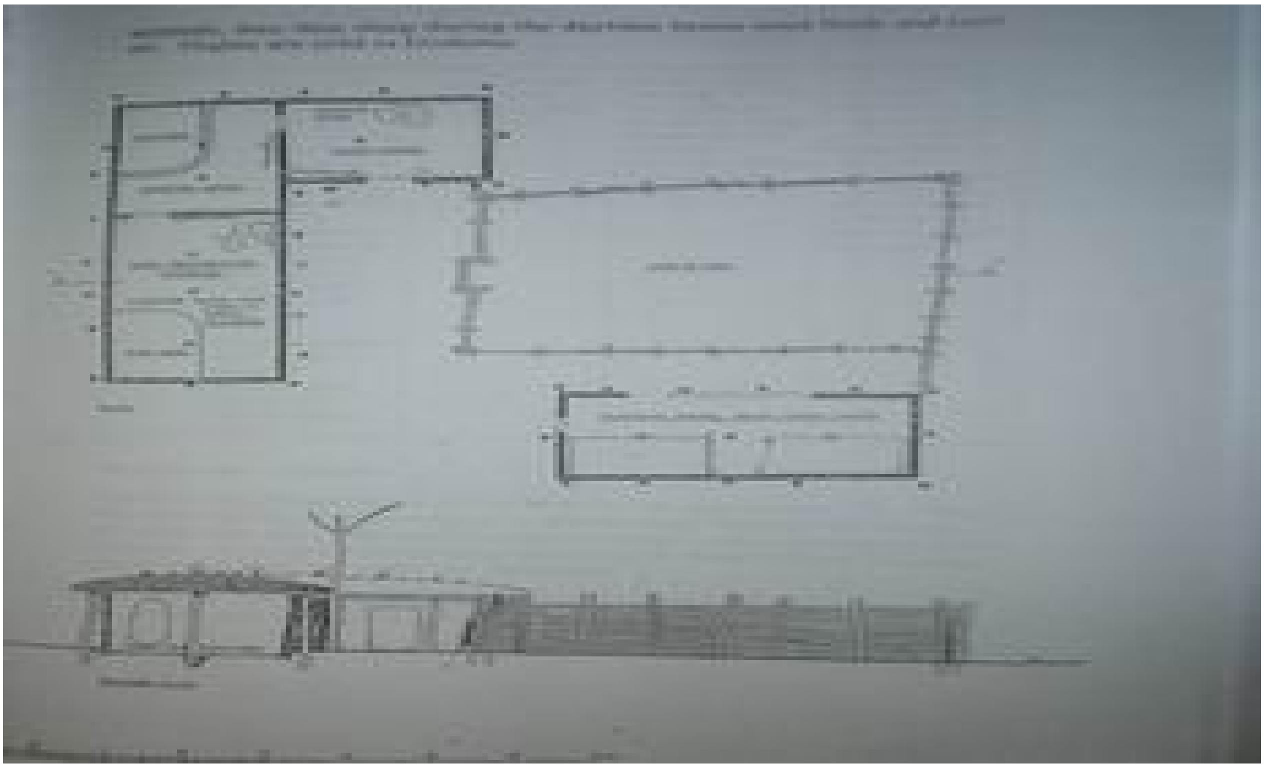
SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Rectangular or Angular in shape with flattish roof ***(TEMBE)***	Grinding stone placed into the ante-room. Three bedrooms are provided for various purposes. Boys socialise in a separate small house. The cow-yard (kraal) is provided separately in front of the house Gogo and Hehe houses posses great similarities in layout and shape, built in stages.	Headroom height is about 1.65m (not enough height for an adult to stand)	Only one door is provided (very dark inside). No windows are provided for the parent's house except for small vent holes (200x30mm) in the walls at interval of one to several per room. House for the boys are provided with windows.	Large heavy structures in poles and timber for security and insulation purposes. Plastered inside but not outside. Roof: timber, fito and soil with grown grass onto it Kraal (cow-yard) is fenced with poles about 900mm horizontal spacing and fitos around say two raws vertically.

Table 7.4

The Gogo tribe – TEMBE

The Gogo, who are a Bantu, and have adopted many of the cultural traits of their neighbours, the pastoralist Maasai, their Tembe building style is found extensively in Central Tanzania and it extends as far north as Singida. In roofing the Gogo houses thatch is not used although a layer of course grass may be used between the poles, as purlins and rafters, forming a flat roof. A layer of earth is placed on the roof top.

Other Wagogo structures include a cattle pen and a house for boys to socialise. Boys usually build their hut near the boma. It is not similar to that of their parents as they tend to have big windows to fight the effect of the hot weather experienced in this semi arid region of Dodoma. Since boys need to keep awake during the whole night, checking for possible attack of their animals against theft and wild animals, they thus sleep during the daytime hence need fresh and cool air. Nights are cold in Dodoma.



GOGO HOUSE

(E) **HEHE**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Rectangular or Angular in shape with a flattish roof (TEMBE)	Cooking place, visitors room, sheltered courtyard also for storage, parents sleeping room, room for receiving guests, two rooms for cattle and goats, two rooms for youngsters and adult members of the family, one room for cooking and one room for sleeping. Gogo and Hehe houses provide great similarities in layout and shape, built in stages.	About 90 square meters. Headroom height is about 2.5 meters.	Two external doors opposite each other. No windows are provided except for small vent holes at intervals of one to several per room.	Well kneaded clay is used for the walls (externally and internally). The arched roof is made from carefully curved wooden supports and the rood (tree) is then matted with clay, reeds and grass.

Table 7.5

The Hehe tribe – TEMBER

The Hehe traditional house is one with several apartments. The Hehe like other Bantu ethnic groups do construct their rectangular houses by using clay soil. The roof is neatly provided with a pressed layer of clay soil. Very little windows are provided of about 150mm diameter due to cold in Iringa where the Hehe live.

At a start a Hehe house is constructed by providing a sitting room at the centre with a sleeping room and kitchen on its sides.

As the family increases by having more children more rooms are added. Always girls are at the centre for obvious security reasons, embedded by the parents’ room on one side and boys room on the other side.

HEHE HOUSE

(F) **<u>NGONI</u>**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Cone-cylindrical	Two similar half cylinders divided by partition. Fire place for cooking and food preparation, keeping animals, and sleeping room. The floor is provided with grass carpet.	Outer diameter is 5.4m. Inside height at the peak is about 3.5m.	Two doors opposite to each other. No windows are provided. Cross ventilation is through the top of the wall perimeter.	

Table 7.6

The Ngoni tribe – MSONGE

The Ngoni are said to have come to Tanzania from South Africa. They left South Africa in 1824 advanced northward crossing the Zambezi river to settle in Southern Tanzania around the Ruvuma river in 1935. The main reason of the movement was because of the Mfecane war. This was a tribe war arising due to land shortage an advancement of Boers from South to north. They are famous for maize and tobacco.

The layout of the Wangoni house is in line with their polygamy practise which is their traditional practice of family formation.

At best, as a start, a Wangoni family builds two houses. One of the houses with 2 doors is for the senior wife. The smaller house is for the junior wife. The husband and children sleep in separate houses, alternating between the two houses.

Traditionally, the large house has a hole in the floor which is used for urinating at night. Early in the morning the hole is cleaned out with hot ashes.

Third open - sided bwalo shelter is used for socializing and craft work by men (the Ngoni are famous as wood carvers) Outside the compound of the three fenced structures at the Village Museum is a small shelter for black smithing.

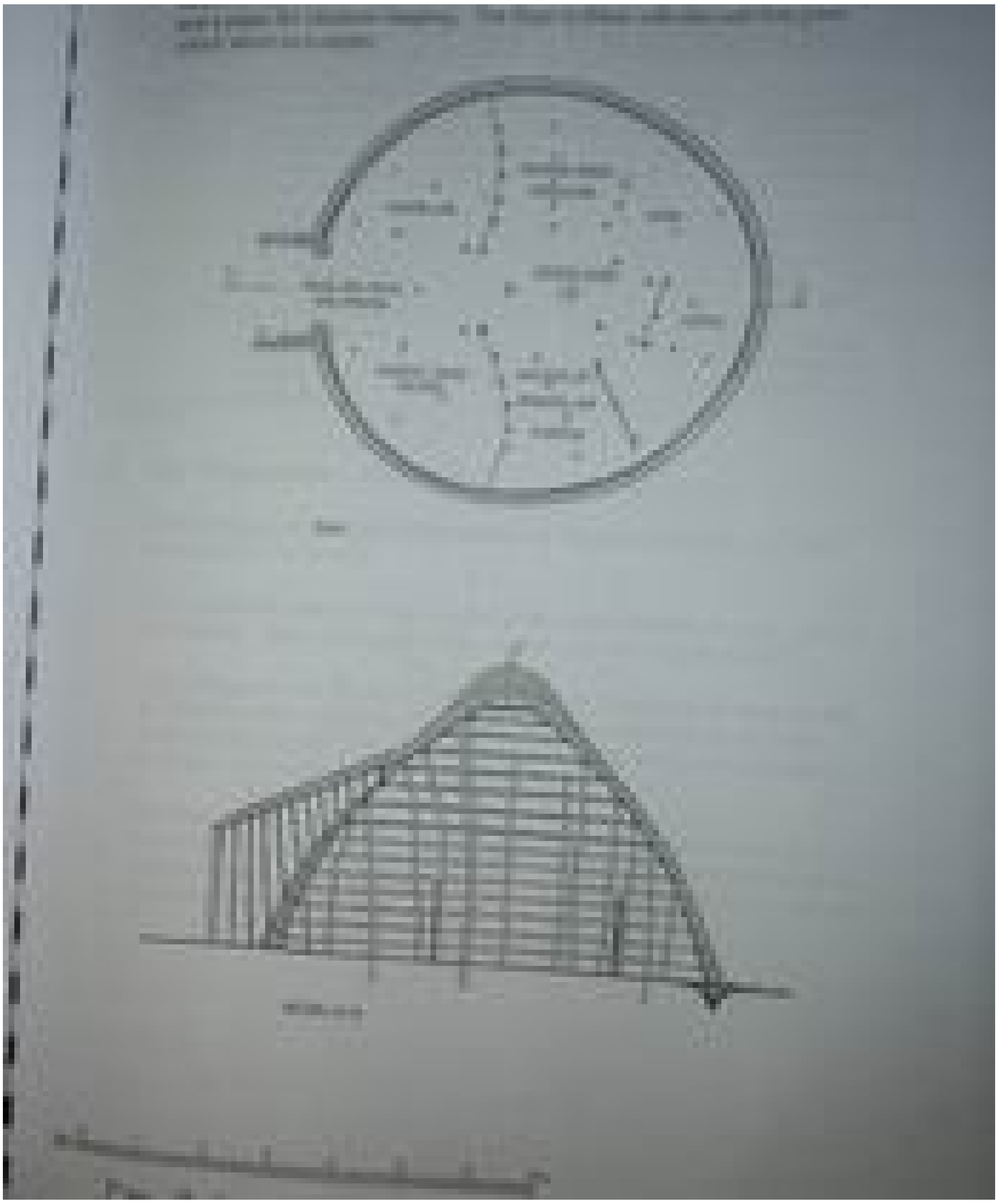
(G) **HAYYA**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Conically shaped ***"MSONGE"*** The traditional "Haya" house is becoming unpopular to-day.	Sleeping area for parents and small children (right or central area) Sleeping area for grownups children (left of central area) Fireplace and food preparation and storage (central area) Space for friendly talking and "guest wing" Floor is covered with dried grass. A "Ha" beehive "ngondano" traditional house is much used by old people even at present.	Approx. 6.5m diameter with a height of about 4.3m in height.	Usually only one door is provided which is protrusive and arched. The arched door way or foyer extends outwards to make a long arch.	Thatched all the way through from ground to apex of a conical house. Closely parked bamboo, split bamboo pieces, sticks and reeds closely parked together as internal finish on place of plaster. Ropes of banana barks. Hewed strong columns with no nails. Strong poles used. Ample technical construction details is seen.

Table 7.7

The Hayya tribe – MSONGE

The Hayya house is of distinctive "shaggy dog" appearance. It is entered through a long porch. The builder works from top to bottom, using closely-packed bamboo held in place by circle of sticks thatched with tough grass. Inside are many artefacts, including a bark bed cloth and gourds from which beer is drunk through the bamboo straw. There is a sitting room, bed room for parents, a church (Hayya used to preach in the house before going out side), kitchen, storage and a place for children sleeping. The floor is filled with this and fine grass which serve as a carpet.



HAYA HOUSE

(H) **CHAGGA**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Conically shaped MSONGE	Parents sleeping area, children sleeping area, cooking area, pen for cattle and goats. Food storage on the second floor. The Chagga used to share their homes with their domestic animals because of predators like leopards.	About 5.6m diameter Height measuring a total of about 4.9m (two levels)	Only one door is provided (rarely the second door is provided). No windows are provided.	House covered with grass work all the way through from ground to apex (for heat restoration) with "fito" inside woven closely together ("sochi" or "Okooyo") The Pare and Meru build this type of house.

Table 7.8

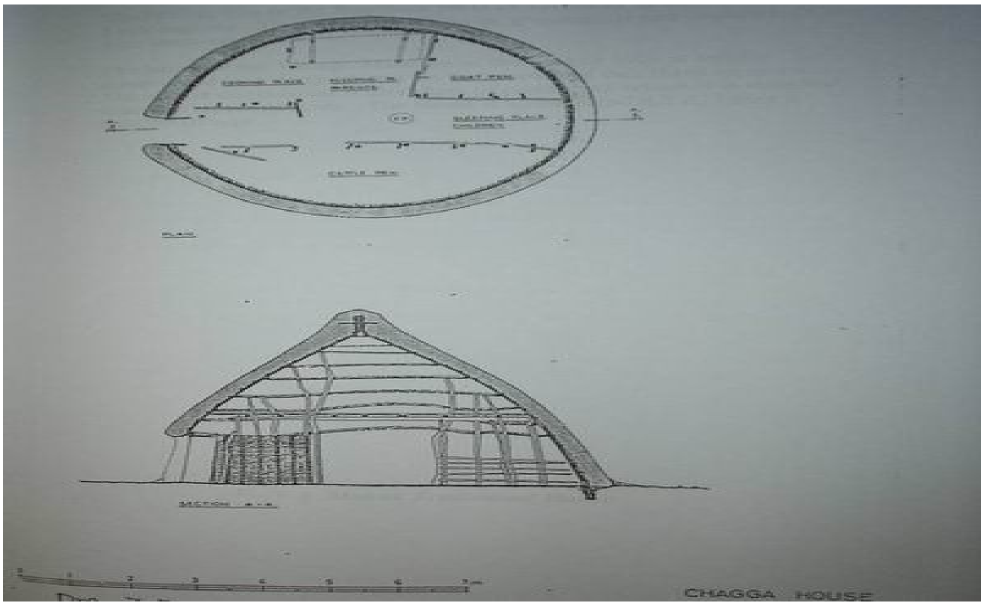
(H) The Chagga tribe – MSONGE

The Chagga live on the fertile slopes of Mount Kilimanjaro in the north east of Tanzania.

They practice intensive agriculture cultivating banana, maize, coffee and beans. They also keep cattle, sheep and goats as livestock.

The Chagga house at the Village Museum is made out of framework of flexible wood which is then covered with a thick layer of grass from bottom to top. The thickness of the thatch serves as insulation from the cool climate of the mountain area.

The layout of the Chagga house is such that one sleeping room is for parents, the second room is for children. Cattle and goats/sheep are in the same main house near where cooking takes place. Their livestock are fed in the house – zero grazing.



CHAGGA HOUSE

(I) The Makua tribe – MSONGE

The Makua live in the Southern parts of Tanzania in the Mtwara and Lindi regions. They cultivate cassava, groundnuts and cashewnuts as their main crops.

The house at the Village Museum of the Makua tribe is solidly constructed with earth plaster on framework of thin three supports. The roof is constructed with rafters of poles onto which it is thatched neatly in layers of grass. The house is circular (NDULE) being a MSONGE type.(Refer Fig, 2.2at Chapter Two)

(J) **SAMBAA:**

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Cone-cylindrical (MSONGE)	Traditionally, only one room is built with about 12 square meters. The house is divided into several rooms depending on the size of the house.	12 – 15 square meters when the house is of only one room.	Small holes are provided (about 150mm – 300mm diameter) as windows. Only one door is provided.	Poles, fitos, grass as thatch,. A wooden post (as column) is provided at the centre of the house as support of the thatched roof. Plastered inside and outside with clay soil.

Table 7.9

The Sambaa tribe – MSONGE

The Sambaa who are a Bantu of north- east Tanzania with Lushoto in Tanga Region as their major town have cone-cylindrical houses (MSONGE) as their traditional houses. They are of mud and pole and fitos construction and grass roofed.

In the 19th century the indigenous clans on the Sambaa namely Wahea, Washee and Wakinaturi inter-marriaged with foreign ethnic groups like Wambungu, Wataita from the North Wakwizu from Pare and Wakilindi from Nguu. Others were Wazigua from Zigua and Wabondei from Bondei (Chief Kimweri).

Such a composition has made the shapes, styles and constructional techniques evolve the Sambaa houses towards the rectangular or typical Swahili houses.

The Iraqw tribe – MSONGE

Iraqw **is the largest ethnic group which inhabits the Mbulu, Babati and Hanang districts in Arusha Region.**

Construction of their houses involves careful selection of poles to attain strong wood-work, and the houses are sited facing a valley.

The design, layout and siting of the Iraqw houses is dictated by their need of security as they are primarily agriculturalists who keep large heards of cattle, goats, poultry and often bee-hives, and also cultivate maize, wheat, groundnuts and beans.

The round house which is rare, known in the Iraqw language as *"Quri"* **was used mainly during peace time and has two storeys inside while the subterranean house ("Assemo") was primarily to defend against the Maasai raids. These subterranean houses built underground or cut across the hill were often interconnected by an underground tunnel that led to the central hide out – or through which they run with their cattle to the other side of the hill.**

Currently Iraqw construct their houses with hipped roof. (refer Current House at fig 7.7)

At night children sleep on the upper platform, while cattle are kept below the platform. Parents and children sleep on one side.

The Iraqw cattle are nearly everything. With cattle they are assured of various provisions like clothing, bed sheets, and also being a symbol of authority and status. They prefer to live with cattle because cattle provide them with warmth. Both of these two types of houses are now rare in the region.

(L) **HA**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Conically shaped MSONGE), and More so dome-shaped. Small in size Before thatching the house resembles a large invented wicker-work bowl – typically known as NGONGLANO.	Sometimes the house is portable. No division or partitions are provided in the house.	Quite small in size measuring about	Only one door is provided. No windows or small holes for lighting are provided lighting by fire.	Sticks or quite thick and strong straws, not big woods or poles are used. The thatch, is very carefully applied, starting at the ground and working up to the top.

Table 7.10

(L) The Ha tribe – MSONGE

Ha is the largest ethnic groups to be affected by an artificial colonial boundaries. Only about 7.5 per cent of them live in the Kigoma Region of Tanzania and are known as ***Waha***, while the rest live in Burundi and are commonly called ***Warundi.***

The Ha traditional house placed on the south-east corner of the site of the Village Museum is dome-shaped house i.e. conically shaped (MSONGE). The layers of straw used in its construction are thick and strong.

The Ha are both fishers and farmers. The house is portable, letting them be able to move according to their activity. The movement of the house may also be influenced by death of a beloved one. They will remove the house on the belief that the area has an evil spirit. When carrying the house away, the head of the household will seek for assistance from friends, neighbours or relatives.

A “Ha” beehive “Ngondano” traditional house much used by old people even to-day

(M) ***The Zanaki tribe – MSONGE***

The Zanaki is an ethnic group of Bantu speakers and inhabits in Musoma Region, East of Lake Victoria.
(The first President of the United Republic of Tanzania,
Mwl. Julius Kambarage Nyerere belongs to this ethnic group)

Construction of the Zanaki house at the Village Museum comprise of poles and fitos for the walls and roof frames. The roof is grass thatched and the walls are plastered with clay.

The Zanaki house is traditionally provided with two doors. The main door of the house is used to get into the fenced area where many cores take place, while the small door is for security against thieves and wild animals.

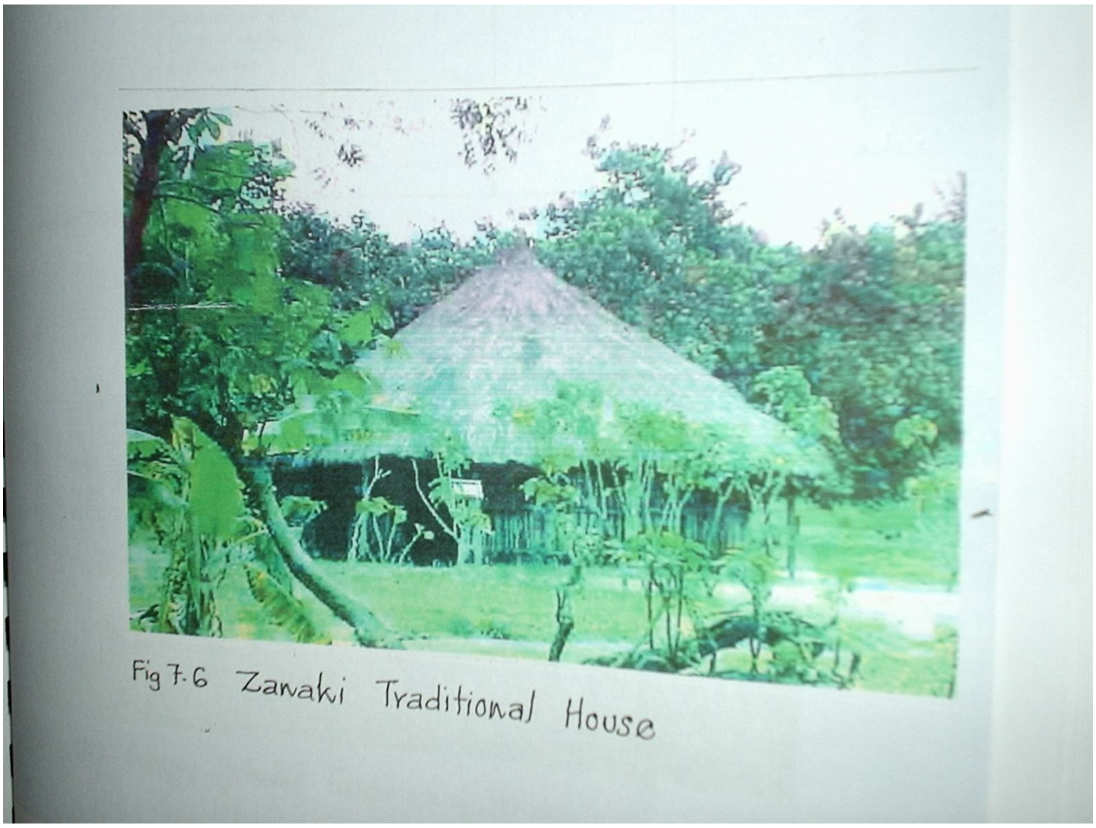


FIG: 7.6 zanaki traditional house

(O) **<u>MBULU</u>**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Rectangular and Angular in shape with flattish roof (TEMBE)	Men's place for meals and chatting at the entrance. Sleeping place for father and son. Working place for women and keeping cattle at night. Cooking and sleeping place for girls. Main cooking place and for women to take their meals. "Second" floor is used for mother and small children sleeping and storage purposes. Middle of the house is for small cattle, sheep and goats.	Usually very large house of about 110 square meters including verandah. Very low height.	No windows or window opening and no vent/hole. One door opening is provided.	Poles, reeds, fitos, soil, grass, ropes. It is semi-subterranean, which means it is partly dug into the sloping ground with only the front wall entirely free above ground.

Table 7.11

At Figures 7.10 and 7.11 there are Iraqw (Mbulu) Traditional Houses

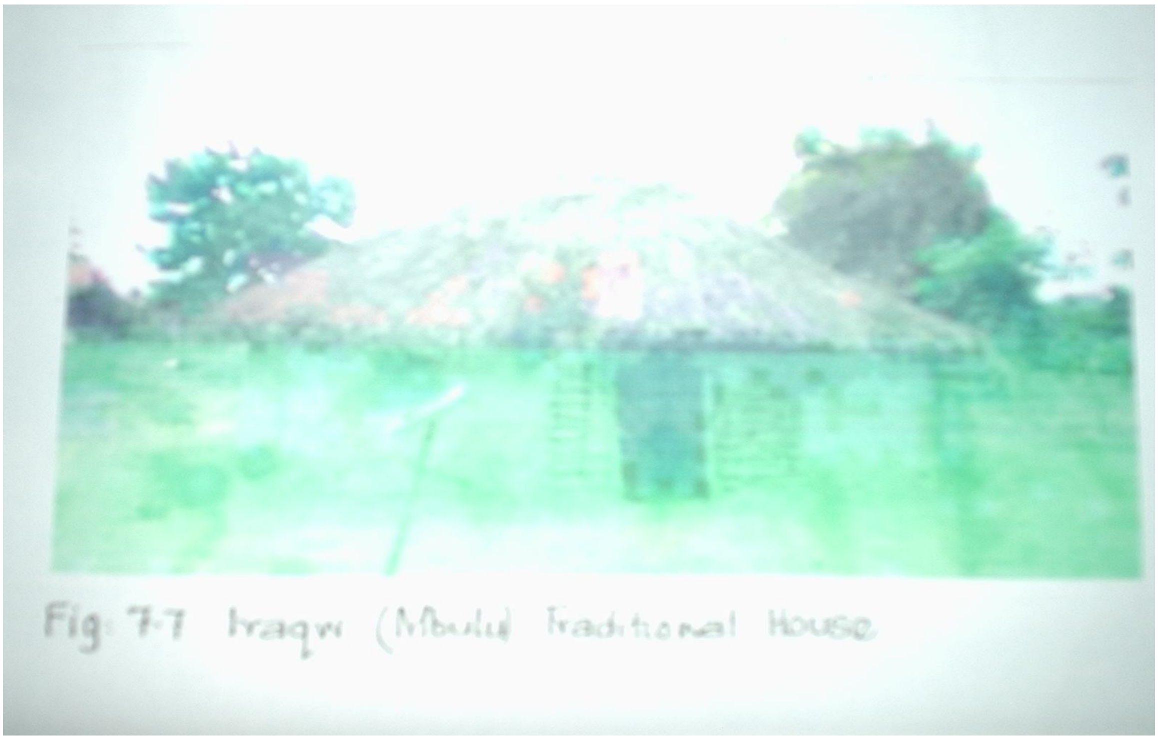


Fig: 7.7 Iraqw (Mbulu) Traditional House

Fig: 7.7 Iraqw (Mbulu) House – Current

MBULU HOUSE

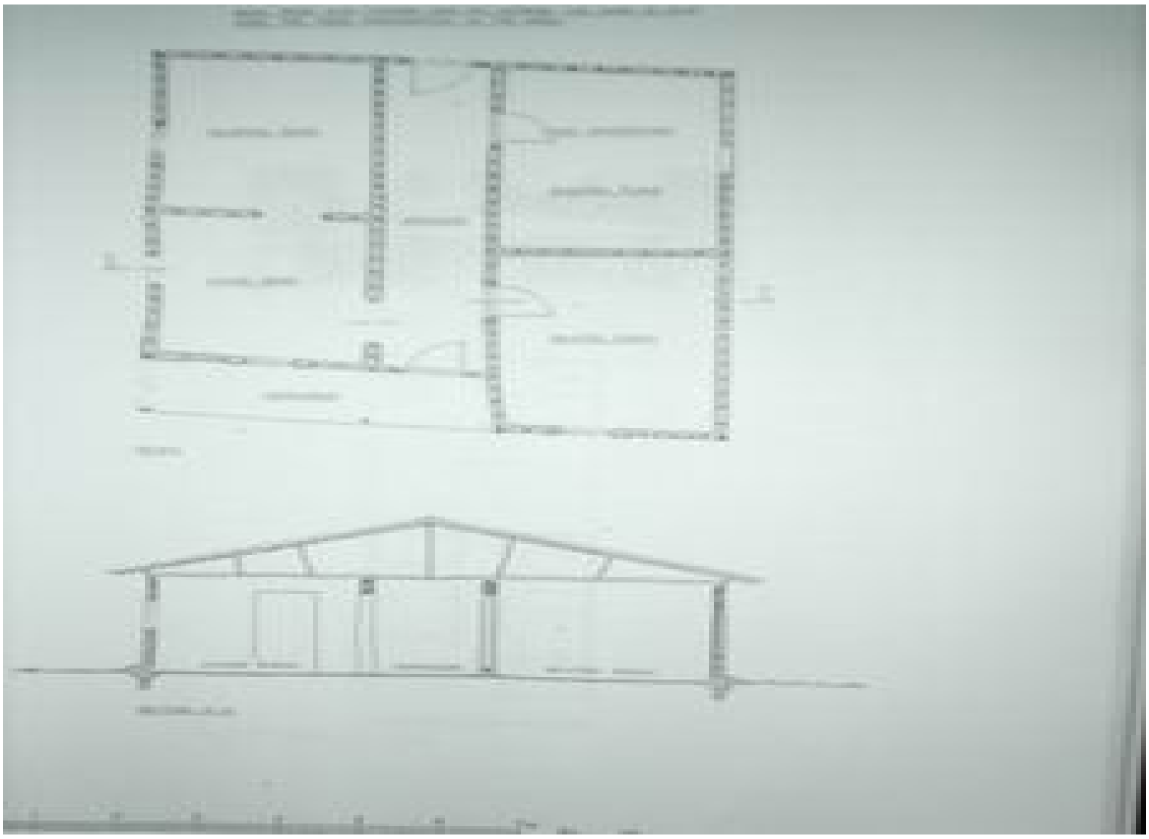


Fig: 7.11 Side view of a Mbulu semi-subterranean house, the orientation if these houses on sites depends on direction of the slope.

(P) **FIPPA and RUNDI**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Conically shaped (MSONGE)	Circular layout with no partition inside	2.5 – 4.0m diameter. Heights 2.5m at centre sloping evenly at the external round wall reaching 1.5m. Height for the Rundi house at the centre is 1.7m sloping evenly at the external wall up to 1.1meters. The size can differ depending on the purpose, size of the family and household wealth.	One door opening is provided. No windows or holes for lighting or ventilation are provided.	Poles, sticks, grass and earth mixture. The house is conical and thatched with long grass from top to bottom. The interior of the house is plastered with earth mixture.

Table 7.12

The Fippa tribe - MSONGE

The Fippa live in the Southern Western highlands of Tanzania. They are agriculturalists, cultivating maize, groundnuts and millet and those who live by the shores of Lake Rukwa include fishing as one of their economic activities. The Fippa have also a long history of iron smelting. The small shelter-like unit displayed at the Village Museum acts as a moulding area for iron products.

The Fippa house on site of study is conical and thatched with long grasses from top to bottom. The interior of the house is plastered with earth mixture.

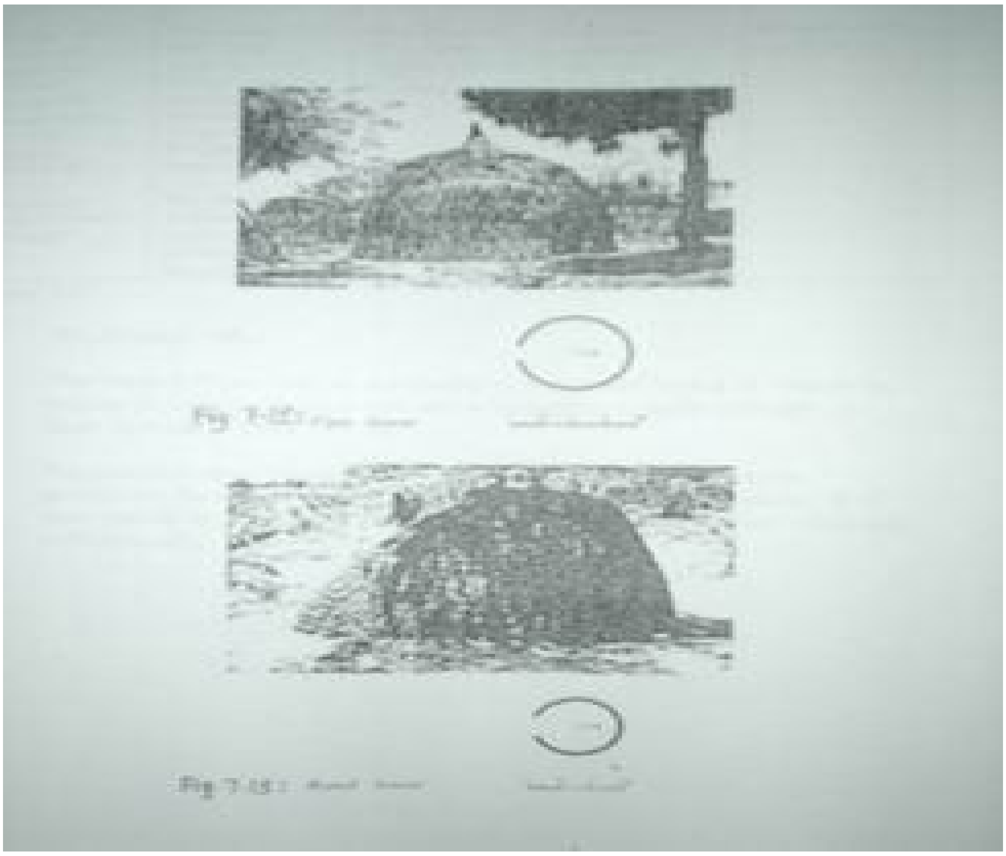


Fig: 7.13

(Q) **MAASAI**:

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Oblong. All corners and angles are smoothly rounded off (unique shape), and now adopting "MSONGE" The Maasai house is known as "engaji"	Two rooms with one "open" partition small fenced area for keeping goats and poultry, sleeping room, fire place and food preparation. The Maasai settlement is usually surrounded by a thorn fence.	Main house is 5m x 3.5m. Highest point is 1.75m	One door opening is provided, extending from the house like the opening of a snail shell. No windows are provided but a small vent hole near the sleeping place.	Made of wattle and daub.

Table 7.13

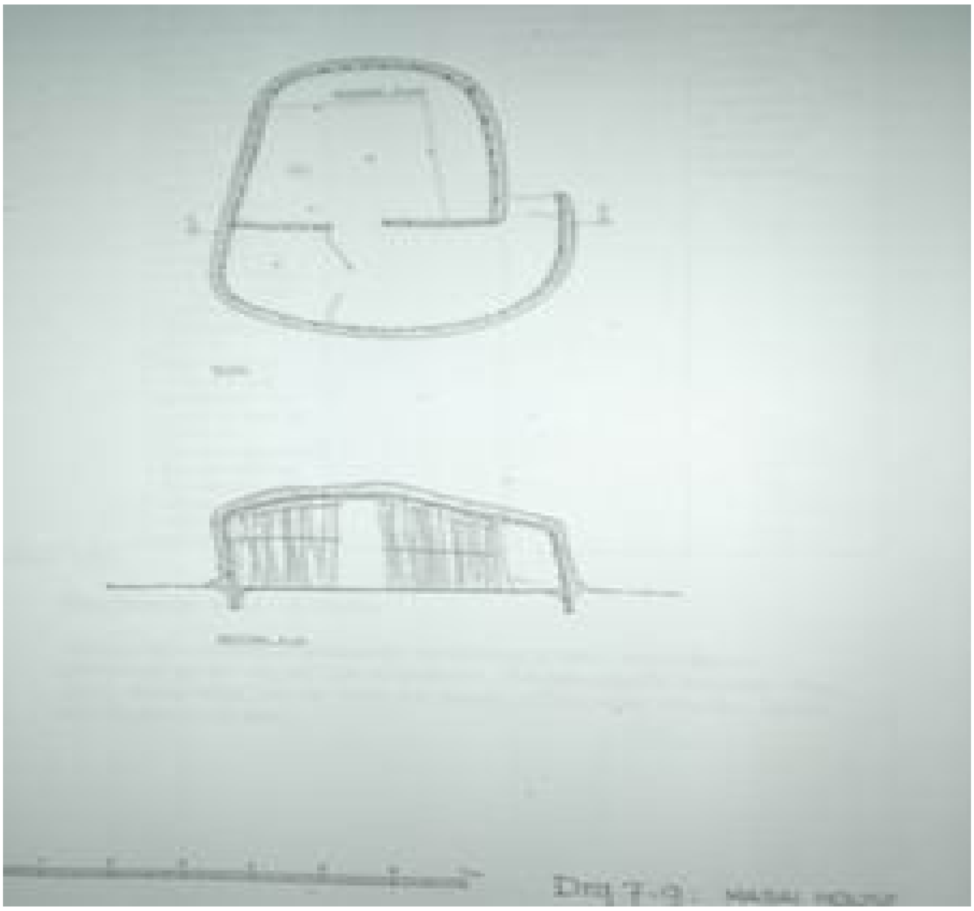
The Maasai tribe

The Maasai house has no similarity to any other house in Tanzania, neither in layout nor in shape, even though it is made of wattle or daub like many other houses.

The house is constructed from earth mixed with cow dung to strengthen their building. The boma consists of several units. It is surrounded by a fence of throny twigs to encourage the intruders and wild animals.

The pattern of settlement of the Maasais is a circular cluster of between eight and sixty similar houses with an open yard in the middle.

The type of house is only used by the Maasai who number about 65,000 in Tanzania.



DRG 7.9 MAASAI HOUSE

ZARAMO

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Rectangular house with either gabled or hipped roof.	Two external doors are provided facing each other on the two long sides of the house of the house with passage in between. Verandah is provided as part of the main house. Usually 2- 6 rooms. A sleeping room from which a toilet room is accessible (not common feature of design in the rural houses in Tanzania), and also the application of verandah and corridor for the Swahili house is favoured. Kitchen and store are provided on the opposite side of this. Used both in rural and urban areas.	32 square meters including verandah. Height from ground to ridge about 2.6 meters.	Originally no windows were provided thus ventilation depend on the two external doors facing one another at each end of the corridor.	Poles, fitos, reeds, makuti (coconut palm leaves) ropes, thatch. Original house of Zaramo is thatched all the way through (even its partitions). The thatch is supported or held in position by tying it with fitos/reeds horizontally.

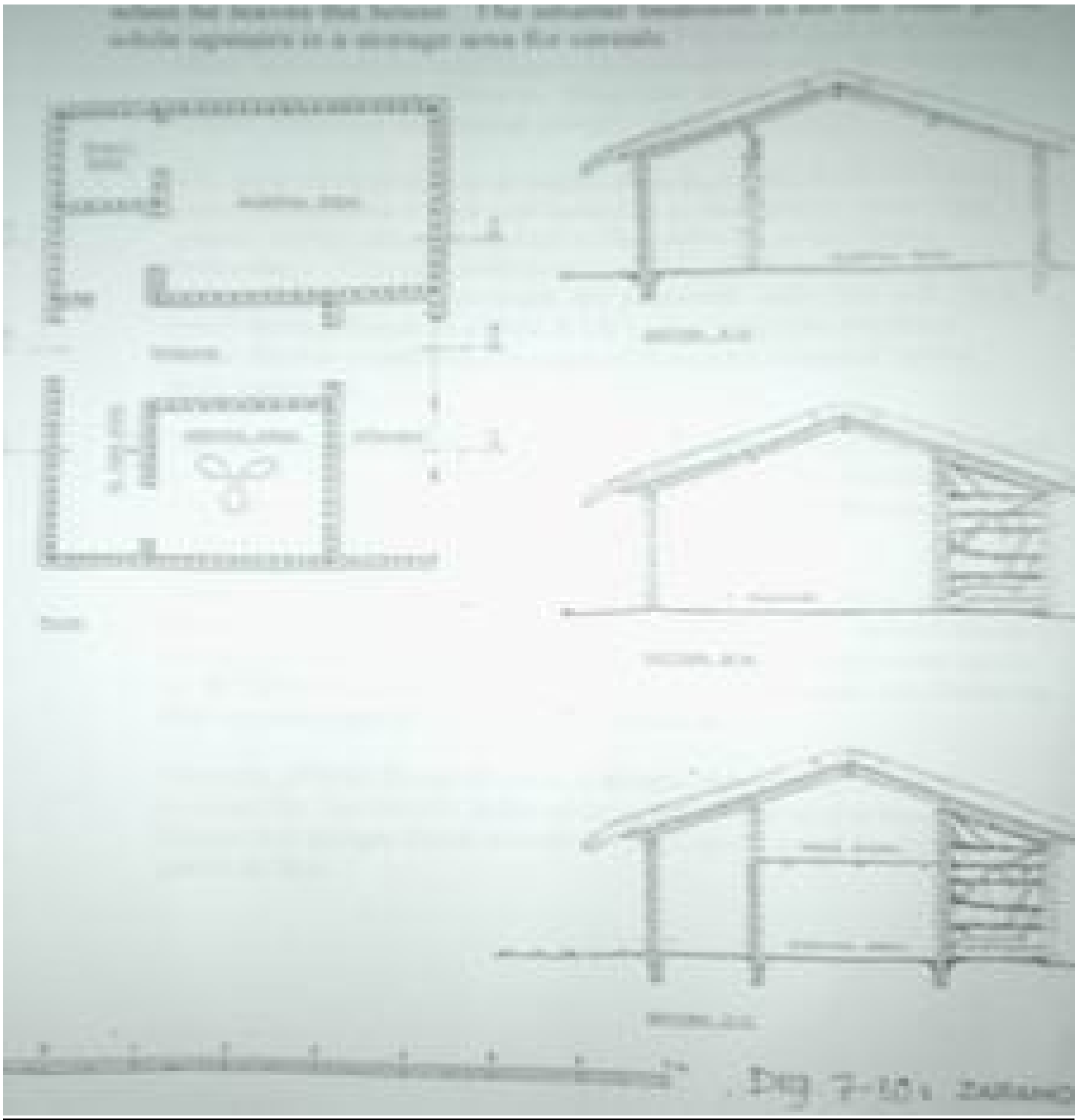
The Zaramo tirbe - BANDA

Zaramo are coastal community inhabiting an area immediately surrounding the city of Dar es Salaam. Predominantly moslems they share many other habits with the people of Zanzibar, Pemba, Mafia and Comoro Islands.

"*Dungu*" – This is the original Zaramo house commonly constructed or found in the agricultural farms to guard their crops. It is always built at the field edges to scare away birds. The *Rufiji* people use similar houses. Their rice

fields are often flooded during rainy season, so they live “upstairs” to escape from the water.

The large traditional Zaramo house is made of grass tied to a frame by sticks. Farm tools and storage tub for rice are kept in the house. The larger room is the couples bedroom, with a separate bathing room for parents. It is the Zaramo habits for a father to clean the room when he leaves the house. The smaller bedroom is for the older girls, while upstairs is a storage area for cereals.



DRG 7.10 ZARAMO HOUSE

(S) The Kwere and Doe tribes - BANDA

Wakwere and Wadoe are matrilineal ethinc groups, who resides in Coastal Region in Bagamoyo and Kibaha districts and rural Morogoro district in Morogoro region.

Wakwere and Wadoe are agricultural communities cultivating mainly millets and pulses with maize, rice and cassava.

hey also keep cattle, hens, goats and practice fishing and hunting activities.

ulturally they share much with the Waluguru and Wazaramo. They have cultural and linguistic similarities with the foregoing ethnic groups and Wakutu. They also share the same clan origin, religious and social pattern of life.

he type of their house is called *Banda*, neatly built by using poles (*Misaraka* which are believed to last longer more than 50 years), small poles *(fito)* tied to the poles by using fibers *(miombo)*. The roof is thatched with small bundles of grasses called *ving'ondwa.* Its walls are plastered with clay soil. The small *banda* house is called *SAKA*, is a bedroom for boys. Boys always construct this type of house to reveal or prove their maturity.

he big house is for parents. There are two rooms, the left hand side is for the senior (eldest) wife and in case the husband marries another wife the other room will be used by junior (young) wife.

n the upper level of each of these two rooms there is a storage place for cereals *(sorghum and rice)*. More-over behind these two rooms there is another room for father or some times used by daughters. During the colonial rule fathers used this room as hiding place against colonial tax evasion.

ut side of this house there is a *dungu* for storing cereals (maize) for the family belonging to the father of the homestead. Under the *dungu* there is underground room used for keeping goats or hen.

ince time immemorial health care of Wakwere and Wadoe ethnic groups have been influenced with their social, cultural and economic life. They had preferred the traditional healing system. There are two miniature huts under a tree. The smaller one is called *Kinyamkera*. It can be compared with the district hospital available in the modern society. It is used for healing and making offerings to patients who suffers from illness or not critical sickness. The other one is called *satanic* hut for treating patients who suffer from evil spirits. In this case it is compared with a referral hospital. It cures critical sickness relating cases.

he height of the doors in this house are a bit low. Wakwere and Wadoe are short. But they feel so comfortable with the bending when they get in or out of the house.

SWAHILI

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS
Originally from the Zaramo shape, being rectangular with either gabled or hipped roof.	There is a corridor running through the centre of the house with 2 – 6 rooms on either side of the house arranged symetrically and accessible from the passage. There is a verandah in front of the house and an enclosed courtyard at the back containing a small house with a toilet, storage and kitchen. House is mainly for sleeping rooms (equal numbers of rooms on either side) sometimes cooking/food preparation is done in the corridor. Any ***poultry***, washing, pounding, clothes drying lines are carried out in the enclosed courtyard.	About $68.5m^2$ including verandah Height from ground to ridge is 3.4m.	Ample ventilation is available due to provision of windows to each room and height of roofed Swahili house.	Poles, usually (mangrove), fitos, reeds, coconut palm leaves, clay soil and ropes.

The Swahili tribe - BANDA

The Swahili house is very common along the Eastern African Coast, spanning from Lamu in the north through Mombasa, Tanga, Saadan, Bagamoyo, Dar-Es-Salaam, Lindi, Mikindani, Kilwa and Mtwara in the south of the country. And also Islands of Zanzibar and Pemba.

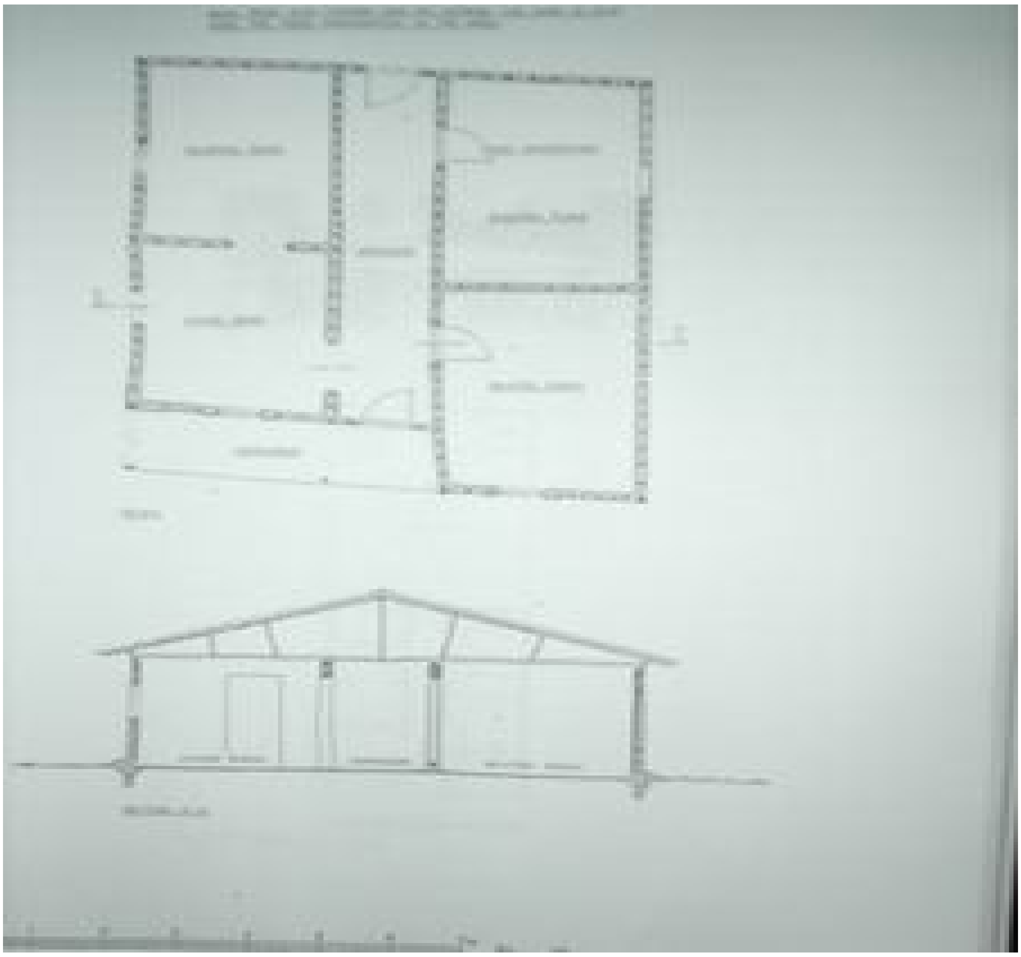
The ***Swahili*** **is a collective term for a community of people which inhabit the coast of East Africa.**

The Swahili house studied at the Village Museum is a rectangular house with a hipped roof. Its internal layout includes a central passage (corridor) and rooms arranged on both sides of the passage and accessible from this.

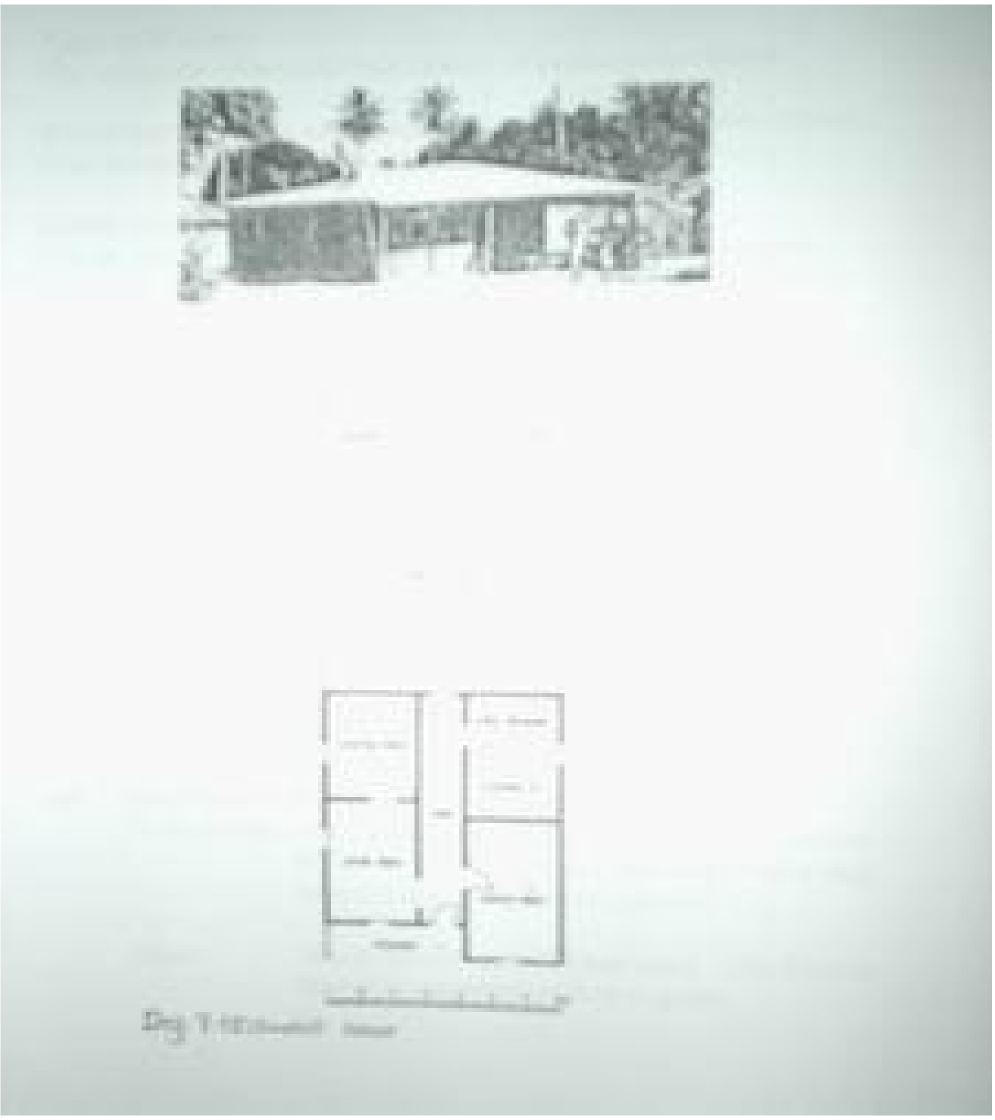
The house has a verandah in front and enclosed courtyard to contain toilet, storing and cooking facilities. Materials of construction are mangrove poles, fito, coconut palm leaves, clay. *(Chapter 1` (1.22) – History of Housing Dev. in Tanzania*.

Grading the Swahili House

As for the colonial rulers, materials such as mud and pole urban swahili houses were considered a temporary solution. It used to be named semi-permanent, non-durable, third class and temporary house. These terms reflected the attitude of the colonists in relation to native housing as unsanitary, cheap, uneconomic and ill-suited to modern methods of city planning.



DRG 7.11 4 – R SWAHILI HOUSE



DG 7.12 SWAHILI HOUSE

7.2.2 <u>Summary of the Case Study Findings</u>

indings gathered from the Village Museum Case study describes the house elements, layouts, shapes/types, building materials and their costs, services and functions.

ype of Houses

he majority of houses have plans of rectangular shapes.

hile the rest have round house plans, and one oblong house plan belonging to the Maasai tribe.

nside Layout of Houses

nside rooms arrangement of each house did not resemble; differing from one house to another depending on the ethnic group of the given tribe and the climatic environmental conditions it experiences; but all houses have rooms depicting intentions of separating functions carried out in the house. Some houses have verandah or potch at entry.

lain Use of the House

t was noted that all common activities covering food preparation, cooking, eating, sleeping charting and meeting visitors take place in the house.

pace for animals, such as cows, goats, calves, is not provided in the Village Museum. It was reported that they are kept both, indoors and outdoors in a fence or kraal depending on locality and culture.

(f) *Materials Used*

Foundation **-No foundation was noted to all the houses. Poles to form the walls are simply dug and erected upright into the ground.**

Floor **-Earth floor/consolidated mud. The Hayya house is carpeted with dry grass.**

Walls **- Poles, branches, fitos, mud, bamboo, reeds, banana ropes, creeping plants as ropes and cow dung as plaster.**

Thus ending up with a wall mud – structure which consists of straight poles dug into the ground. Split poles are tied horizontally on the outside and inside of these poles. Thus framework is then covered with mud, usually plastered on the inside. Sometimes the framework is parked with coral stones (coastal area for the Zaramo/Swahili house) before plastering.

Roof: **Poles, fitos, reeds, creeping plants as ropes and banana ropes forming up the roof structure; with grass, palm leaves (fronds) or mud as roof covering material on top of the roof structure.**

(g) *Ventilation:*

-small openings/holes on walls
-Doors
-Unplastered top end of walls as openings.

(h) *Finishes:*

Mud plaster on the inside surfaces for the walls. Five houses have their outside surfaces of the walls plastered.

(i) *Ceiling:*

All houses have no ceilings provided, except three houses have partial constructed ceilings being used for storage purposes. Their construction are of poles and fitos.

(j) *Services:*

-Cooking place – provided inside the house where chatting is done (sitting room).

-No electricity and water connection

-Storage – Small items are stored in the house, hanged on the walls, on ropes, under the bed and on the ceilings where provided.

-WC – No WCs/latrines are provided in the Village Museum except two toilets of European type for visitors of the Village Museum and Staff.

(f) *Shape:*

Walls: **Square/rectangular forming a four corner house. This shape came up with a** *Tembe* **and** *Banda* **Types.**

	Round	**-**	*Msonge* **Type**
	Oval	**-**	*Msonge* **Type**
Roof:	**Flat**	**-**	**roof not raised.**
			Tembe **type**
	Pitched	**-**	**four corner house**
			Banda **Type**
	Conical/Pointed roof	**-**	*Msonge* **Type**

Construction materials used for the houses: bamboo, poles, sticks, grass, palm leaves (fronds), forest creeping plants and ropes of banana backs as ropes for tying up poles, bamboo and sticks together, cow dung as mortar, reeds woven together as door shutters. (No evidence of use of nails, screws/bolts, concrete blocks, burnt/unburnt bricks, sand, roofing metal/iron sheets and tiles.

Having gone through the houses of the 18 styles presented in the village. There is all convincing evidence that the building styles of the Museum are used in a contemporary society.

-*Common Room* **-This is noted and reached immediately one entered the house preceded by a verandah or potch.**

Kitchen **- Position and cooking facilities not at all related to the so called modern styles.**

-*Element* **- Sizes of the building (walls, windows, doors,) room sizes, constructional materials used for the building: poles, grass, fitos, palm leaves, cripping plants as ropes cow dung as mortar, reeds woven together as door shutter., rummed murrum as floor.**

Construction techniques:
o nails, screws/bolts but forest cripping plants as ropes, timber, poles, fitos used.

Io concrete blocks, stones, burnt/unburnt bricks, sand, roofing sheets, tile used.

ervices **- No electricity and water connections. In side the house always dark and no ventilation due to lack of openings as windows.**

Io traditional pit *latrines/toilets* **of any kind are provided in the Village Museum. Modern toilets (WCs) are provided for the Museum visitors' use.**

7.2.3 *Conclusion*

he result of house types and shapes being advocated are based on the survey carried out at the Dar-Es-Salaam Village Museum. This is supplemented by a number of research visits by the researcher in the rural areas and application of a structured questionnaire.

Out of the X No. houses found at the Village Museum in Dar-Es-Salaam "a" are round houses (MSONGE), (b) are and thus coming up to MSONGE, BANDA and TEMBE.
t has been noted that the three styles (MSONGE, BANDA and TEMBE) have emerged as a result of climatic conditions, environmental conditions, geographical conditions (topography), availability of materials, life/cultural style, security considerations and adoption from neighbouring countries through immigration.

<u>TRADITIONAL HOUSE TYPES AND SHAPES</u>

7.3.1 *Types of Traditional Houses*

he traditional houses in Tanzania can be identified into three main *types*

- **Banda**

•Msonge
•Tembe

The *Banda* type of house is a four corner house and taking the lead in representing the housing styles used in contemporary Tanzania. Their layout and types are found in all regions in the country but originally used by a single group of tribes of the Zaramo and Swahili in the coastal areas. This type of house comprises the following:

- **Rectangular House with *hipped* roof and entrance door on the long side of its four walls. Found in all regions of the country. It covers 40 – 45% of the rural houses.**

- **Rectangular House with *gable* roof and entrance door on the long side of its walls; and found in all regions of the country, covering 20% of the rural houses.**

- **Rectangular House with *hipped* roof and entrance door on the short side of its four walls. This is a “Swahili House”, commonly found in the Coast Regions, covering 10% of the rural houses.**

According to the Household Budget Survey (HBS) 1969, the most common traditional shape of houses was rectangular with entrance door in long walls there were about 71%. Out of these, 36% houses had hipped roof, 19% houses had gable or curved soil roofs, and 2% houses had the roof sloping in one direction; 11% of the houses were rectangular with hipped roof and entrance in short walls and 11% was cone-cylindrical "*misonge*” Some 2.5% were of bee-hive type of roof structures without walls.

The *Msonge* type of house is a round house with a conically pointed roof and can further have their layouts and types divided into four groups (ethnic groups).

•Fipa and Rundi House

•Chaga and Haya House

•Ngoni and Nyamwezi House

•Maasai House

-*Round con-cylindrical house.*
Northern part of the country; also in few areas of Morogoro Region and Mbeya Region. It covers 5 – 8% of the rural houses.

Beehive houses.

Northern part of the country (West of Lake Victoria and eastwards along the border towards Kenya), and few in Rukwa Region. In 1983 this type house might have covered less than 1% of the rural houses in Tanzania.

Round bee-hive houses **(less common)**

Western border in Tanzania (Kigoma). Insignificant percentage of the rural houses in Tanzania.

The "*Mbulu*" semi-subterranean house in Arusha Region – Northern Tanzania falls into this *Tembe* group. The house is partly dug into the sloping ground with only the front wall entirely free above the ground. The orientation of these type of house depends on the direction of the slope. This type of house is now disappearing.

In the southern part of the country close to the Lake Nyasa a special variation of the rectangular gable roof house can be found with the roof at the gable prolonged at the top and with a separate support for the prolonged ridge beam outside the wall. In 1983 only a few houses might have been of this type. (Commonly used by the Nyakyusa tribe in Mbeya Region).

Square house with pyramid shaped roof

In most cases, even if the house plan was square, still the roof had a short ridge at the top. It is also possible that the coding for pyramid roofed houses in the HBS 1968 – 69 included such square houses with a short ridge and that such houses, more correctly, should have been classified as hipped roof houses.

The *Tembe* type of house has a roof which is not raised towards being flat, primarily of a four corner house; and can further have their layouts and types divided into two groups of tribes, which is a single ethnic of tribes:

- **Gogo House**
- **Hehe House**
- **Mbulu House.**

The Tembe type house comprises the following:

Rectangular Flat Soil Roof House.

"Hot and Dry" and "Temperate" Central part of the country, covering 10% of the rural houses.

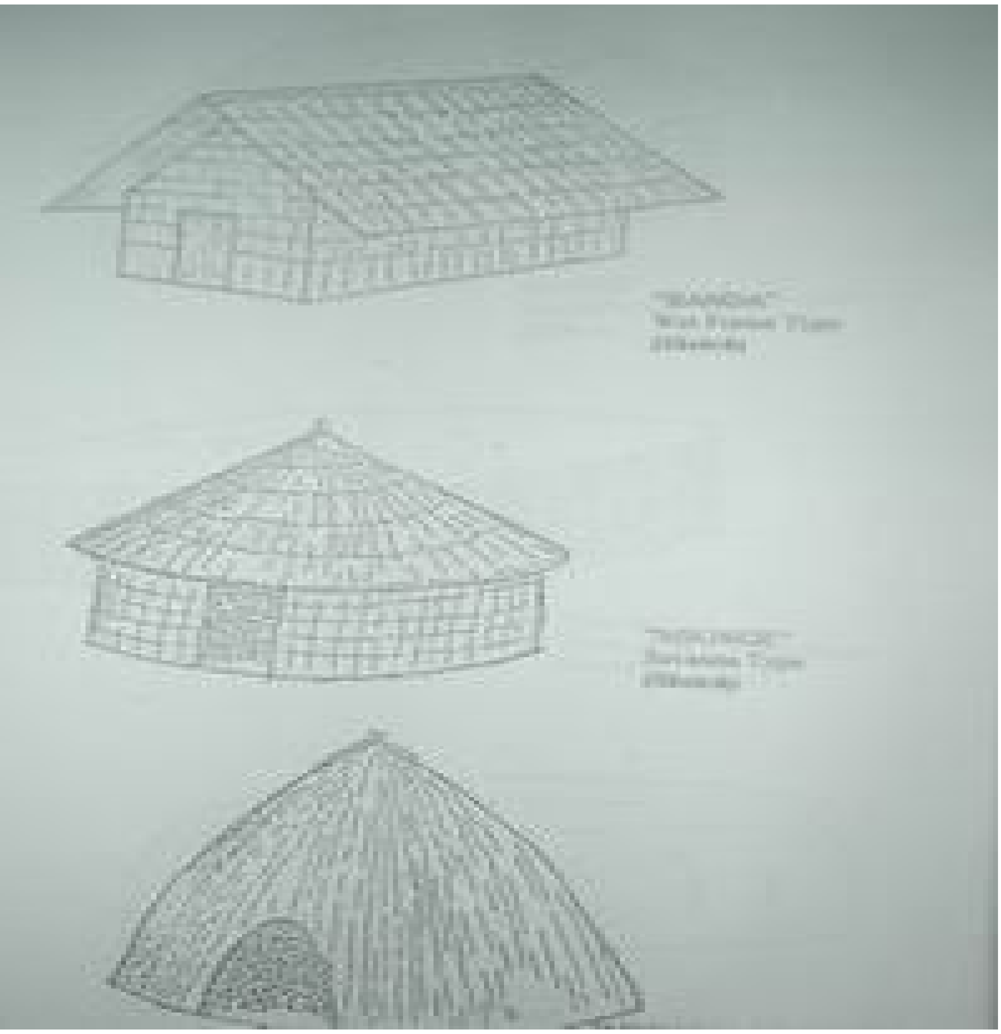
Long Rectangular House with vaulted roof

It is a curved roof built with insitu mud and grass, found in Iringa Region, covering 1 – 2% of the houses in the rural areas.

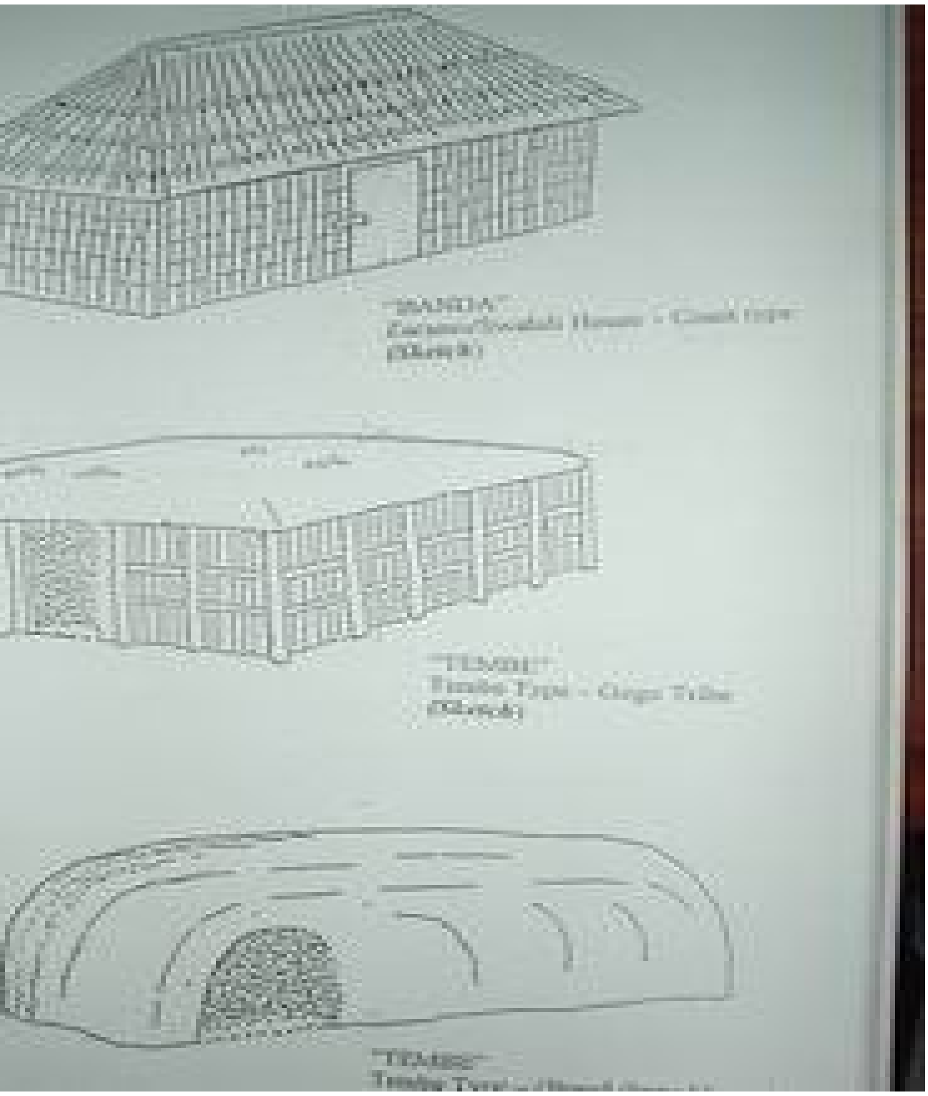
Oval Maasai House

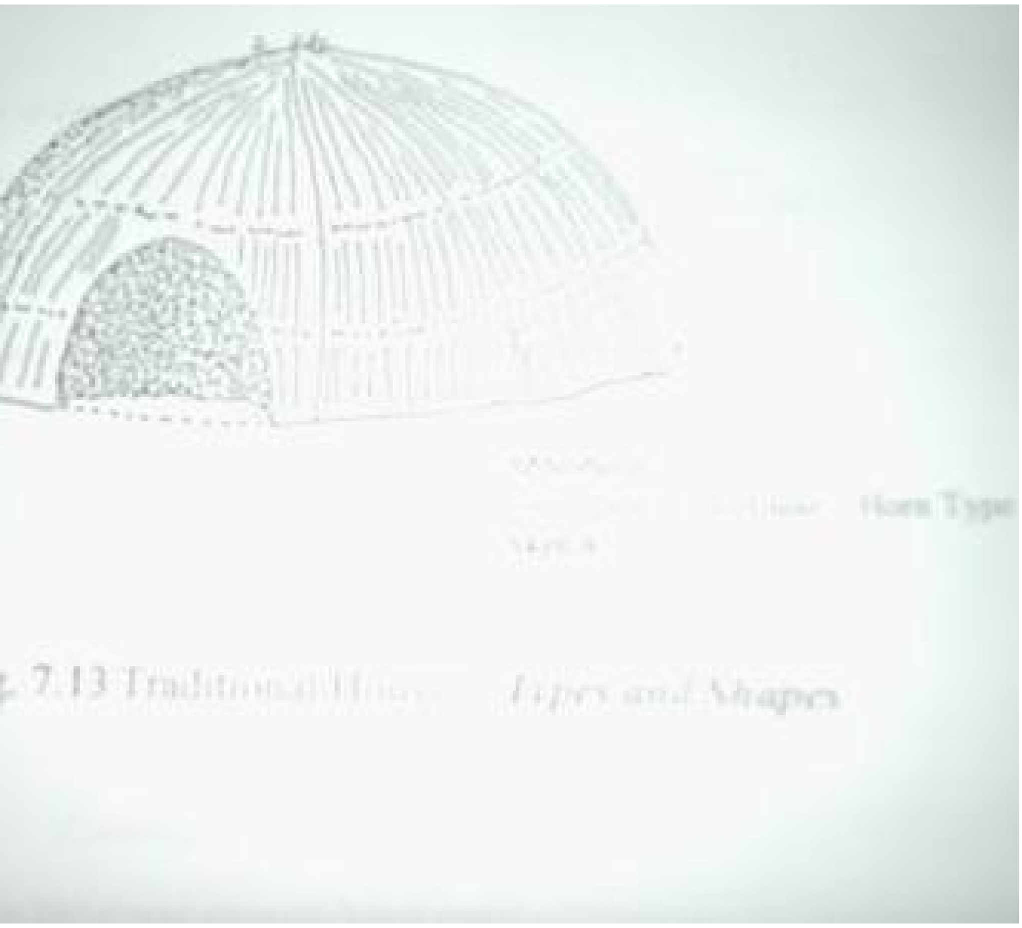
The Maasai House which resembles a long oval brown bread, is found in the Northern part of the country. It has a tunnelled entrance constructed in such a way that rain is prevented entering the dark interior (no windows). In 1983 this house type might have covered less than 0.5% of the rural houses in the country.

SKETCHES OF VARIOUS TYPES AND SHAPES OF Traditional Houses are as below.



"MSONGE"
Round Cone – Cylindrical House
(Sketch)





Drg 7.13 Traditional Houses: Types and Shapes

Shape of Traditional Houses

Different types of shapes have been used spreading all over the country. These shapes have formed up themselves according to the ethnic grouping, with their cultures, coupled with the climatic condition of the given zone of the country (Village Museum).

According to the *BRU Working Report 68 the most common* **house shape is the rectangular house with hipped roof and entrance door on the long side and can be found in all regions of the country. The 1982 – 1985 survey records that this house type might have covered 40% - 45% of the rural houses in Tanzania.**

The *second* **most common house shape:**

- **Rectangular house with gable roof and entrance door on the long side.**

  - **Can be found in all regions.**

- **Covering 20% of the rural houses.**

he *Third* most common house shape:

Rectangular flat soil roof house (Tembe)

- **Can be found in the “Hot” and “Dry” and “Temperature” in the central part of the country.**

Covering some 10 per cent of the rural houses.

he *Forth* most common house type:

- **Rectangular house with hipped roof and entrance door on the short side (Swahili House”).**
- **Found mainly in the coastal regions and Morogoro region.**

Covering 10 per cent of the rural houses.

he *Fifth* most common house shape:

Round con-cylindrical house

Mainly found in the northern part of the country, in few areas of Morogoro region and Mbeya region.

- **Covering about 5 – 8 per cent of the rural houses.**

he *Sixth* most common house shape:

- **Long rectangular houses with vaulted roof covered with grass and soil.**

Found in Iringa region

- **Covering 1 – 2 per cent of houses in rural areas in Tanzania.**

he *Seventh* most common house:

Pointed beehive house

- **Found northern part of the country (West Lake Victoria and eastwards along the border towards Kenya) and few in Rukwa region.**
- **Covering less than 1 per cent (1983) of the rural house in Tanzania.**

Another less common house type is the smaller *round bee-hive house,* **which can be found in the west border of Tanzania (Kigoma) in 1983, however, this house type might have covered an insignificant percentage of the rural houses in Tanzania.**

The *Oval Masai- House* **is a less frequent house type which can be found in the northern part of the country. In 1983 this house type might have covered less than 0.5% of the rural houses in Tanzania.**

In the south part of the country close to Lake Nyasa a special variation of the *rectangular gable roof* **can be found with the roof at the gable prolonged at the top and with a separate support for the prolonged ridge beam outside the wall (like a raised up tail). In 1983 only a few houses might have been of this type. In this survey no good examples could be found.**

Another house which was used in the classifications for the Household Budget Survey (HBS) 1968 – 69 was *square houses with pyramid shaped roof.* **In this survey 1982 – 85 however, very few houses of such houses were observed.**

n such cases, even if the house plan was square, still the roof had a short ridge at the top. It is also possible that the coding for pyramid roofed houses in the HBS 1968 – 69 included such square houses with a short ridge and that such houses more correctly should have been classified as hipped roof houses.

As regards the house types (shapes) according to the House-Hold Budget Survey (HBS) 1969, the most common traditional shape of houses was rectangular with entrance door in long walls there were about 71 per cent. Out of these, 36 per cent units had hipped roof, 19 per cent units had hipped or curved soil roofs, and 2 per cent units had roof sloping in one direction; 11 per cent of the houses were rectangular with hipped roof and entrance in short walls and 11 per cent was cone-cylinder *"msonge"* **shaped. Some 2.5 per cent were of beehive type of roof structures without walls. Corresponding checklist was not different field studies in 1976 – 79 indicate that the main pattern in 1977 might not differ very much from the conditions in 1969. The only main exception might be that the number of round** *"misonge"* **houses had decreased.**

The dome structure is probably one of the older forms of construction of a shelter, and the conical roof can be seen as a refinement of this basic form.

A common feature is the circular shape of the houses – with the exception of the Tembe being a more rectangular form. The round form has probably been adapted for practical reasons. A circle is the easiest way of setting out a house and needs only a string of a certain length and something to peg it down. Along the circle thus drawn, the uprights of the house are dug in, giving the basic structure.

It is obvious that most tribes choose to remain their circular mud-and-thatch structures, being the most simple form to construct, of temporary nature and materials locally available. But they are also at once utilitarian,

comfortable and aesthetically pleasing. There is, however, little doubt that the long-term trend is, towards rectangular forms.

In East Africa's interior, rectangular forms did not become common until the 19th century. They became more apparent as commercial contacts increased between the Coast and the Interior, particularly among groups most deeply involved in long distance trade.

Swahili-type structures had appeared in North Eastern Tanzania at the outset of the 19th century. By the 1860's the Nyamwezi – as active long-distance traders to the Coast had begun to construct rectangular houses, reflecting designs of the Eastern Congo and the Coast, both areas serving as the Nyamwezi's extreme points of trade. The Usambara had begun to create towns as a defence against plundering Maasais from Kenya, and as a defence against Ngoni invasions in Central Tanzania, as well as a defence against belligerent Arab/Swahili slave traders, there were constructed stone fortress towns and central palisaded towns – Kalengas – which were also used against the German eruptions which followed.

Ujiji became a kind of architectural crossroad – Joseph Thomson wrote in 1881 that:

…. The houses represent almost every style of African architecture: The huge roofed Indian bungalow, the fat roofed Tembe, the quadrangular huts of the Waswahili with baraza in front and the beehive-shaped huts of most of the natives, with composite forms of every description ….”

It seems that the most common house-type in coastal towns of East Africa today originates from the 16th century Arab-influenced stone buildings of the Swahili City states.

Round and Conical Houses Disappearance

Round and Conical houses have been used, even to a small extent, or used for small purpose, by almost all tribes in Tanzania as their traditional houses. These had been commonly constructed of poles fastened to small sticks, thatched with long grass or dried banana leaves, where available. For the conical houses thatch runs from top to the ground. In most cases the interior of the houses are plastered with earth-mixture with no pronounced windows. These types of houses are now getting absolete, remotedly spotted in the country, and the few still noted are used by peoples of advanced ages.

THE APPLICATION OF BUILDING MATERIALS.

House Elements Building Materials

(c) *Foundation Materials*

he preparation of the foundations of most of the rural houses is dependant on the firm soil as a foundation. Independent small holes of about 50 – 60 centimeters depth close to one another (15 centimeters apart) in a straight line are dug into the ground. Foundations are just firm as foundations. Each vertical is excavated into the ground and have the soil compacted, and at times with branches and grass. The poles are then inserted in these holes with compacted soil before the rest of the walls were erected.

(d) *Floor Materials*

loor is merely a tamped soil as floor and more or less same level as the outside ground floor. The floor materials are the same as for the foundation materials as aforesaid to most of the rural houses, having been tamped to form the floor.

(c) Wall Materials

o most rural houses, mud, poles and bamboo together have emerged as the most common materials to the wall construction. Mud and soil is used to fill the rectangular openings between the poles and the reeds whose arrangement is brought about by the vertical poles arrangement in the centre of the reed on each side of the vertical poles. Proportionally, one will see more soil/mud in these walls than poles and reeds. Similar to this but with more poles than mud are also preferred with vertical poles erected close together with a few horizontal reeds, for the purpose of keeping the vertical poles together. The small gapes on the wall, between the vertical poles are filled up with mud or mixed up with ashes or cow dung; and also acting as plaster to the internal and sometimes to the external wall. These two types of walls covered about 49 per cent of the houses in the rural area (1978 Census Survey).

he second most common group of wall materials is the mud block or mud insitu. Clay soil area up-country have taken advantage of mud block materials (18 per cent with this type of wall) while, the mud in-situ construction can be found in the examples from the Central and Southern Highlands (mud block and mud insitu material for rural areas housing - 20.8 per cent for rural areas in the Census Survey 1978).

he third most common wall materials are of poles, branches and grass. (This includes the Maasai house, although they are covered with a layer of cow dung on the outside and partly on the inside) – Census Survey figure: 15.7 per cent, HBS 1977: 32 per cent.

he Nyakyusa house of the Southern Tanzania extending down all the way to the northern tip of Lake Nyasa have used bamboo in all its house elements – walls, roofs and ceiling.

Remaining alternatives for wall materials:

-Burnt brick walls - 3.5 per cent
-Concrete or sand – cement block walls – 1.5 per cent
-Stone wall - 1.0 per cent.

Census Survey of 1978 figures are lower HBS. 1977 for all the remaining categories gives a figure of 7 per cent with a lower figure of 2 per cent burnt brick.

(d) *Roof Frame Materials*

Round poles as roof frame materials are used, and these present 87 per cent of rural farming households in the HBS 1977. Very little amount of sawn timber have been used in connection to corrugated iron roofing sheets. A small number of houses 7 per cent Census Survey – 7 houses out of 95 houses) with detailed architectural sections had full roof truss structures constructed with different houses with a mixture of round poles, round purlins, sawn timber purlins, trusses of sawn timber and sawn timber purlins all in connection with corrugated iron sheets as roof cover material.

In general roof frames are not based on roof truss principles.

(e) *Roof Covering Materials*

The most common roof covering material are grass. Palm leaves (fronds) is mainly found in the East Coastal locations. The three types of roofs cover 71 per cent as per Census Survey – 59.2 per cent as per rural areas according to the Census Survey 1978. Rural farmers in HBS 1977 – 71 per cent.

A second group of roofing materials are flat or vaulted on gable soil roofs supported by different layers of poles, branches, shrubs and usually grass – 12% HBS 1977.

The third common roofing material is metal sheets - could be metal sheets from flattened tins or corrugated iron sheets – 15% for rural farmers: HBS 1977.

7.4.2 *Development of Building Materials*

Statistics available at the Building Research Agency (BRA) reveals as per table below (BRU working Report No. 6 –
1977, 1990/1 and 2000/01 Household Budget Surveys.

			1
ıction of poles branches and grass)			
icks (dropping)			
ranches			
ks (increasing)			
ks, soil cement, concrete			
roofing			
sheets			
oundations			

Cost of Building Materials

omperative Costs of Alternative Materials Construction Components.

general list of unit costs for building materials (given below) expected to give the costs of the basic building materials commonly used in the rural areas, and those which can be introduced further in the rural areas, but currently extensively used in low and medium cost in urban centres.

		t)	
		)	

		) a	
	ets	)	

	ium Sheets		
	k	i)	
	k	i)	

dations, Floors and Roofs

dated ation				
poles ter				
afters ch				
te				

ks				
ocks				
blocks				
on ge)				
ge)				

Soil-cement is a relatively new building material in Tanzania.

To facilitate a practical comparison of the use of the above building materials the cost of foundations, floors, walls and roofs have been separately calculated using each of the different materials.

The detailed labour cost is not reflected in this submission due to the fact that families in the rural areas in Tanzania build their hoouses themselves without any help from cash paid labour. This is as per the 1969 Household Budget Survey which counts for this Self Help System at 80 – 85%.

However, for the purpose of the research of equiping the reader with a set of information as a tool of developing models suitable for current Tanzania needs of the traditional and contemporary building styles an interview with a limited number of house-builders, fundis (craftmen), contractors and local building materials suppliers at the village museum and building materials market place was carried out.

Local building materials are obtained locally in the vicinity of the rural villages being transported manually on the head (for women), and on the shoulders (for men).

HOUSEHOLD SPACE APPLICATION AND SERVICES

Space Application

(a) *Sitting Room*

This is a socializing area where even the visitors can be let to sit and chat. In most cases cooking can be done in this space including food preparation, eating and storage of water, utencils, cooking pots and farming implements. Cooking in this area warms up the house and household occupants when cold. Smoke and hot air raising up to the ceiling helps to dry up the food storage (grains) and keeping away *dudus* **from destroying the maize, beans and other cereals kept there.**

The *sitting space* **activities can spread in many different spaces:**
Indoors, outdoors, including the front verandah and under surrounding trees, for the purpose of chatting, socializing, playing cards, playing *bao***, plaiting hair and the like. Men/ Women and children usually do not socialize together. Looking at the functions of this space, which includes preparation of food and also as an eating place, its size ought to be considerable, comparatively.**

(f) *Sleeping Space*

Probably the most respected and valued activity in a house is the sleeping space and thus the provision of safety, health and comfort ought to be adhered to. Some tribes in Tanzania position their sleeping places near where livestock are kept or at least where easily seen in case of rustlers. Storage of other valuables items like clothes hanged on a rope, boxes, radio, of the household members are put in the sleeping place. Where the house is not big enough the sleeping space is combined with other activities, just as much as other domestic activities may very well be either outdoors or indoors.

Not all houses have beds for sleeping. The village keepers reported that all house-hold members do sleep inside the house and all rooms can be used for sleeping even on the floor on mats.

(g) *Cooking*

Cooking is one of the most important activity requiring space in a house design. In rural areas depending on the climatic conditions, area and size of the house the activity may take place in-doors, outdoors in the open, under shades of trees or in a separate small house *("banda")* **in the backyard. When taking place in doors, the place for cooking and food preparation is in specially designed areas, that is the kitchen. Basing on the questionnaires 5.88 per cent cooking is carried out in the open and 35.29 per cent cooking is carried out in a separate small** *banda.* **56.86 per cent is carried out in the main house.**

According to the interview carried out at the

Mr. Sanusi Mussa firewood is used for cooking pot or sufuria placed on three molded clay boulders or stones raised about 20 centimeters above floor level leaving enough space below the pot for the burning of firewood.

Many will opt to carry out the cooking outside the house due to limited space inside the house, and accummulation of fumes and smoke for lack of chimnery, lack of cross ventilation and of environmental pollution which can pose serious health risks (Nystron 1994), although this also is inconvenient during sunny and rainy days. A specially designed area for cooking as a kitchen is necessary so as to improve the hygienic way of cooking food and crockery handling .

(h) *Eating*

Eating is another activity carried out in or out of the traditional rural house. In a traditional rural house it is not common that space is provided specially for eating, such as a dinning room where would be a dinning table and dinning chairs. It is common practise that the household members sit on a mat spread on the ground eating together using bare hands from a common dish or tray, with a jag of drinking water on the side.

(i) *Storage*

In as far as storage in t11he rural situation is concerned can be devided into two major parts: Storage in the main house and storage in a separate small hut (granary) away from the main house.

Household items like cooking utensils, water, food, and other personal belongings are stored in the main house in buskets and drums.

Drinking water, **in some areas like Mbeya, Iringa and Rukwa regions, is kept in clay pot containers (water becoming very cool if kept long enough). The pot or sufuria or bucket is slightly raised up from the floor, mounted/supported on a three forked pole, about one meter from the floor, alternatively, placed on the three stones, triangularly arranged, similar to the cooking style arrangement, about 20 centimeters from the floor level.**

Water for other purposes like washing and cooking is kept in drums, clay pots, buckets outside the house.

Cooking utensils like plates, bowls, sufurias are kept on a straw rack (table) about a meter high raised from the ground. Any remaining cooked food is kept in the clay pot or *sufuria* **for future use.**

n most houses clothes are hanged on a drying line, tied on roof supporting pillars or locked up in wooden or metal or carton boxes, usually stored in a sleeping room with other items.

Fig 7.14 : Storage (drying up utensils) on a raised straw deck

Fig 7.15: A bedroom with clothes hung on a rope

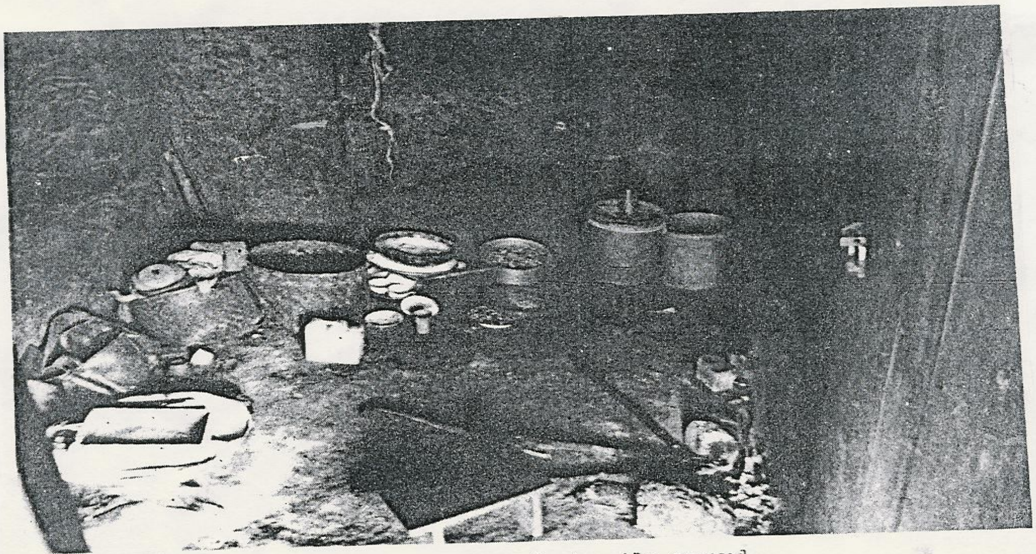


Fig.7.16: A kitchen with a lot of utensils around.

Fig 7.17: A kitchen within the main house.

Firewood for cooking are stuck outside the main house. A few

ome maize, beans and cassava are kept at the ceiling of the house, and at times hang the corn-cob on pillars supporting a house roof. This helps to dry them up. The storage of food cereals like beans, rice, maize, wheat in large amount reserved for future use – may be during famine due to draught – is stored in a granary away from the main house.

irewood for cooking are stuck outside the main house. A few pieces for immediate use or needing them to dry up in cold zones are laid up on top of the ceiling of the main house so that the heat of the fire from the floor below can assist to dry them up.

(f) *Animals*

Vhere ones animals are not much, say about two, are provided some space in the main house or either a kraal is built outside the main house. Like most tribes in the central semi-arid region of the country the young boys have a separate house from the main house entrusted with the responsibility of looking at the animals in the kraal or fence compound.

hicken which are usually few feed freely in the near surrounding and let them in the main house in the evening and covered with a reed woven busket on a corner of the house. When many, but quite rare, are provided with a separate small hut outside the main house.

(g) Two major styles are used in keeping animals:

Kraal

Where the number of cattle is big (say around 50 cattle and above) the provision of a kraal is preferred. This is a simple unroofed fence of about 2 meters poles high construction with uneven spacing of about 400 centimeters for the verticals, and an average of three horizontal members around the fence with one opening which is shut by using three independent poles supported on the two sides of the jamb. The shape of the fence is always round or rectangular positioned in close proximity of about 5 meters away from the main house. Cattle, calves, sheep, goats is mixed up in one kraal, but not with pigs.

Where the number of cattle is not big they may be kept in the main house where the family live, but separated by a simple partition with a separate entrance or either be provided with a separate house, usually rectangular in shape within the proximity. In some areas, particularly in the Southern part of the country (northern Lake Nyasa), cattle are tied up with banana ropes on the timber stumps, fixed to the ground on a straight line on one side of the length of the pan. This is for discipline promotion of the cattle, while the calves are let free within the pan.

7·18: Cattle keeping in a separate house *(h)* *Granary*

n agricultural areas where cultivation is carried out extensively, granary construction is a common feature for a long term storage of large quantities of food crops, such as maize, rice, beans, millet, and other cereals. Granaries are separate from the main building, built separately as an outdoor building.

'he common materials used in a granary construction are bamboos, poles, reeds and cow dung to an about 45 cm raised floor off the ground, usually a cylindrical small house with about 2 meter diameter wide, with an elephant grass conical roof. Small granaries are made of twings and mud or cow-dung. They differ in size but averagely they measure about 1.0 meter diameter, 1.5m high, looking like a big basket without any noticable cover as its roof but placed where rain cannot be a nuisance. Rectangular granary can also be found.

Vater/moisture and insects find it difficult to reach the storage due to having the granary raised from the ground and the impermeability promotion by the application of mud or cow-dung, or a mixture of the two, applied as mortar/plaster in and on its walls of the cylindrical structure.

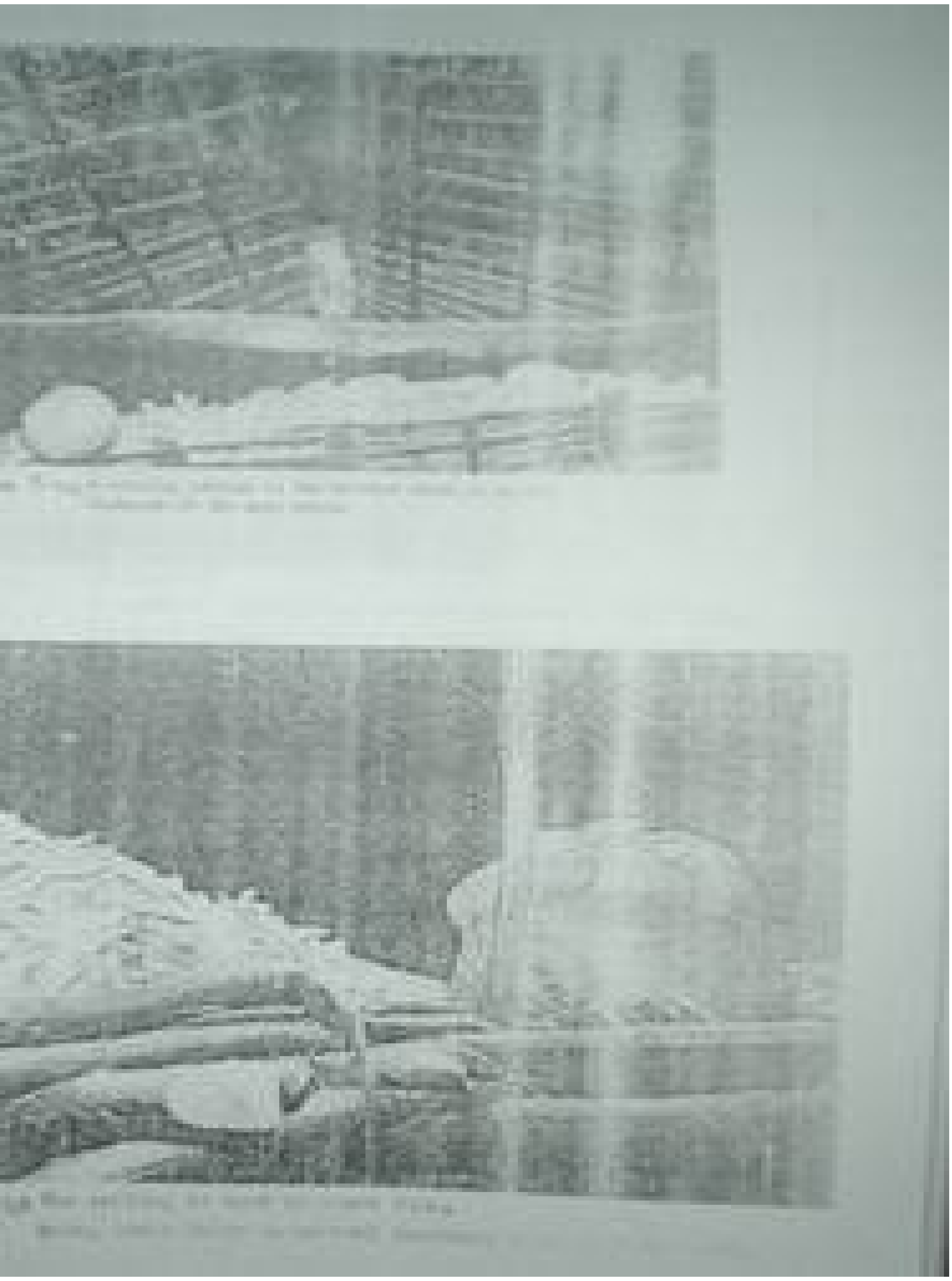
'urther, storage of food crops is kept on the ceiling of the main house. The ceiling is constructed of bamboo and poles. Smoke produced from the fire below in the room acts as a spray to the insects who may be vulnerable to the crops.

ometimes storage is right on top of a mud flat roof. This is common in the Central part of Tanzania where its climatic condition is arid.

Vhere the quantity of storage is small and usually for a short period, keeping around the kitchen is usual. It is common to see bags of various sizes containing all sorts of kinds, including foodstaffs hanging on a rope on the wall, or rope hanging from a pole or bamboo of the roof structure at any convinient position of the room.

-20: Granary.

...) Granary with ladder for climbing.
Apart from grains other things like pots can be
kept at the top.



(ii) *Pit Latrine*

No sample of traditional latrine is provided in the Village Museum. Modern latrines are provided for use by the Village Museum visitors and workers.

Traditional Latrine is never in the main house but separate small *banda* **away from the main house – as far as 30 meters away.**

Pit latrines are not of any standard, not clean and usually not roofed *banda*. **The walls are of any organic materials ranging from branches and grass tied up to poles and fitos stuck into the ground.** *Makuti* **(palm fronds) are extensively used in the coastal areas. In some cases the pit latrines get full of waste quickly due to rain storm water entering the pit which is not covered and not**

provided with appropriate care. When the pit is full the house owner digs another pit within the plot.

Fig. 7.26
Pit Latrines

7.5.2 *Rural Scene – Service Distribution*

he housing situation inn rural Tanzania serve for its poor state of construction, hygiene and house spaces functionalism, there is largely no shortage of houses in rural areas, where 90 per cent of all homes are privately owned, while in urban areas for over a decade over a third of the urban households rent privately (200/01 BHS).

he proportions of households using shallow wells, piped water or other water supply source increased from 40 per cent in 1969 to 65 per cent in 1977.

dditionally, from 1991/92 to 2001 (BHS) there had been an improvement in the proximity/availability of water source with the proportion of households depending on the unprotected supplies falling from 64 per cent to 54 per cent. The protected source has also improved from 10 per cent to 18 per cent.

t the moment indicators show that 60 per cent of rural households depend on wells for their water supply, 13 per cent have communal taps, 5.8 per cent are connected to water pipes; while 21.2 per cent use other means, including natural rivers, springs, lakes and ponds. Only 0.3 per cent are connected to a sewer.

boost of essential services has it that around 0.1 per cent of households are connected to electricity grid with 1.6 per cent reporting the use of solar electricity. The grid serves the urban population above all – 2 per cent of rural households report a connection. In rural areas solar electricity is almost as important a source as the grid.

irewood is the most common source of fuel, and being used by over 90 per cent for the cooking for the rural households; followed by charcoal and minimumly parafin which also is used for lighting.

(b) *Latrines*

The number of households using pit latrines or other types of toilets increased from 50 per cent in 1969 to 78 per cent in 1977.

Further, improvement is noted in that some 93 per cent of households reported using a toilet of some type the vast majority using a simple pit latrine. In rural areas 90 per cent of households report having the use of a toilet, which is a high proportion by comparison with many developing countries. The proportion of households not using a toilet varies quite substantially by region, the highest proportions being in Tanga, Arusha and Mara (2000/01 BHS).

Research carried out in Lwifwa, Massoko, Rungwe District, Mbeya Region had it that 95 per cent households had pit latrines. The rest are said to be using neighbouring latrines, which is in violation of government advocacy which requires each household to be provided with the latrine. Inclusion of health and sanitary standards in a house design is essential. Six toilets visited in this area were not clean, not easy to clean and not ventilated. Lack of water in the house latrines cannot be provided in the main house, as flow of water for the purpose ought to be guaranteed.

Pit latrine away from my huose is alrighty. Using it at night allows me to check my compound (livestock which are in a pen outside), but quite a bother for my children, particularly if it rains (Mr. Lupaso Mwakipesile (57), Lwifwa, Massoko).

What is important and paid attention to is for the pit latrine to be easily cleaned and well ventilated to reduce ordour and have a lid to keep out flies as of now they are in a bad condition not having ventilation pipes and are poorly designed for ease of cleanliness.

There is a big possibility that in non-mountainous areas, flat areas, like the coastal areas where water wells are the common water supply, there is a big possibility for the pit latrine to pollute the ground water through water perculation in sandy ground.

(b) *Trees*

The naturally provided trees in the rural areas surrounding the rural habitation or settlements contribute immersely to indoor comfort and thus their preservation is necessary and important

Planting of treees supplementing the already available naturally grown trees in the rural areas will always be a positive action as trees can filter sunlight, reduce air temperature by evaporation and reduce glare, and contribute the climatic comfort sought by the house occupants, notably in the rural areas where people (men) prefer to socialize in the open under shadows of trees.

7.6 RESEARCH FINDINGS FROM THE QUESTIONNAIRES SURVEY

7.6.1 *Introduction*

This Chapter presents the findings and analysis of data of the study and the interpretation of the results thereof.

In the preceeding Chapter 5 it was argued that primary data collection involve the collection of new information first hand for the particular research. The use of questionnaires was a data collection methodology discussed alongside the design approach for both qualitative and quanititative research data collection, analysis, interpretation and presentation. This *section's objective is to present the findings from the questionnaires* **survey, data synthesis and analysis to add to the secondary data findings to support the research hypothesis.**

The questionnaire was designed and constructed with the objective of collecting information first hand from the various stakeholders and knowledgeable people of rural houses. The questionnaire covered:

- **House types**
- **Storage facilities**
- **Kitchen facilities**
- **Latrine facilities**

- **Livestock**

- **Local and conventional building materials with their cost**

- **Availability of manpower in the rural areas and cost of the house.**

7.6.2 *Results*

a) *Preference of Type/shape of Houses*

	TYPE		
	NGE	**IBE**	**ND**
	9	**0**	**1**
	8	**0**	**2**

From the questionnaire the *Banda* have 62 per cent emerging as the most favourable traditional house. An average of 3 –4 rooms (3.45) featured out as the most common number of rooms applicable in a traditional house.

Storage facilities

	LOCATION			
			8	

he results from the questionnaire has featured out that 69.5 per cent households kept their general storage in the main house. 25.39 per cent of the households have their storage in a separate minor house. These are mainly agricultural products in the agricultural practicing area. This could be a granary or small house constructed with the same traditional materials as for the main house. 14.28 per cent are households providing their storage both in the main house and in a separate minor house or granary.

Kitchen facilities

	LOCATION			
	IOUSE	NT HOUSE	DE	ER
	5	9		

6.86 per cent of the houses in the rural houses are provided with space for kitchen services. 35.29 per cent of households have kitchen services space provided in smaller houses where the household had more than one house. 5.88 per cent of the households have their kitchen services provided in the open.

This amounts to concluding that kitchen functions in the rural areas are accommodated inside the house. No household have a kitchen outside only. In cold areas …… regions of Mbeya, Kilimanjaro, Arusha, Ngara – fireplace is not for cooking purposes only but combat cold during cold seasons.

(c) *Latrine facilities*

	LOCATION			
	RINE	ERN	RN	ER
	5	5		3

1.25 per cent of the households are provided with pit latrines at an estimated average of 13 meters away from the main house (minimum –3.0m and maximum – 30.0m.

Western type closets appear in 4.16 per cent households; thus not being common in the rural houses/areas Eastern type closets are non-existant in the rural houses.

4.58 per cent households have no latrine facilities in their areas. Families lacking latrines in their households, by convenience visit and relieve themselves in the bush or neighbouring households.

(e) *Livestock*

	LOCATION			
	HOUSE	FENCED)	OUTSIDE	E
		5		

The questionnaires came up with the presence of 89 per cent of the households with livestock. These are cattle, goats, sheep, pigs and chicken.

1.8 per cent of the households have their livestock in a separate house.

3.6 per cent of the household have their livestock in fenced compounds outside with no roof cover, but within the household compounds.

.45 per cent of the households have their livestock both inside their houses and in fenced compounds outside; while 9.07 per cent of the households do not keep/have any livestock.

All chicken are kept in the main house at night and letting them roam around the compound during the day in search for food.

(f) *Building Materials*

	ATERIALS	ONV. ERIALS	CONVENTIONAL
	6	6	4
	.14	0.7	7.27

2.14 per cent of the households have their houses constructed with local building materials, while the conventional materials have been applied to 10.7 per cent.

.27 per cent of the households have their houses a mixture of the local and conventional building materials.

(h) *Cost of Conventional building materials*

Not much response was received on Part 11 of the questionnaire; could be because conventional materials like cement, roofing sheets, ceiling boards, prime, oil, paint, nails, mosquito wires, butt hinges, latches, barrel bolts, and transparent glass sheets

are remotely applied in the traditional rural house construction. This is a discovery of the research worthy noting their application.

(h) *Availability of Manpower*

er		ry	g		

Masons **and** *Carpentry* **as Manpower for the house construction in the rural area is in abundancy showing 89.36 per cent and 87.2 per cent respectively.**

(i) *Labour most commonly used*

our	ploy	elf	nily
	3	5	0
	.6	.2	.1

The questionnaires results show that construction of houses in the rural area have it that *self* **employed takes up 54.2 per cent;** *Family* **members is 36.1 per cent and 9.6 per cent is by** *Employment***.**

(j) *Cost Estimate of a traditional rural house*

Working out from the questionnaires the estimated cost of the rural traditional house comes to an average of TShs. 397,613/= (equivalent to 390 USD). The figures obtained from an average figure spanning between TShs. 50,000/= (50 USD) and 1000 USD.

(k) *The Source of Income*

he source of income is agricultural activities and farming resulting into an average of TShs. 134,886/= (130 USD) as *income per capital.*

7.6.3 *A Summary of Research Findings from Questionnaires*

The philosophy of the design of the questionnaire was to find out the situation of the traditional rural housing development in the country covering construction approaches, extent of use of building materials, general use of space by the household and facilities spartial provision arrangement and the economical position underlying the existing development.

he questionnaires have come out with the BANDA type of house as the most favoured (62%). TEMBER and MSONGE taking almost equal positions – 20% and 18% respectively.

t has been found out that the development of the housing situation is wholly dependant on *agriculture and farming.*

oor handling of *building materials* **by the untrained and unskilled labour whose application is over 81% underlies the current, not palatable situation of the rural houses.**

Masons and Carpemters **are at the rural houses developers disposal (over 80%) to supplement the local people's efforts where over 90 per cent (54.2% self + 36.1 families) build for themselves without employing any one.**

itchen **facilities has received notable consideration to the rural housing provision. More than 90 per cent are provided in the house.**

atrines **are mostly pit latrines positioned well over 10 meters away from the house of the household.**

torage **facilities has been positively considered. Storage of properties is mainly inside the main house (60%, but extends to outside facilities (25.39%) where agricultural products are in plenty.**

he keeping of *livestock* **is both, in the house (41.8%) and 43.6% outside the house Rustlers are the main factor of this division. 14.28% is for the households who have their storage both inside and outside.**

ost **of the rural house tends to vary notably (50 USD – 1000 USD) with an average of 400 USD. Variancy of building materials and the scale of agriculture and farming between regions determines.**

CHAPTER EIGHT

CONTEMPORARY BUILDING RESEARCH FINDINGS AND ANALYSIS

8.1 INTRODUCTION

The previous Chapter which was ***Research Findings and Analysis*** have the introductory submission applicable to this Chapter but dwelling more on the findings and analysis of the ***traditional houses.***

The present Chapter's objective is to primarily, present findings on the ***contemporary house*** whose sources are dependant on secondary and primary data sources, once again, carrying out research as per methods given out in Chapter Five, except for the Village Museum of the National Museum in Tanzania.

As discussed and submitted under ***INTRODUCTION*** contemporary houses can be viewed from as early as 1962 after Tanzania got independence in late 1961 in realization that rural housing was given high priority by drawing up various development policies and strategies towards improving and coming up with modern house designs, utilization of local building materials and construction methods. And this is a span of 40 years The endeavors were boosted
(1962 – 2002) by the government by introducing the following:-

- Villagization Programme (mid 1970's)
- National Housing Policy (1982)
- Istambul Declaration of the Habitat Agrend (1996)
- The National Human Settlement Development Policy

As submitted at Chapter Four ***Organisations Contribution to Housing Development in Tanzania*** acted towards developing Contemporary houses from that time.

Picking with care, major public organizations entrusted with the house development in the country – NHC, NPF, NEDCO, VETA, TBA, EARC, EAHA, EAA have their designs and production taken as case study for the purpose, in line with what was researched and investigated in the rural traditional houses.

8.2 FINDINGS FROM CONTEMPORARY HOUSES BY THE PUBLIC ORGANISATIONS

8.2.1 Analysis of House of the Public Organisations

	ORGANISATION	YEAR OF CONSTRUCTION
(a)	National Housing Corporation (NHC) Low-Cost Housing, Boko, Dar-Es-Salaam.	2001
(b)	National Provident Fund (NPF), Korogwe	1993
(c)	National Estates and Designing Corporation (NEDCO) Msasani Peninsula Flats, Dar-Es-Salaam.	1975
(d)	PHFC/National Housing Corporation (NHC), Drive-In-Cinema, Dar-Es-Salaam.	1972
(e)	National Provident Fund, (NPF) Kilosa.	1993
(f)	National Housing Corporation (NHC) Mbweni Housing Estate, Dar-Es-Salaam.	2002
(g)	National Provident Fund (NPF) Housing Estate	1977
(h)	National Provident Fund (NPF) Low-Cost Residential Houses, Lindi	1993
(i)	National Provident Fund (NPF) Manager's House, Tukuyu and Njombe	1993
(j)	National Housing Corporation (NHC) Mbweni Housing Estate, Dar-Es-Salaam	2001
(k)	Vocational Education Training Authority (VETA) Residential House, Vocational Training Centre, Singida	2002
(l)	East African Railway Corporation (EARC – Community Organization) Residential Block of Flats Dar-Es-Salaam	1976
(m)	Tanzania Building Agency (TBA)	2002
(n)	East African Harbours Corporation (EAHC – Community Organisation) Residential House, Dar-Es-Salaam.	1975

Table 8.1

8.2.1 ***Analysis of Houses Public Organisations***

(a) ***NATIONAL HOUSING CORPORATION LOW-COST HOUSING at Boko, Dar-Es-Salaam - 2001***

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
•BANDA Type •Rectangular, pitched, gabrel roof	•House Arrangement of rooms resembles the Swahili traditional house with long corridor, but no courtyard •A sitting cum-dining room •One master bedroom with attached toilet. •Two bedrooms with separate toilets. •A kitchen with a store •An entrance verandah •One toilet room •One shower room A long corridor Sitting/Dining room being the first room as one enters the house from the entrance verandah on the short side of the house.	•Area of the House: $110.9m^2$ •Ceiling height: 3.0m •Sitting/Dining Room: 5.4x3.0m •Verandah 4x1.5m •3No. Bedrooms: 7.7 x 4.8m 3.15 x 3.15m 3.2 x 3.0m •Kitchen/Store: 3 x 3m •WC/Shower: 3.0 x 1.8m •WC/Shower: 3..5 x 2.5m.	♦Timber paneled external door at front main entrance and external door at back of kitchen. ♦Glass Windows on timber frames to each room.	•Cement, sand and aggregate for concrete walling, blocks, floor and foundation. •Timber for door/window frames, roof trusses, cupboards, flush doors for internal shutters. •Galvanised corrugated iron sheets for roofing. •Pipes for water supply and drainage of foul water. •Cables for electricity supply. •Glass on timber frames as windows shutter pans.	•Water supply, •Drainage System for the foul water. •Electricity System.

Table 8.2

(b) ***<u>NATIONAL PROVIDENT FUND Manager's House, KOROGWE (Plot 13, Block D): 1993</u>***

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
Rectangular House, pitched with gable roof	•Living Room with a verandah in front •Another verandah behind the house at center part of the building. •3 No. Bedrooms with a master bedroom with its own WC/Bath measuring 3.0mx1.6m •Dining room is provided next to the Living Room. And near •Kitchen.	•Area : $108m^2$ ***•Height of house: 3.0m*** •Dining Room: 3.5 x 2.9m •3No. Bedrooms: 3.5 x 3.35m 3.5 x 3.5m 3.3 x 3.5m •Kitchen: 2.7 x 2.3m •Toilet: 2.0 x 1.5m •Verandah: 4..5 x 1.2m. 3.4 x 1.0m Plot /Area: $5721.85m^2$ Plinth Area: $121.13m^2$ Plot coverage: 2.1% Plot Ratio: 0.021	•Two doors: one at front and another one at rear. Glass Louuvre Windows to each room. Some rooms have two windows. Louvre concrete blocks to garage as ventilation and some lighting device. Top part of flush doors as internal shutters are provided with glass louvers as sunlight vents.	***•Cement, sand (concrete blocks) , Aggregate, Timber (for trusses doors, windows and door frames, cupboards and shelves), Glass for window glazing (louvers), ceiling boards, mosquito gauze, pipes (for water supply and foul water drainage system) and cables for electricity laying).***	Water supply, Drainage System for the foul water. and Electricity System.

Table 8.3

(c) ***NEDCO FLATS, MSASANI PENINSULA, DAR-ES-SALAAM. – 1975***

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
Rectangular Building with reinforced concrete roof	•It is a three storey building •A block of residential flats (6 No. Flats). •A staircase from ground floor to roof.. •A Living room A Dining room A Kitchen A Bath/WC 2No. Bedroom to each flat.	Plinth Area: 161.8m^2 Verandah: 15.65m^2 171.5m^2 ***Area per dwelling: 88.755m^2*** ***Living room: 3.62 x 3.5m*** Bedrooms: 3.5x3m 3.37x3.3m Dining room: 2.57 x 3.37m Kitchen: 3.37 x 2.17m WC/Bath: 2.37 x 1.655m Front Verandah: 3.62 x 1.3m. Rear Verandah: 4.2 x 2.47m Ceiling height: 3.0m	•Openings through staircase. •Doors from staircase to Living room; and from Living room to front verandah and from kitchen to back verandah. Windows provided to each room of the flat.	***•Concrete Blocks*** ***•Cement, Sand*** ***•Steel (for reinforcement and burglar proofing to windows)*** ***•Reinforced concrete roof*** ***•Timber frames for doors, windows and cupboards*** ***•Glass louvers to windows*** ***•Mosquito gauze provided to all openings.*** ***•Internal door shutters at flush doors.*** •Electrical cables •Steel pipes for water supply and drainage. •Plastic pipes as conduits for electrical cables. •Timber handrails of staircase and balcony.	Water supply and Electricity connected to all flats. Staircase.

Table 8.4

(d) ***PHFC/NHC – DRIVE IN, DAR-ES-SALAAM. – 1972***

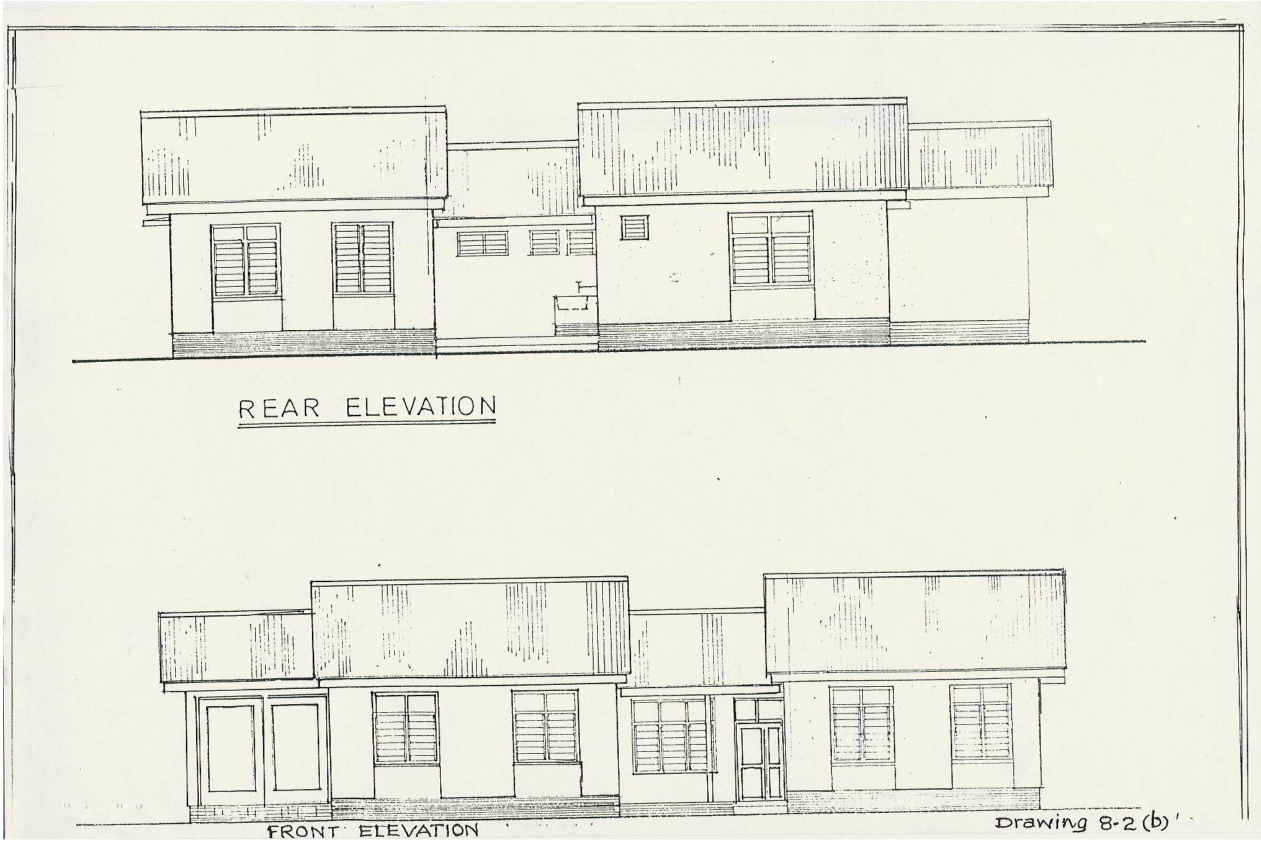
SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
TEMBE Type Rectangular House with reinforced concrete roof	•Terrace in front. Living Room in front with 3 No. bedrooms on the sides. •Kitchen is on one side of the living room with door leading into the lobby, with external door to courtyard. •Toilet with bath. •Washing through outside behind kitchen. •Courtyard directly behind living room and kitchen. •Terrace behind house leading into Living room.	•Plinth area of house: $122m^2$ ***•Living room: 5.0m x 4.0m*** •3 No. Bedrooms: 4.040 x 3.2m 4.040 x 3.2m 3.040 x 3.3m •Kitchen: 2.21 x 3.0m •Toilet/Bath: 1.9 x 3.0m •Terrace: 5.0m x 1.8m •Courtyard: 7.59m x 5.72m. •Ceiling height: 3.0m	•House has two external doors – front and rear. •Louvre windows. Each room with one window. •Some with two windows.	***Concrete Blocks Cement, Sand Steel (for reinforcement and burglar proofing to windows), Timber, Glass, Mosquito gauze, pipes, cables.***	Water supply and Electricity connected to the house.

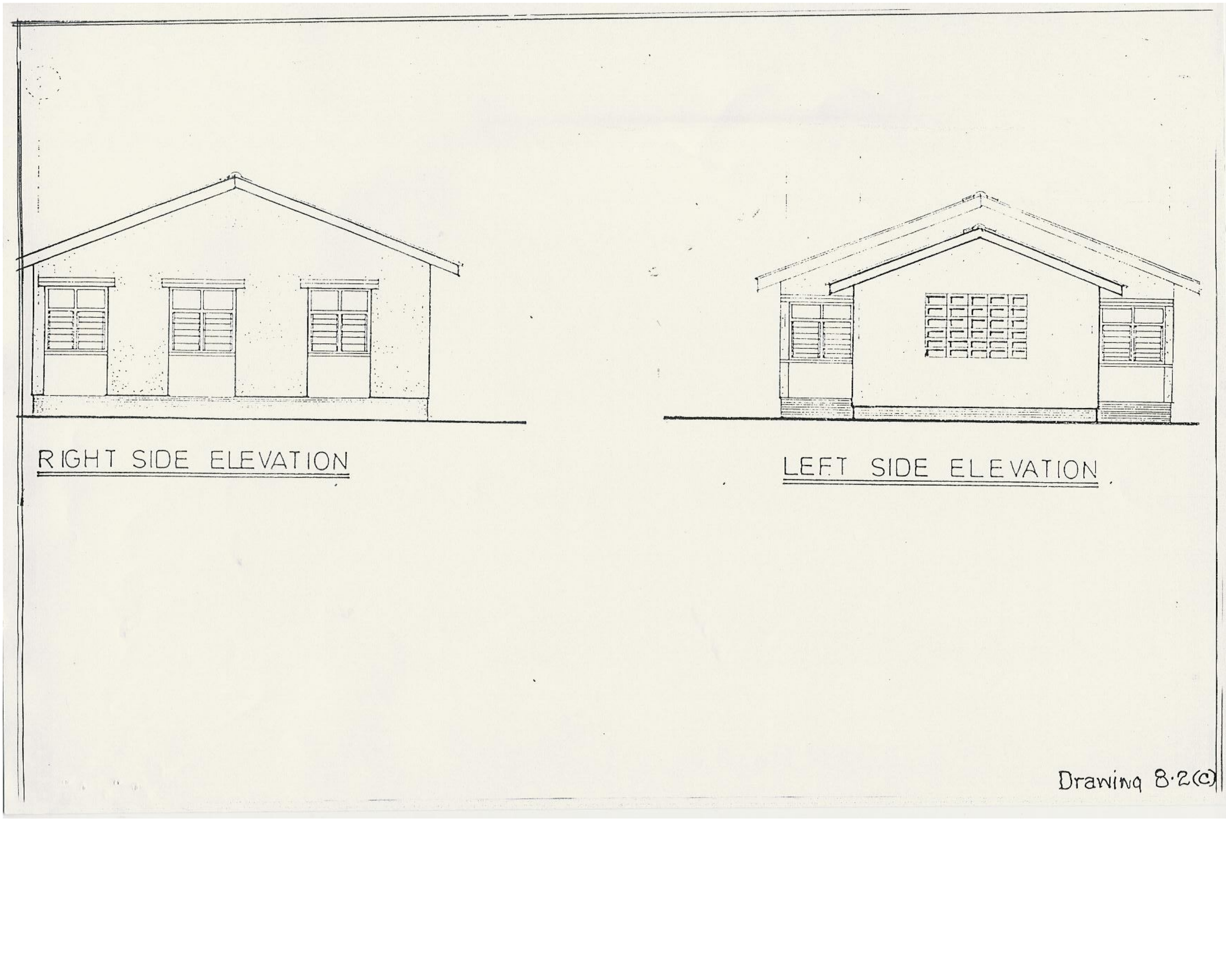
Table 8.5

(e) ***NPF FUND Managers House on Plot 42, Block D, KILOSA. – 1993***

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
BANDA Type Rectangular House with pitched gable roof	●Living Room as soon as one enters the house from ●the verandah ●3No. Bedrooms ●Dinning room more or less center of lounge and kitchen. ●Store attached to kitchen directly end of carpot. ●Verandah at center of the front of the house. ●Carpot on one side of the house next to ●Lounge and kitchen. ●WC/Batch and WC. ●Master bedroom with separate WC/Batch.	Plot area : $2714m^2$ ***Plot area: $175.5m^2$*** ***Plot coverage: 6.467/*** ***Plot area: 0.065*** ***•Living room: 2.5m x 3.0m*** ●3 No. Bedrooms: 3.2 x 3.8m 3.2 x 3.8m 3.05 x 3.2m ***•Dining Room:*** 2.5 x 3.0m ●Stores: 1.410 x 3.0m ●Carpot: 10.53 x 3.23m ●Verandah: 5.5 x 1.5m ●Area of house: 19.23 x 10.12m. ♦Ceiling height: 3.0m	●Two doors provided, one at front and one at rear of house ●Louvre windows (glass) at each room. ●Concrete louver blocks to garage as window.	***•Sand*** ***•Aggregate*** ***•Cement*** ***•Galvanised corrugated roofing sheets*** ***Timber, Glass*** ***Ceiling boards pipes Electrical cables.***	●Water supply ●Foul water drainage system ●Electricity

Table 8.6


REAR ELEVATION
FRONT ELEVATION
Drawing 8·2 (b)

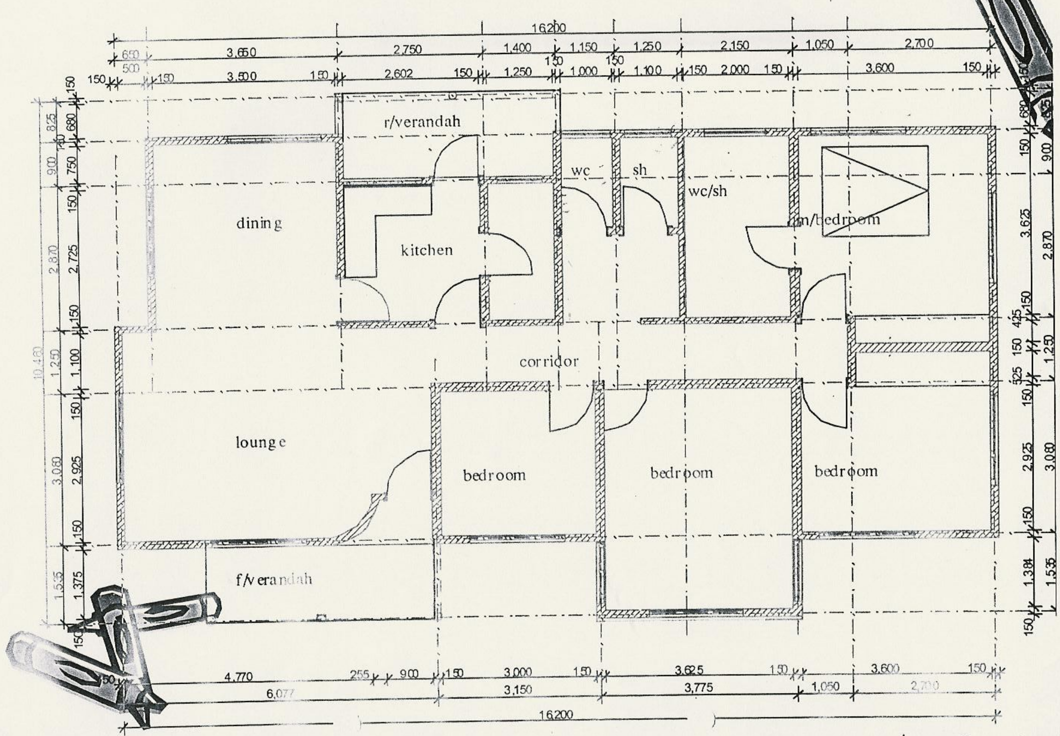

RIGHT SIDE ELEVATION
LEFT SIDE ELEVATION
Drawing 8·2(C)

(f) ***<u>NATIONAL HOUSING CORPORATION Mbweni Housing Estate, Dar-Es-Salaam.</u>***

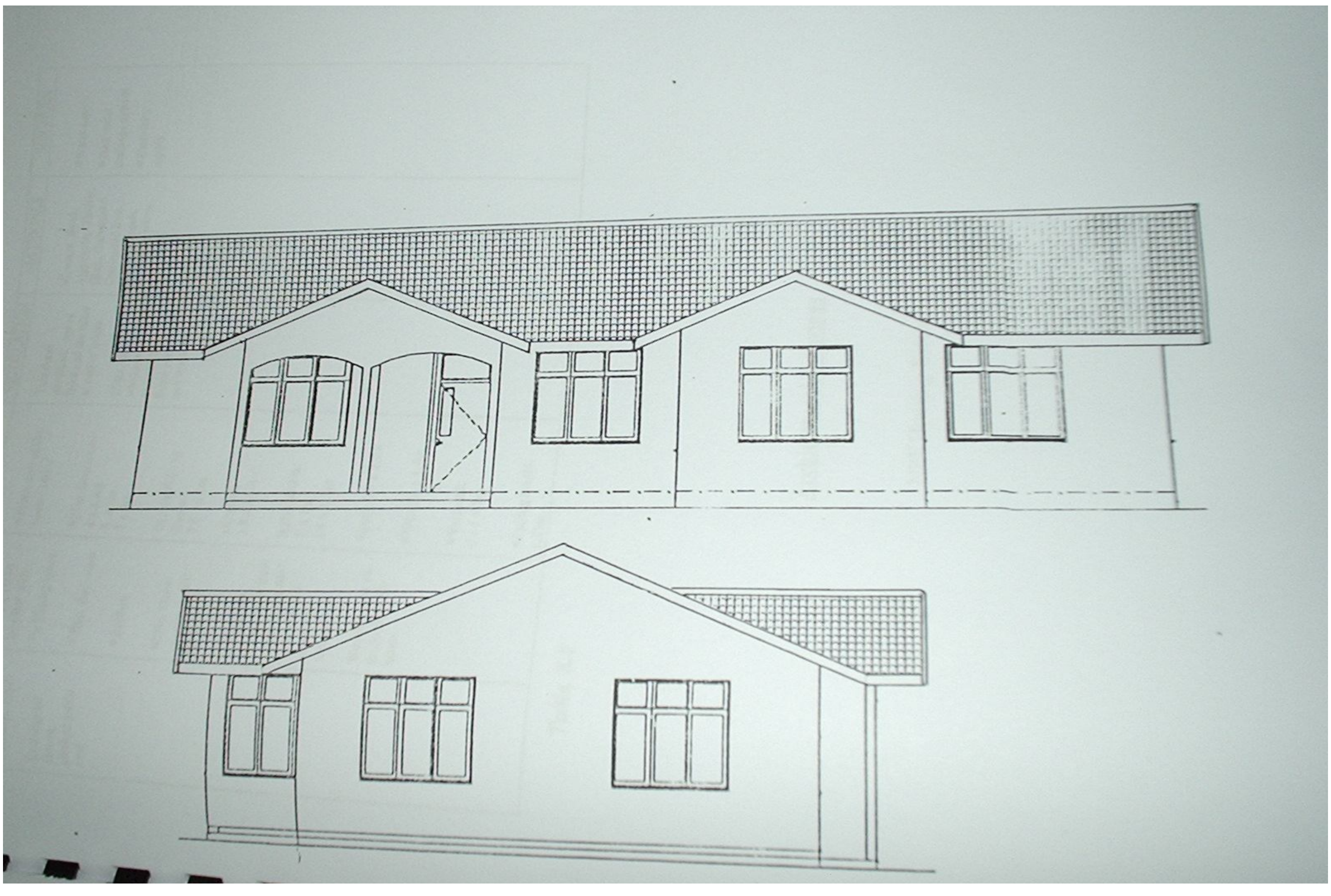
SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
BANDA Type Rectangular House Gable pitched roof	•A corridor at the center of the house. •A verandah at front entrance into lounge. •Verandah at the rear with external door into kitchen. •Lounge cum-dining room •One master bedroom with attached WC/Shower. •3No. Bedrooms with separate toilet and shower. •Kitchen with a store.	•Floor area: 153m^2 ***•Lounge: 6.077 x 3.080m*** ***Corridor width: 1.1m*** ***•Dining: 3.5m x 2.87m*** •Master Bedrooms: 3.6 x 3.6m •Master Bedroom WC/Shower: 2.15 x 3.6m •3No. Bedrooms: 3.4 x 3.08m 3.6 x 3.4.5m •Kitchen: 2.6 x 2.75m •Stores: 1.25 x 2.75m •WC: 1.0 x 1.5m Shower:1.1x1.5m •Front Verandah: 3 x 1.375m •Back Verandah: 4.1 x 2.3m. •Ceiling height: 3.0m	•Glass window on timber frames to each room. •Timber paneled external doors at front main entrance and external door at back of kitchen.	***frames, roofs, trusses, cupboards/cabinets, flush doors for internal door shutters.*** ***•Clay for roofing tiles.*** ***•Pipes for water supply and drainage system. Cables for electricity supply,*** ***•Glass for window glazing.***	•Water supply •Foul water •Drainage system •Electricity supply

Table 8.7

Floor area is 153 sq.m



Drawing 8·3(a)



Drawing 8.3 (b)

(g) ***NPF HOUSING ESTATE .*** - ***1977***

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
BANDA Type Rectangular House, pitched gable roof	•Living room together with •a Dining space. •3No. Bedrooms •Kitchen •2No. Stores opening to the kitchen •WC/Bath. Verandah in front of the house next to the Living room, and Bedroom.. Washing area on the back of the house.	•Plinth area of the house: 140m^2 •3No. Bedrooms: 4 x 3.4m 3. x 3m 3 x 4m •Living/Dining Room: 5.6 x 5m ***•Kitchen:*** 3.9 x 2.1m •2No. Stores: 2 x 1m 1.4 x 2..5m •Bath: 1.9 x 2.4m •WC: 0.8 x 1.4m •Verandah: 6 x 1 x 5m •Ceiling height: 2.25m	Two doors provided: one at front and the other at rear of house. Glass louvre windows provided to all rooms. Some rooms have two windows.	***•Cement, Sand, Aggregate, Timber, Glass, Galvanised Corrugated Iron Roofing Sheets, Electricity wires, Steel pipes.***	•Water supply •Foul water drainage system •Electricity supply

Table 8.8

(h) ***LOW-COST RESIDENTIAL HOUSES FOR NPF AT LINDI - January,1993***

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
•TEMBE Type •Rectangular House, hipped and gable roofs	•Living room with Dining. •Three Bedrooms •Kitchen •WC/Shower. •Entrance into Verandah running full length in front of the house. •Corridor at the center running through from the front entrance to the last bedroom at the rear of the house.	•Plot: 12089.8m^2 •Area of under construction of 26 houses: 2630.5m^2 •Plot coverage: 21.75% •Plot Ratio: 0.22 •Living/Dining Room: 5x4.2m •3No. Bedrooms: 4 x 3.4m 4. x 3.2m 3.1 x 3.5m ***•Kitchen:*** 3. x 2.8m	Two doors : one at front and another at one side. Glass louvre windows.	***•Cement,*** ***•Sand,*** ***•Aggregate,*** ***•Timber for trusses frames and doors.*** ***•Glass*** ***•Ceiling Boards.***	•Water supply •Foul water drainage system •Electricity supply

	•External doors at front and kitchen.	with Stores: 2.1 x2.2m •WC: 2.2x2.1m •Shower: 2.2x1.0m •Entrance; with verandah 3.0x1.5m •Ceiling height: 3.0m			

(i) ***NATIONAL PROVIDENT FUND - TUKUYU AND NJOMBE - Mountainous, rainy and cold areas) … 1993***

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
•BANDA Type •Rectangular House, with a hipped roof.	•Lounge at front of the space arrangement. •3 No. Bedrooms including self-contained master bedroom with shower and toilet. •Dining space near Lounge •Kitchen with Store. •Front verandah at center of front part of house. •Back verandah directly behind kitchen. •Garage at side of house next to lounge with concrete louvre blocks as ventilation device.	•***Njombe:*** Plot Area: 1894m^2 Covered area: 141m^2 Plot covered: 7.4% Plot Ratio: 0.07 •Tukuyu***:*** Plot Area: 1016.3m^2 Covered area: 141.3m^2 Plot coverage: 13.9% Plot Ratio: 0.39 •Lounge 4.99 x 3.86m •Master Bedroom •elf contained 3.07 x 3.5m •Shower/Toilet 1.9 x 1.6m •2No. Bedrooms 3.75 x 3.07m 3.11 x 3.07m •Kitchen 4.45x3.21m •Store: 2.41x1.35m •Dining: 2.95x2.41m •Front verandah: 5.0 x 2.0m •Garage: 10.50 x 3.0m •Ceiling height: 3.0m	Two doors : one at front and another at the back of the house. Casement glass windows on hardwooden frames to all rooms.	***•Sand,*** ***•Aggregate,*** ***•Cement,*** ***•Timber*** ***•Ceiling board*** ***•Glass*** ***•Pipes.*** •Electrical cables	•Water supply •Foul water drainage system •Electricity cables ***•Fireplace with chimney at kitchen.***

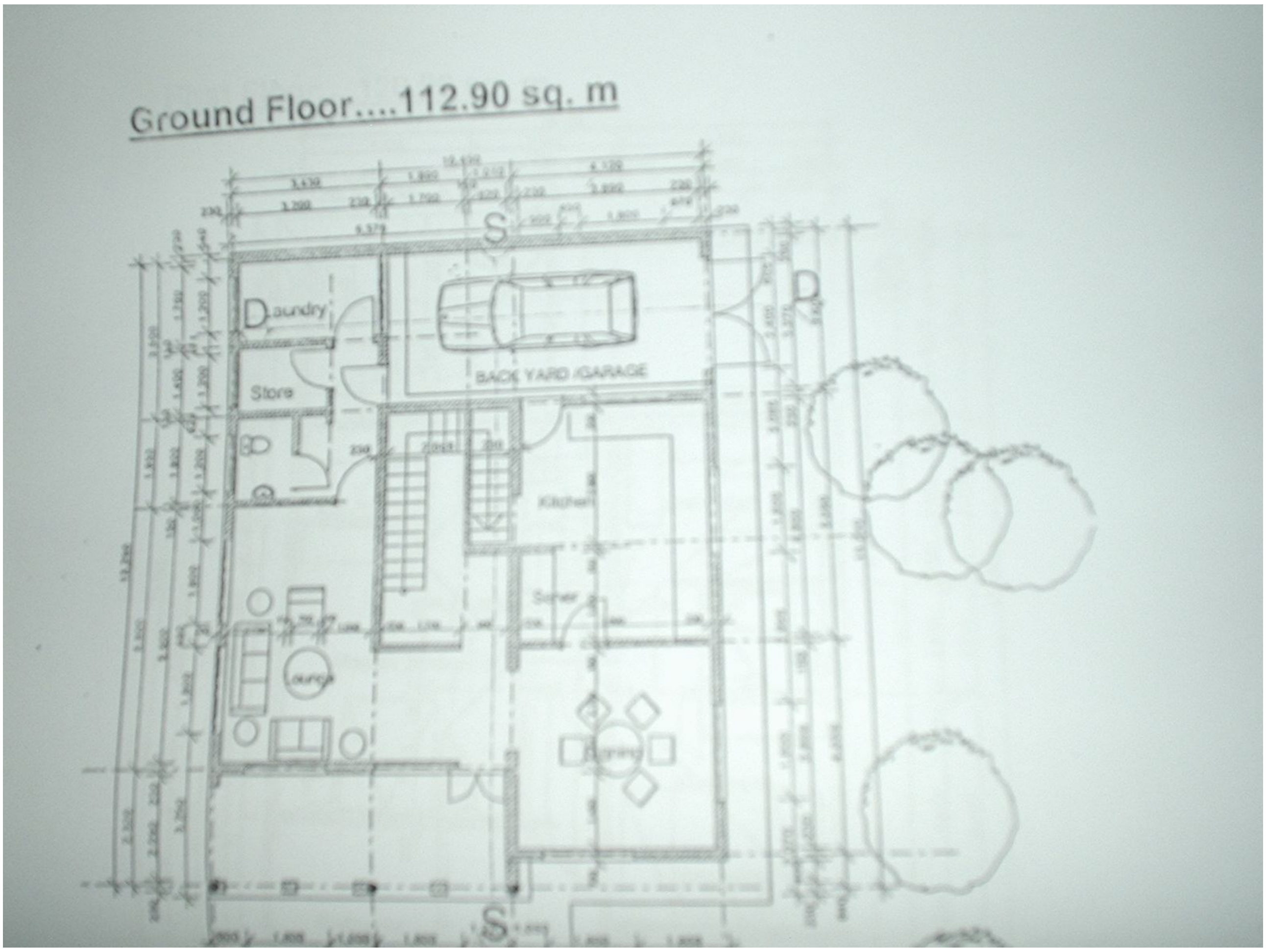
Table 8.10

(j) ***NATIONAL HOUSING CORPORATION, Mbweni Housing Estate Dar-Es-Salaam. - 2001***

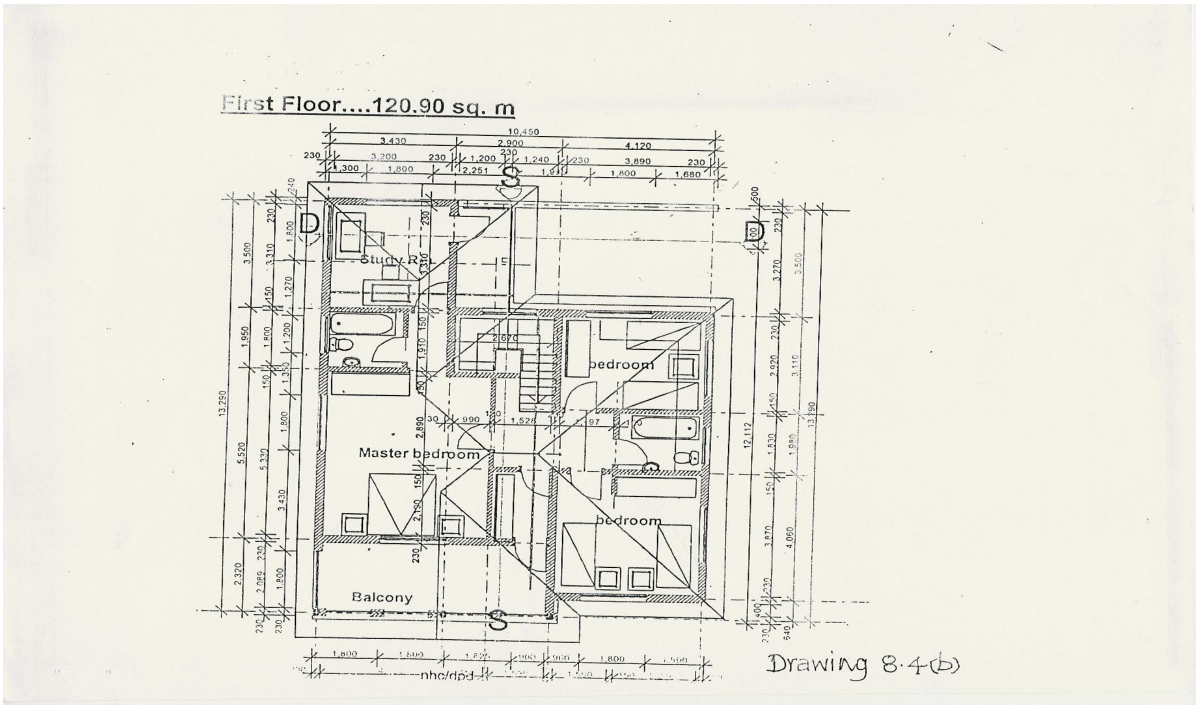
SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES

•BANDA Type •Rectangular House, with a hipped roof.	•It is a storeyed building – ground and first floor. •***Ground Floor*** has Balcony at entrance leading into •Sitting room on one side and Dining on the opposite side. •Staircase at centre •Kitchen follow behind dining room. •WC/Bath, Store and Car garage at back end. •***First Floor*** •3No. Bedrooms •2No. WC/Baths •Balcony, Study room and •Staircase.	•Ground Floor area: $112.90m^2$ •First Floor area: $120.90m^2$ *Ground Floor* Verandah: $12.2m^2$ Lounge: $32m^2$ Dinning: $15m^2$ Kitchen: $16.6m^2$ Laundry: $5.6m^2$ Store: $2.1m^2$ WC: $1.8m^2$ Staircase (in plan): $13.5m^2$ Garage: $23.8m^2$ *At First Floor* Balcony: $12.2m^2$ ***3No. Bedrooms: $24.4m^2$*** $16.5m^2$ $12.8m^2$ Study Room: $12m^2$ WC/Bath: $4m^2$ WC/Bath: $4m^2$ Corridor: 1.5m width.	•One external door in front. •Garage door in the back of house. •Glass panel windows to each room. •All rooms except store, WC/bath and garage have two windows.	***•Concrete Blocks*** ***•Cement, Sand,*** ***•Steel (for reinforcement and burglar proofing to windows),*** ***•Timber for roof trusses, door frames and windows;*** ***•Glass, mosquito gauze, pipes,*** ***•Electrical cables and clay (burnt) tiles for roofing*** ***Steel balustrades of staircase.*** ***Timber handrails to staircase and balcony.***	•Water supply and •Electricity connected to the house.

Table 8.11



Drawing 8.4 (a)



Drawing 8.4(b)

(k) VETA RESIDENTIAL HOUSSE– Singida Vocational Training Centre -2002

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
•BANDA Type •Rectangular House, pitched with gable roof.	•Verandah on one side of the house with main entrance leading in to the Living room. •3No. Bedrooms one of them being a master bedroom self-contained. •Kitchen next to the Living Room on the rear side provided with a store and kitchen yard at the Back. •WC and Shower next to a store. •Short corridor at the center of house separating all the rooms.	•Plinth Areas: $119.04m^2$ •Living Room: 5.5 x 4.95m •Front Verandah: 4.95 x 1.8m •Kitchen Yard (at rear) 5.7 x 1.5m ***•3No. Bedrooms: 3.8 x 4m*** 4.0 x 4.0m 3.66 x 2.68m Master Bedroom WC/Sh: 1.9x2.4m Shower: 1.23x1.8m WC: 1.1 x 1.8m Kitchen: 3.8 x 3.8m Store: 2.41x1..1m	•Two external doors – front and rear. •Provided adequate windows to all rooms/functional space. •Kitchen yard at rear provided with concrete grills.	***•Sand and cement for concrete wall blocks, foundation, floor slab, Floor screed, columns and lintels.*** ***•Hardcore below floor slab.*** ***•Timber for roof trusses, rafters, purlins, wallplates, fascia boards, ceiling joists, Ceiling boards, Wardrobes Cupboards, cabinets and shelves.*** ***•Doors and Windows Timber frames and shutters.*** ***•Steel reinforcements for columns, beams, canopies and lintels*** ***•Aluminium Roofing sheets.*** ***•Plastic pipes for water supply and drainage system*** ***•Electrical cables and plastic conduits.*** ***•Glass for casement windows.*** ***•Nails, Bolts, screws, gaskets.***	•Water supply •Drainage system •Electricity connected to the house.

Table 8.12

(l) EAST AFRICAN RAILWAYS CORPORATION FLATS (COMMUNITY ORGANISATION) - 1976

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
•TEMBE Type	•Verandah/ balcony at Front leading to Living room and Dining	•Area of Flat: $137.79m^2$ •Living Room: $23.75m^2$	•Two external doors are provided with permanent vents on top – front and	***♦Cement and Sand for concrete block walling and for floor slab and foundation,***	•Water supply •Foul water drainage system

•Rectangular 3 storeyed flat roof building.	•A passage (corridor) from Living room to 3No. Bedrooms and WC/Bath. •Main Bedroom with verandah at the back. •Kitchen reached from Dining and Balcony behind with a store. •There are six flats in a block with similar layout approached through staircase for the upper floor flats. •Parapet wall at roof.	***•3No. Bedrooms: 1.8 .9m^2*** 14.7m^2 12.6m^2 •Kitchen: 6.87m^2 Bath: 2.9m^2 WC: 1.8m^2 •Verandah/Balcony: 6m^2 3.9m^2 •Staircase (in plan) 7.5m^2 •Passage: 1.0m width •1.2m conc. Block parapet wall at roof. •Ceiling hight: 2.24m	rear. •Casement windows are provided with P. vents on top to each room (a window each). •Concrete grills to staircase as p. vents.	***♦Iron bars as reinforcement for concrete slabs, beams, staircase and lintels.*** ***Aggregate/hardcore for concrete slabs and foundation*** ***♦Timber for door and window frames and door shutters.*** ***♦Doors and Windows Timber frames and shutters.*** ***♦Internal doors are flush doors*** ***♦Timber for cupboards, shelves and cabinets.*** ***♦Glass for windows.*** ***♦Pipes (plastic) for water supply and drainage.*** ***♦Cables for electricity (copper)***	•Electricity Supply.

Table 8.13

(m) TANZANIA BUILDING AGENCY - 2002

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
•BANDA Type •Rectangular with gable pitched roof .	•Verandah at front leading to Lounge/Dining room. •Kitchen is next to Lounge/Dining space. •Two-bedrooms on the back separating them from Lounge/Dining/Kitchen by a store and WC/shower. •Courtyard approached from	•Plinth Area : 73m^2 •Courtyard: 47m^2 •Verandah: 6.5m^2 •Living Room: 21.6m^2 ***•2No. Bedrooms: 1.2m^2*** 9m^2 •Kitchen: 10.8m^2 •Store: 1.8m^2	•Two external doors – one at front (lounge) another at gable side (kitchen) leading into the courtyard. •Pavement vents provided at top of doors. •Two glass louvered windows with p.v. on top to each bedroom and kitchen. Living room with three glass louvred	***•Cement and Sand for concrete block walling and for floor slab and foundation,*** ***•Reinforcement bars for beams and lintels.*** ***•Aggregate/hardcore for concrete slabs and foundation.*** ***•Mild steel pipes as pillars at front verandah.***	•Water supply •Drainage system of foul/waste water. •Electricity Supply.

	the kitchen on the gable side of house.	WC/shower: $2.85m^2$	windows.	***•Timber for roof trusses, rafters, purlins, fascia/barge.*** ***•Corrugated roofing sheets for roofing..*** ***•Nails, screws, bolts gaskets.*** ***•Timber for door and window frames and shutters, internal flush doors, cupboards, shelves.*** ***•Glass for windows.*** ***•Plastic pipes for water supply and drainage.*** ***•Copper Cables for electricity.***	

Table 8.14

(n) EAST AFRICAN HARBOURS CORPORATION (COMMUNITY ORGANIZATION) - 1975

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
BANDA Type •Rectangular with pitched gable roof .	•Entrance at Verandah through Foyer to Dining and Lounge on one side with Kitchen next to Dining Room, utility and back verandah embedded to Lounge. •3No.bedrooms on the other side reached through corridor from Lounge, Self contained Master Bedroom inclusive. Another WC with shower. •Courtyard approached from the kitchen on the gable side of house.	•Plinth Area : $173m^2$ •Verandah: $21.24m^2$ •Lounge: $49.14m^2$ •Dining: $12m^2$ ***•3No. Bedrooms:*** ***$11.34m^2$*** ***$11.34m^2$*** $22.6m^2$ •Kitchen: $12.9m^2$ •Utility: $4.9m^2$ •Rear Verandah: 10.2m2 WC/Bath: $4.5m^2$ Ceiling height: 3.0m Foyer: Corridor:	•Two external doors opening at front and rear verandah. •Adequate windows provided to each room. •Door and window shutters are provided with PV's at their tops.	***•Aggregate*** ***•Sand*** ***•Cement*** ***•Galvanised*** ***•Corrugated roofing sheets,*** ***•Timber*** ***•Glass*** ***•Ceiling boards*** ***•Pipes*** ***•Copper electrical cables.***	•Water supply connected to house. •Drainage system foul/waste water. •Electricity Supply.

Table 8.15

(o)

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
•BANDA Type •Rectangular in shape, pitched with gable roof .	•Verandah at front entrance, centre part of the house, leading to •Dining room and Lounge through Foyer •4No.bedrooms; master bedroom is self contained. •Kitchen an Utility with verandah at one side of the house •Other side of the house there is a WC and shower. •Dining room is next and accessible to Launge and Kitchen	•Plot Area : 755.44m^2 •Plinth Area: 176.m^2 ***•Lounge:*** 4.95 x 5.25m •Dining: 3.2 x 3.75m •Kitchen: 3.45 x 3.75m •Utility: 2.25 x 2.2m ***•3No. Bedrooms:*** ***5.4 x.3.9m*** ***3.6 x.3.15m*** 3.6 x 3.15m Verandah: 8.8 x 2.4m 2.8 x 3.6m •Width of Foyer: 1. 3m •Width of corridor to WC/Bath and to bedrooms: 1.2m	There are two external doors. Ample windows provided, with at least a window to every room.	***•Cement and sand for concrete blocks for walling, concrete foundation concrete, floor slab. Steel for reinforcement of columns at verandahs, beams and lintels. Floor cement screed. Hardcore fill below concrete slab.*** ***Timber for roof trusses, rafters, purlins, walplates, cupboards, wardrobes, cabinets. Door and window shutters and frames, fascia boards.*** ***Harvey tiles for roofing.*** Nails, bolts, screws, plastic pipes for water supply and drainage, electric cables and conduits.	•Water supply, Drainage system and Electricity connected to house.

Table 8.16

8.3 CONTEMPORARY HOUSE TYPES AND SHAPES:

8.3.1 *General*

Traditional houses are still being built in the country although tendencies of moving towards modernizing them are seen practically. This is more so on their ***types*** and layouts when round houses are slowly being abandoned moving towards angular and rectangular layouts.

The degree of change differs from one district to another.

The houses in ***Dodoma district***, the arid central part of the country, have their housing layout pasisting change, but the traditional construction methods of mud and poles being left out in favour of brick or solid mud wall construction.

People of ***coastal regions*** still construct their houses in the traditional way, using the Swahili houses related layout and main construction methods.

People of the ***Mbulu district*** have their traditional semisubterranean houses changes to the "above-the-ground" houses layouts with two or three rooms and rectangular in shape. This change of persuading the people to build their houses above the ground has resulted into bringing in a notable change from the traditional shelter.

People of the ***Iringa district*** have their traditional TEMBE type houses and rectangular in shape facing minimal changes because the layouts recommended are rather close to what have previously been the traditions in the Hehe house. This is because the changes which are going on bringing changes in housing conditions do not affect people's habits.

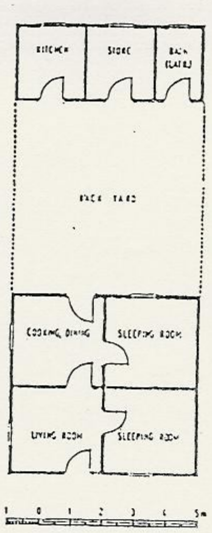
People of ***regions of Arusha, Kilimanjaro, Mara, Mwanza, Shinyanga, Tabora, Kigoma, West Lake and Ruvuma*** face changes of their accustomed different types of round houses.

8.3.2 ***Samples of New Layouts in Housing***

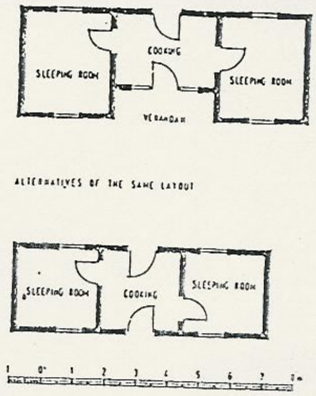
Changes taking place in housing construction methods, layouts and shapes are looked upon by people as necessary steps brought forward in housing so far do not represent any serious problems.

When studying and looking at the contemporary houses there are some clear and obvious traditional layouts which have been modified.

Tanga house bears all the similarities to the Swahili house layout except that the corridor found in the original Swahili house is missing in the Tanga house new layout. Similarity is retained in that its back yard has facilities for cooking, storing and personal hygiene; the floor space is simply divided into four equal rooms.

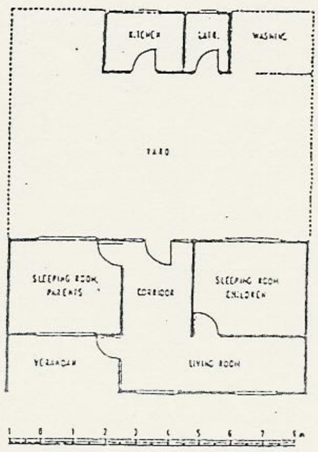


Model house, F.U. Tanga



Model house, F.U. Iringa

As for the Tanga house layout, the layout for Mwanza house is not far from the Swahili house. The provision of corridor and back yard are retained having thefacilities for cooking, storing and hygiene a little distance away from the main house. The principle is adopted in new housing designs, as it allows the house construction to be delt with in stages in line with one's affordance. All the above allow for sheltered verandah in front, and provision of three rooms traditionally started.



Model house, F.U. Mwanza

Drawing 8·7

In most of the recently designed houses, windows are provided, locally made with or without shutters. The shutter could be of timber panel (restricts light and ventilation when closed). When there is no shutter, weldmesh is usually fixed for protection. Sometimes these windows are quite small and few in number although comparatively useful for ventilation and lighting.

8.3.3 *Characteristics and Transformation of a Swahili House into Contemporary Style*

The history of a Swahili type of house which is a coast dominant house could be traced way back to the 13th century spreading all the way through in the town surbubs and rural areas. An example of an original Swahili stone house is found in Bagamoyo. The characteristics of this house is a BANDA type with hipped pitched roof and ***triangular*** in shape, with high screen walls and a front verandah – common in contemporary houses now. Spartial progression is portrayed in the house as one enters the house or moves from the narrow public street through a semi-public area characterized by the verandah or front courtyard. Private area follow culminating with semi-private spaces in the courtyard (Vestbro 1975).

The improved traditional Swahili house in urban areas, showing the same spartial organization as a traditional Swahili house, depicts the basic evolution of the modern urban Swahili house.

The Swahili House commonly used in the coast belt extended to the Kenyan coastal region in the north, and the Mozambique Coastal region in the south. The birth of this portion of housing civilization in the zone was brought about for centuries, by merchant vessels bearing traders from India, Arab, Persia, China and even Russia.

The Swahili house is one of the few rural well-established house types in Africa, South of Sahara, along the Coast that provide accommodation for the low-income group all the time fitting in the pace of contemporary styles. (7.3) This is because of its functional organization that involves sharing facilities such as verandah, backyard latrine, kitchen and corridor. Now have been fully adopted from the rural to urban use. The spatial organization of rooms in a house to be rented. This makes house flexible, cheap and therefore affordable to many in urban areas, especially in Dar-Es-Salaam which is surrounded by the rural zones dominating these Swahili traditional houses.

As its name explains and spels out the word ***Swahili*** which became a district race, it is named from the Arabic word ***Sahil*** meaning ***Coast,*** with its own language, rulers, art forms and decorative traditions clearly depicted on its own ***contemporary*** buildings, furniture, crockery and other household equipments.

In style and construction with ample improvement and transformation to these rural houses, the resulting urban buildings include features of traditional East African coastal architecture (Sutton 1970:181). The dominant building materials used at the time were coral stones and mangrove poles. Stone buildings were for the upper class people while mud and poles were for the lower classes.

The coast of East Africa, as it stretches from Somalia to Mozambique the islands of Comoros and Madagascar are dotted the remains of Swahili architecture, often in ruins, depicting the testimony of a long history of Swahili culture. Despite of all this, Mogadishu, Pate, Lamu, Mombasa and Zanzibar are thriving towns still today with this historical traditional architecture.

India Street of the popular Bagamoyo town and Dar-Es-Salaam city supports the Indian existence of craftsmanship in Tanzania. However, the emphasis of craftsmanship declined during the 19th and 20th centuries.

Indian, Arabic and African building traditions blend together to form a unique and cosmopolitan architecture heritage (Text George H.O. Abungu).

The Swahili house calls more on the ***improvement*** to fit and march the contemporary style rather than on modification of the house design. This is more so on the adaption and use of building materials and finishes abundantly found in the coast region, such as coral stones, wooden construction of mangrove poles, timber, "***meninga***" (much like teak), ***fitos*** (small poles), clay and stabilized soil, lime or cement, palm leaves (fronds) and plaster are now widely used in the urban centers, such as Bagamoyo, Dar-Es-Salaam, Tanga, Pangani, Korogwe, Muheza and other towns in the Indian Ocean Coast areas.

The aforesaid principal building materials found in the coast areas have always been a commandable service as building materials for the humid and hot climate, but probably now it may be difficult to find straight poles.

The attractive and strong curved doors commonly found in Bagamoyo and Zanzibar produced by local carpenters are now disappearing may be because of their high quality.

This imported style with admirable skill of carving of many cultures brought to Africa by colonists and interpreted by the local carves should still be advocated as a typical Bagamoyo symbol.

The Swahili House is commonly found not usually far and in deep interiors of rural areas, but town periphery close to old established urban centers in the coastal strip of the country for the middle and low income groups.

The houses of this group appears to be taking the lead in influencing the urban low and medium income dwellers to adopt their style, layout and shape. The application of these in urban centers is bought about by the fact that a greater population of this live in or near urban centers.

Shape – BANDA

The contemporary houses in the country are mostly the BANDA type of houses. It can be said that they have spread all over Tanzania with its originality from the Indian Ocean coastal areas due to various trades like slave trade which came into the country from afar countries. This was and being modified further by the East African Common Services Organisation EACSO, the East African Community (EAC) and other organizations both governmental and public (*Chapter Four*).

DESIGN (BY BRU) FOR THE IMPROVED TEMBE HOUSE DODOMA (ALT 1)

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
TEMBE Type •Rectangular in shape, with a flat roof .	•Rooms are arranged in a U-shaped triangular house arrangement. •With a verandah at centre of the concave side (at entrance) of house. •Sitting room at the center of house. •5No. Bedrooms •Kitchen •Bath •Store	•Plot Area : 755.44m^2 •Plinth Area: 176.m^2 •***Area of house***: 112.14m^2 •***Ceiling height of house: 2.0m*** •Verandah 9.0 x 2.8m •Sitting Room: 5.0 x 3.0m •***5No. Bedrooms: 3.0 x.30m 3.0 x.3.0m*** 3.0 x.3.0m 3.0 x.3.0m 3.0 x.3.0m •Kitchen: 3.0 x2.0m •Bath: 2.0 x 1.4m •Store: 2.0 x 2.0m	•Timber doors and windows are provided to each room. •900 x 900mm permanent ventilation openings above windows.	•***Stone foundation*** •***Soil-cement or concrete slab for floor hardcore.*** •***Sun-dried soil blocks for walls.*** •Soil cover for roof on timber rafters purlins and walplates. Poles as support at verandah.	•Kerosine Stove and charcoal is used for cooking. •Water supply, from rivers and wells. •Pit latrine provided away from the main house. •Lighting is by lantern.

Table 8.17

8.4 PRESSURE CAUSING PROMOTION OF CONTEMPORARY HOUSE DEVELOPMENT

8.4.1 *Regional Intergovernmental Organizations*

Introduction:

The East African Community is the regional intergovernmental organization of the Republic of Kenya, Uganda and Tanzania, with its Headquarters located in Arusha, Tanzania. The East African Heads of State signed the Treaty for the Establishment of the East African Community in Arusha on 30th November, 1999.

The three East African countries cover an area of 1.8 million square kilometers and have a population of 82 million who share a common history, language, culture and infrastructure. These advantages provide the Partner States with a unique framework for regional co-operation and integration.

From Co-operation to Community:

Prior to re-launching the East African Community in 1999, Kenya, Tanzania and Uganda had enjoyed a long history for co-operation under successive regional integration arrangements. These included the Customs Union between Kenya and Uganda in 1917, which the then Tanganyika later joined in 1927; the East African High Commission (1948 –1961); the East African Common Services Organisation (1961 – 1967); the East African Community (1967 – 1977), and the East African Co-operation (1993 – 1999).

Following the dissolution of the former East African Community in 1977, whose headquarters was in Nairobi, Kenya, the Member States negotiated a Mediation Agreement for the Division of Assets and Liabilities, which they signed in 1984..

However, as one of the provisions of the Mediation Agreement, the three States agreed to explore areas of future co-operation and to make concrete arrangements for such co-operation.

Subsequent meetings of the three Heads of State led to the signing of the Agreement for the Establishment of the Permanent Tripartite Commission for East African Co-operation on November 30, 1993.

Full East African Co-operation operations started on March 14, 1996 when the Secretariat of the Permanent Tripartite Commission was launched at the Headquarters of the EAC in Arusha, Tanzania.

Considering the need to consolidate regional co-operation, the East African Heads of State, at their second Summit in Arusha on 29 April 1997, directed the Permanent Tripartite Commission to start the process of upgrading the Agreement establishing the Permanent Tripartite Commission for East African Co-operation into a Treaty.

The Treaty-making process, which involved negotiations among the Member States as well as wide participation of the public, was successfully concluded within three years.

The Treaty for the Establishment of the East African Community was signed in Arusha on 30 November, 1999.

The Treaty entered into force on 7 July 2000 following the conclusion of the process of its ratification and deposit of the Instruments of Ratification with the Secretary General by all the three Partner States.

Upon the entry into force of the Treaty, the East African Community came into being.

Institutions of the EAC.:

The main organs of the EAC are the Summit of Heads of State and or Government; Council of ministers; Co-ordination Committee; Sectoral Committees; East African Court of Justice, East African Legislative Assembly; and the Secretariat.

The Region's External Trade:

The region's principal exports are mainly agricultural products. These include horticulture, tea, coffee, cotton, tobacco, pyrethrum, fish, and hides and skins. Other exports include handicrafts and minerals such as gold, diamonds, gemstones, soda ash and limestone. Tourism is also one of the major sources of foreign exchange for the three countries.

The region's major imports are machinery and other capital equipment, industrial supplies and raw materials, motor vehicles and motor vehicle parts, fertilizer, crude and refined petroleum products.

The major trading partners of the region are the European Union, Japan, China, India, United Arab Emirates (UAE) and Saudi Arabia.

Top Development Strategy for EAC.:

The East African Community operates on the basis of a five-year Development Strategy. The Strategy document spells out the policy guidelines, priority programmes and implementation schedules.

The EAC strategy emphasizes economic co-operation and development with a strong focus on the social dimension. The role of the private sector and civil society is considered as central and crucial to the regional integration and development in a veritable partnership with the public sector.

Areas of Co-operation:

The regional co-operation and integration envisaged in the EAC is broad based, covering trade, investments and industrial development; monetary and fiscal affairs; infrastructure and services; human resources, science and technology; agriculture and food security; environment and natural resources management; tourism and wildlife management; and health, social and cultural activities.

Other areas of co-operation include free movement of factors of production; and co-operation in political matters, including defence, security, foreign affairs, legal and judicial affairs.

Partnerships:

The EAC collaborates with other African organizations in the spirit of the Abuja Treaty for the establishment of the African Economic Community. Among these organizations are the African Union, Common Market for East and Southern Africa, Inter-governmental Authority on Development and the Southern African Development Community.

Funding:

The core budget of the EAC's Secretariat is funded by equal contributions from the Partner States. Regional projects and programmes are funded through the mobilization of resources from both within and outside the region.

The Kenya, Uganda and Tanzania within the time of contemporary era had a population of 27 million and 82 million (1967 – 2002). Out of this, Tanzania alone had a population of 11,958,000/= (1967) and 34,563,000 (2002), and had almost 1.0% of the population as employees of the organization.

The organization which had East African Railways, East African Harbours, East African Airways, East African Cargo and Handling, East African Posts and Telecommunications and Extelecommunications had all its employees housed in the organization which are similar and categorized according to employees' ranks. Classes 2, 3 and 4 house designs had been favoured over the others and adopted in many parts of the country when one builds his/her own personal house, even for those who were not employees of the organization.

The positioning and presence of the centers of services of the EACSO/EAC, such as railway stations, postal and telephone services, sea and lake ports around the numerous and large lakes in the country had necessitated the provision of ***contemporary houses/buildings*** in nearly all urban centers and some parts of the rural areas.

8.4.2 ***Distribution of Institutions and Education Centres:***

Pursue of education in Tanzania at all levels is spread in regions all over the country. One can pursue his/her education or training in any region in the country with no limitation to ones original locality. This has let Tanzanian people see different types of cultures and houses and thus freeing them from the traditional houses notion towards choices of contemporary houses.

8.4.3 ***Promotion of Housing Development by employment posting:***

One is employed and posted to work anywhere in the country. The
Dar-Es-Salaam city and other towns in the coastal regions have more employees and business people than anywhere else in the country, and such people have adopted the traditional Swahili house, coming up with the contemporary houses, even elsewhere in the country.

8.4.4 ***<u>Trade</u>***

Trade, particularly the Slave Trade has greatly influenced and spread the Swahili traditional house in parts of the country ending up with contemporary houses. The concentration of this, influencing the housing designs, style, planning and shape, spread over the rural areas of the Indian Ocean coastal strip, concentrating in all rural areas surrounding all notable contres (Pemba Island, Tanga Region, Pangani, Kipumbwe, Saadan, Utondwe, Bagamoyo, Kaole, Mbweni, Kunduchi Kimbiji, Kisiju – Dindini, Kwale – Kisiwa, Kwale, Mafia Kisiwani Kilwa, Lindi and Mikindani (Mtwara).

8.4.5 ***<u>Migration</u>***

Migration – moving from one place, of a given ethnic or cultural behaviour and tradition, to another area with a different cultural and tradition, eminates from the following causes, ***dense population, famine, epidemic military disaster, trade, adventure and fighting*** (as submitted at Chapter One). This has played a notable role in the development of contemporary buildings.

Siting out the population increase in Western Tanzania: 939,051 both as refugees living in settlements and in Tanzania villages. In addition 3258 Somali refugees living in Tanga, Eastern Tanzania since 1962 (Chapter One – Table).

Western regions of Tanzania have been hosting fluctuating number of ***refugees*** since 1962, 1993 – 1994 the Benaco Camp had 800,000 – 1.1m refugees.

By April 2001 - 500,000 refugees were being assisted in Tanzania.

Recently, Burundians – 600,000 refugees Democratic Republic of Congo (DRC) – more than 100,000 refugees.

Taking Kagera (with a total population total population of 1,679,109) it features out that 33% are immigrants of the area due to war alone.

Even if no new refugees across the border, refugees population continue to rise due to high fertility rates. One camp of 50 refugees some 450 babies were born in January – February 2001. All this requires proper shelter.

As a result of this Kasulu district alone 2086 modern houses were constructed using mud brick; and have let other people in the areas imitate the production.

On the other hand the rise of the rural population in Tanzania threatens the swelling of urban centers due to rural-to-urban immigration. To a certain extent this type of migration is either partial or temporary and thus being a mere transportation of new ideas to rural areas by the migrants.

8.4.6 *Population*

The social interaction, common communication of Swahili language and intermarriage of the Tanzanian people as submitted in Chapter One under ***Disappearance of Cultural boundaries,*** coupled with the country's population rapid growth, has changed the cultural values and unfamiliar social systems and tribal norms ending up with modifying the traditional houses, to choices suitable towards ***contemporary houses.***

Regions like Mbeya and Kilimanjaro with dense population have their traditional houses styles persisted from immediate change due to minimal migration. Pressure of people on such land resources is high and thus with land shortage. As such areas have been unable to absorb immigrants readily as in other areas. This, however, entailed houses improvement and transformation easy.

It is noted that the identified contemporary houses, which has been featuring from pre-independence – 1961 due to rise of population and growth of urban centers (Chapter One) The move towards the contemporary houses was to a certain extent sped by the ***Arusha Declaration and Human Settlement,*** a declaration adopted by the then country's ruling political partly, the Tanganyika African Union (TANU) towards the general human settlement in Tanzania rural life, with the principal of brotherhood promotion by adopting village formation. (Chapter One). Originally the houses had the following lacking or not openly defined in rural traditional houses:

- space planning
- defined/separated functional spaces in the house
- refuse disposal
- water supply
- ventilation by provision of windows and permanent ventilations.

8.4.7 *Cultural Boundaries*

As stated in Chapter One under the ***Disappearance of Cultural Boundaries*** tribal boundaries and cultures upholding diminished due to positive fratanity, long political stability, peace, social interaction and common communication of Swahili language. This have also promoted immense intermmariage among tribes due to intermixing of the about 120 tribes – ending up with the modification of the traditional houses due to changed cultural values and "tribe" boundaries disappearing whose "new community" outlook had more or less uniform cultural behaviour and thus similar details of house production.

The success of the above adoptation was anticipated when revisited the Geographical Conditions of the Country which had it that the political, physical and economical geography, appreciating the position, size economy and topography, situation of the country assured the availability of ample and various types of the local building materials.

8.4.8 *Building Construction Personnel Availability*

The Ministry of Labour, Youth Development and Sports has the Vocational Education Training Authority (VETA) entrusted with vocational training of apprentices and other persons in the industry towards ensuring the existence of adequate supply of properly trained manpower of all levels, in particular in the rural areas, artisans, craftsmen, carpenters, plumbers, painters, electrical, technicians, masons, welders and brick makers provided most of the technical services which lack professionalism; and architectural/engineering draughtsmen to assist in design production Full professionals in the building and civil works industry are trained at the University of Dar-Es-Salaam, University College of Lands and Architectural Studies and the Dar-Es-Salaam Institute of Technology; while the middle cadre in the field are trained at Arusha and Mbeya Technical Colleges.

8.4.9 *Employment*

The acquiring of an employment in the urban centers, such as a teacher, employed as a policeman, medical worker, government or private organizations clerical employee, East African Community employee, has prompted such employees and other onlookers of houses to prefer putting up their own houses either in the rural or urban areas, imitating those given for their accommodation by their employers – the contemporary design.

8.5 THE APPLICATION OF BUILDING MATERIALS

Contemporary Buildings with Local Building Materials.

Much has been submitted at ***Chapter Three*** of this research giving room towards development of contemporary houses. This includes both the ***traditional and conventional*** materials, such as cement, bricks, steel bars, roofing materials, paints, pipes and a number of factories that assemble various types of building materials and components, such as aluminium doors and windows, steel casement door and window manufacturers etc.

Introduction of Technology Transfer, Legislative and Administrative Framework, Building Regulations, Code of Practice, Standards and other Building Regulations promoted the advancement of Contemporary houses.

Detailed submission as at ***Chapter Four*** points out the development of contemporary houses in the country by siting out ***Organisations Contributing Housing Development in Tanzania.***

The Ministry of Industries and Trade has the ***Tanzania Bureau of Standards (TBS)*** entrusted with the formulation of building regulations for the purpose.

The Ministry of Lands and Human Settlement Development has the ***National Housing Building Research Agency (NHBRA)*** working in various fields within the building sector, undertaking research on local building materials and building technology geared to solve problems related to human shelter for use by both rural and urban developers.

A typical example of developing a rural traditional house by the then BRU (now NHBRA) towards improving a traditional house was carried out in Dodoma Central Tanzania. The study was carried out for one week (18^{th} – 25^{th} May, 1976) in three selected villages – Chamwino (built 100 houses), Kigwe and Mahoma Makulu. The application of local building materials was the principal goal of the study, Experimental house was built at Chamwino – Dodoma (Ujamaa Village) – as below at (a) and (b).

(a) ***DESIGN (BY BRU) FOR THE IMPROVED "TEMBE" HOUSE DODOMA (ALT III)***

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
TEMBE Type •Rectangular in shape, with flat roof .	•Rooms are in a straight line arrangement with a ***verandah*** at center (entrance) of shaped •3No. Bedrooms with kitchen at center of bedrooms and •Sitting Room. •Store and bath provided in a separate small house. •Latrine located at least 10m away from the house.	•Size of main house: 16.4 x 4.7m •Ceiling height of house: 2.2m ***•3No. Bedrooms: 4.1 x.3.0m 4.0 x.2.3m*** 4.1 x.2.4m •Sitting Room: 4.1 x 3.5m •Kitchen: 2.3 x 2.3m ***•Verandah: 6.6 x 1.8m*** ***•Store in a small rectangular house: 3.0 x 2.4m*** ***•Bath in a small rectangular house:*** 1.4 x 2.4m	•Timber doors and windows are provided to each room. •900 x 900mm ventilation openings are provided above windows.	***•Stone for foundation*** ***•Soil-cement or concrete slab for floor hardcore.*** ***•Sun-dried soil blocks for walls.*** •Soil cover for roof •Poles as support at verandah.	•Cooking is in the main the house using stove and charcoal. •Water supply from rivers and wells. •Bath and storage in a separate house. •Pit latrine is provided away from the main house. •Lintern (with kerosene) is used for lighting at night.

Table 8.18

(b) ***EXPERIMENTAL HOUSE IN CHAMWINO – DODOMA: Ujamaa Village.***

SHAPE	LAYOUT	SIZE	VENTILATION	MATERIALS	SERVICES
BANDA Type •Rectangular in shape, with pitch gable roof .	•Sitting Rooms 3No. Bedrooms Centrifugularly arranged •There is front door and a rear door.	•Area of house 30m x 21.3m •Ceiling height: 2.2m •Sitting Room: 4.8 x 2.95m ***•3No. Bedrooms: 3.78 x.2.95m 3.78 x.2.95m 3.78 x.2.95m***	•Doors and Windows are provided to each room. •Sitting/Dining room has two windows.	***•Stone for foundation*** ***•Hardcore, sandy soil; concrete or soil cement for floor slab.*** ***•Burnt bricks for walls.*** ***Corrugated aluminium sheets for Roof.*** •Timber for doors and window.	- - - -

Table 8.19

(a) ***Foundation Materials***

Concrete resulting from a well and proportionately mixed or produced materials of the aggregate are sand and gravel (all-in-aggregate). A mixture of this with cement is commonly used for the foundation construction. I part of cement to 9 of all aggregate (1:9) has been used for mass concrete foundation.

The foundation rests on natural subsoil below vegetable top soil and the concrete is therefore, at least, 150mm below ground level, Immediately on top of the 150mm minimum concrete base foundation under the ground a concrete block wall is built up to about 150mm above ground level,
A Damp Proof Course (DPC) is laid on the wall to prevent the moisture raising up on the wall fabric above. ***(This is a continuous strip of bitumen impregnated felt)***.

Hardcore which is irregular shaped lumps of broken bricks, stone or concrete, which are hard and do not readily absorb water or deteriorate is spread over the site within the external walls of the building to such thickness as required to raise to finished surface of the site concrete. Hardcore is spread until it is roughly level and rammed until it forms a compact for oversite concrete. The hardcore bed is 100mm to 150mm thick.

(b) *Floor Materials*

The floor whose aggregate is sand and cement (1:3 by volume) is spread 150mm thick on a hardcore-fill as site concrete slab. The floor is smooth, level and sufficiently hard to withstand from being worn out. On top of the concrete floor slab, there is a jointless 12mm to 18mm thick finish of sand and cement screed.

(c) ***Wall Materials***

The walls of the contemporary houses are of concrete blocks formed from the aggregate of cement and sand. A few of the houses have their walls made from burnt clay bricks, particularly in Iringa region where its soil have proven to be suitable for the purpose.

Size of concrete blocks are 230 x 150 x 100mm allowing thickness of external to be 230mm and partitions of 150mm and 100mm thick; while an average size of brick is 230 x 100 x 75mm.

Sand-lime bricks and stones are also in use but remotedly.

Sand of 3/16" (5mm) in size as the main aggregate with cement (cement and sand mortar is 1:3 or 4 by volume) is used as mortar. Not usually, clay is mixed with sand as mortar.

(d) ***Lintels***

In the walls all the contemporary houses had reinforced (with a few steel rods) concrete ***lintels*** built in over openings (doors, windows, and verandah) to support the walls over it. The ends of the lintel, are built into the concrete blocks/brickwork over the jambs so as to convey the weight carried by the lintel to the blockwork/brickwork in the jamb. The lintels depth range between 150mm to 300mm depending on the width of the opening.

(e) ***Roof Frame Materials***

Timber has been employed to all pitched houses surveyed as trusses, purlins walplates and rafters. Connections are by steel connectors, gaskets, nails screws and bolts.

Rafters and walplates rest and fixed to reinforced (with steel) concrete beams which are also built on top of the walling.

Some big buildings with wide spans other than residential houses have steel members as roof frame materials.

Flat roof houses of the contemporary style have their structures composed of reinforced concrete resting on reinforced concrete beams.

(f) ***Roof Covering Materials***

Galvanised corrugated iron and aluminium corrugated sheets resting on timber purlins. These materials require pitch of 17^{o} to 25^{o} with extremes of 30^{o} and 31^{o} (the median value for this type of roof materials is 22^{o}).

8.5.2 *Development of Building Materials*

The development of building materials towards the use of the same in the construction of contemporary buildings is presented at the previous Chapter (6.4.2). All the principal materials for the house production in the country: sand, cement, metal roofing sheets, burnt clay bricks and tiles, nails, bolts, steel, paints are manufactured and produced in the country as submitted at Chapter (3.01) and their extent of their use for housing, (3.5).

8.5.3 *Cost of Building Materials*

The previous Chapter (at 6.4.3, Table 6.17) gives the cost and details/specifications of building materials in the production of contemporary buildings. Table 6.18 submits costs of house/building Elements of Foundations, Floors and Roofs.

8.6 TRADITIONAL HOUSE TRANSFORMATION TOWARDS CONTEMPORARY HOUSE PRODUCTION

In rural areas, now and then, house owners have engaged themselves in forced exercises of rebuilding and repairing their houses they live in due to the temporary state they are in, aimed at adapting them to better suit their needs. This unknowingly and unintentionally end up modifying the house or changing elements of the structure and choice of constructional techniques and building materials used, ending up as a house transformation. In housing development, after the production process, the house is built, declared completed and occupied, and at this stage is seen as an end, but in actual fact it is the beginning of several other processes. The house is not a static object, it is dynamic as it often goes through a process of transformation of houses and provides insights into the relationship between occupants and their dwellings.

Historically, human beings have continuously developed their housing environment to met essential needs imposed by variables that change from one period of time to another.

It is not unlikely that transformation of housing affects the human environment economically, socially and culturally.

Buildings are changing in different ways by modifications or changing parts of the structure, and these are some of the ways through which buildings are being transformed. It can, therefore, be assumed that the determination to change emanates from the desire by the occupants to improve their standard of living taking into account the physical characteristics of the building in which they live, although this can have far reaching social-economic implications.

An existing house can be improved by ***transforming it as an alternative technique to an approach of starting to put up a new house with new styles, shape, layout, structural handling, constructional techniques, application of building materials, rearrangement of house functions and appearance.***

It is easier for a rural house, in its qualities of temporary nature, to obey any changes than an urban permanently built house.

In conclusion, as noted, transformation allowed occupants of the house to remain in the house throughout the time the construction is being carried out.

Maintenance or transformation costs are not construction time pressing as is the case for putting up a new house. This is a suitable option for a peasant whose earnings are usually not timely.

The house is being improved in “instalments” while the existing services are not interrupted.

Many residential houses in the country have fitted-in the group of contemporary styles through transformation.

8.7 **RESEARCH FINDINGS FROM THE QUESTIONNAIRES SURVEY**

8.1.1 ***Introduction***

Findings and analysis of data of the study and the interpretation of the results has been delt with and presented in the previous Chapter (6.6).

The questionnaire covered:

- House types
- Storage facilities
- Kitchen facilities
- Latrine facilities
- Livestock
- Local and conventional building
- Materials with their cost
- Availability of manpower.

8.1.2 ***Results***

In the questionnaire with the availed results thereof (as at 6.6) a reflection of positive development of contemporary buildings is appreciated due to positive results of:

Preference of Type/Shape of houses

The ***BANDA*** type scoring high (62%) while the ***MSONGE*** (18%) and ***TEMBE*** (20%) are disappearing.

PEOPLE OF THE ***Mbulu district*** are changing their traditional ***“Semisubsterranean”*** houses to the above ground houses (Banda)

Availability of Manpower more so in the rural areas:

Mason: 89.36%
Carpentry: 87.2%
Gives a reflection of abundancy of the required manpower for the contemporary buildings development.

8.7.3 ***Summary of the Findings***

A summary on the research findings from the ***questionnaires*** is as given in the previous Chapter (6.6.3).

Findings gathered from the ***buildings of the public organization*** entrusted with the house development in the country- NHC, NPF, NEDCO, TRC THA, TAA, TBA, VETA describes the ***shapes, layout, size, ventilation, materials*** and ***services*** are given below:

(a) Types and Shapes of Houses:

ll houses have plans of rectangular shapes; and the majority of them are pitched with hipped ends. A few of them have flat roofs and as storied buildings (residential blocks of flats).

(b) Inside Layout of Houses

Principally, the rooms arrangement do resemble. The access to the house is always through the verandah and/or sitting room. From there spreading to other rooms. Kitchen is always close and directly accessible to/from the sitting room and back verandah, if any.

All rooms have been effectively devided towards intentional separation of activities/functions carried out in the house with no relevance to any tribal cultural or traditional ties.

(c) Main use of the house

It was observed that all common activities covering sleeping, family charting, meeting and recreating visitors, food preparation cooking, eating, washing and keeping utencils, personal items storage, water closet application take place in the house.

All sorts of animals and pets (except cats) are not kept in the house.

(d) Sizes of Functional Spaces

Findings tabulated at 7.2, covering sizes of activities and/or functional spaces (areas), such as Living Room, Bedrooms, Dinning Room, Kitchen, Store, WC/Shower/Bath, number of bedrooms and the houses ceiling heights, are within range or not far off from one design to the other, as per the analysis given at Table 7.20.

Analysis of Type and Space Sizes of ***Functions***

	ORGANI-SATION	TYPE/ SHAPE	PLINTH AREA (M^2)	*VERANDAH* (M^2)	SITTING ROOM (M^2)	NO. OF BRS	BRS SIZES (M^2)	CEILING HEIGHT (M)	KITCHEN (M^2)	COST TSHS (USD)
(a)	NHC – BOKO DSM	BANDA Rectangular Pitched	110.9	6.0	15.9	3	37	3.0	9	
(b)	NPF - KOROGWE	BANDA Rectangular Pitched	121.13	5.4 3.4	23.4	3	11.7 12.2 11.5	3.0	6.2	
(c)	NEDCO FLATS – DSM.	TEMBER Rectangular Flat	88.7 per Flat	4.7 2.8	9	2	10.5 11.1	3.0	6.9	
(d)	PHFC/NHC DSM.	TEMBE Rectangular Flat	122	9 (terrace)	20	3	12.9 12.9 10	3.0		
(e)	NPF – KILOSA	BANDA Rectangular Pitched	175.5	8.3	7.5	3	12 12 9.8	3.0	12.6	
(f)	NHC- MBWENI DSM.	BANDA Rectangular Pitched	153	4 9.4	25.8	3	10.5 16 13	3.0	7	48.0M/=
(g)	NPF- DSM	BANDA Rectangular Pitched	140	9	28	3	13.6 9.0 12.0	2.25	8	
(h)	NPF LINDI	BANDA Rectangular Pitched	123	4.5	21	3	11.1 12.8 10.8	3	8.4	
(i)	NPF – NJOMBE TUKUYU	BANDA Rectangular Pitched	141	10 3	19.3	3	10.5 11.5 9.6	3	14.2	
(j)	NHC – MBWENI DSM.	BANDA Rectangular Pitched	112.9	12.2	32	3	24.4 16.5 12.8		16.6	
(k)	VETA SINGIDA	BANDA Rectangular Pitched	119	8.9	27	3	15.2 6 9.8		25	
(l)	EAR Community	TEMBE Rectangular concrete Flat Roof	137.8	6.0 3.9	23.75	3	18.9 14.7 12.6	2.24	6.87	
(m)	TBA	BANDA Rectangular Pitched	73	6.5	21.6	2	12.0 9.0	3.0	10.8	
(n)	EAR Community	BANDA Rectangular Pitched	137.8	21.24	4.14	3	11.34 11.34 22.6	3.0	12.9	
(o)		BANDA Rectangular Pitched	176	21 10	26	3	21 11 11		12.9	

Table 8.20

(e) ***Ventilation***

Ventilation is adequately provided due to provision of windows and doors to all rooms. Glass louvred window shutters assure permanent ventilation and lighting. Some internal doors are provided with permanent vents at top.

Doors and Windows

- Wooden frames and doors with nails, screws and glue connections to wooden shutters.
- **Internal doors and mostly flush doors with glass louvers on top providing permanent ventilation and lighting (PVC).**
- Wooden window frames to louvred windows.

•Metal bars or mesh for burglar protection, and mosquito wire gauze are provided to windows.

•Butt hinges, latches and barrel bolts are used.

(f) ***Finishes***

White and cream painted inside surfaces of the cement-sand plastered walls, including ceilings.

(g) ***Ceilings***

All houses have ceilings provided.

(h) ***Shape***

Walls: Rectangular in shape(Tembe and Banda types)

Roofs: Mostly are hipped pitched roofs.
A few are gambrel pitched (Banda types) and flat roofs (Tembe type)

Constructional materials used for the contemporary buildings studied: stone, sand, cement, timber, galvanized roofing sheets, aluminium roofing sheets, (concrete blocks, burnt claay tiles) nails/bolts, screws, metal gaskets, latches, barrel bolts, butt hinges, steel.

(i) ***Materials***

All the contemporary houses identified as samples in this study have the local building materials, used conventionally in the construction. In most cases timber had been seasoned, treated and graded before use.

The use of steel as reinforcement of various elements, cement in the construction of foundations, floors, columns, beams and lintels, damp-proof-course (dpc) as moisture preventive measure, roof trusses, purlins/rafters and doors/windows frames and shutters; promoted the durability, strength, functionalism and life span of houses.

(j) ***Services***

Electricity is provided for lighting, cooking, ironing radio/television/refrigerator connection and water heating.

Pipes water supply is available in the houses for all domestic purposes.

(k) ***To sum up,*** it is observed that the findings are in line with the country's ***Local Government Regulations 1963*** requirements expressing building standard adherance which includes siting of a building, minimum areas of plot and building thereon, latrine, dwelling house, habitable rooms, kitchen, bathroom windows, ventilation, surface water drainage, method of construction of foundation, walls, floors, roofs, frames of doors and shutters.

•The application of building materials in the contemporary houses are as per the Building Code and Regulations.

•The Township (Building) Rules – Townships
Cap 101 – Supp 55 has been applied in the development of contemporary houses

CHAPTER NINE

9.0 CONCULSIONS AND RECOMMENDATIONS

9.1 INTRODUCTION:

The objective of this research was to analyse and comprehend the rural traditional and contemporary (1962 – 2002) houses in Tanzania. This led to finding out their types, layouts and shapes as traditional rural houses in Tanzania and apply information acquired into updating the traditional house with notable attention paid to proper application of local building materials available, construction techniques, craftsmanship and skills, promote durability of houses, climate influence, hygiene, affordability, efficient space and house functionalism, and financing of the house and the entire neighbourhood of the homestead (Chapter – INTRODUCTION).

This was approached by ***exploring***, ***identifying and studying*** the specific shortfalls of the traditional rural houses performance as ***specific objectives*** whose method of application were carrying out desk research, interviews, use of designed structured questionnaires and collection of information from the Village Museum case study.

The results have shown that there is a remarkable awareness and need of house improvement although the level of the actual implementation towards the goal is very low due to poverty of the rural people and lack of public financing organization for assistance by the government.

Research Hypothesis and Findings

The hypothesis advanced in this research was about the rural houses improvement and contemporary building styles used in Tanzania (1962 – 2002) as a philosophy towards paving the way forward for positive development and emerging with models suitable for current Tanzania needs.

In pursuit of the research hypothesis, both literature review, secondary data sources Village Museum case study and primary data revelation from the questionnaire surveys, have shown that the traditional rural houses need improvement basing on the shortfalls recorded and presented at Chapter 6 (6.63).

The findings from the questionnaire survey for the Contemporary buildings as presented at Chapter 8 (8.7.3), revealed the ***development of modernity***, covering choice and care of application of building materials, both local and imported materials, adherence to building standards for sizes, space arrangement and hygiene, service rooms and ventilation which have been lacking in the traditional rural houses. Contemporary buildings findings will form the base of the ***models suitable to be developed for current need.***

9.2 RECOMMNENDED SITE PLANNING AND DESIGN TECHNOLOGY:

9.2.2 *Site Planning and Design*

To attain a successful ***model*** of house(s) required for the current use in Tanzania, its development and design ought to start from ***plot planning,*** more so for the rural areas.

Topography of the site should be the basis of the choice of area of site of house(s) for, principally, hygienic point of view. A house as ***a model for current use*** should have social and climatic hustle solved by ***orientation,*** among other considerations (Chapter 3).

(a) ***Plot Planning***

Area of housing when carrying out the ***plot layout*** should have it that part of the plot be utilized for housing so that connections to present and future instructional services, such as piped water or electricity can be made easily.

Dirtier functions such as waste disposal and cattle keeping should be accommodated at the back of the plot obscuring from the public spaces and neighbours.

Other factors such as topography, soil conditions, vegetation will dictate further considerations and modifications to suite the locations.

(b) ***Topography***

Choice of area for a house in the rural areas is governed by topography of the site, soil conditions and vegetation. Site should be dry, easy to level and drain off surface water to avoid flooding of the house and avoid water standing in mosquito breeding pools. A site with a gentle slope, maximum 1:30 will facilitate a proper surface drainage. Steep slopes should be avoided.

Areas with clay or ***organic soil*** (peat) as subsoil are usually not suitable for building.

A site with vegetation (trees) is an advantage due to the shading effect to the outdoor space and protects the house from the heat of the sun.

Distance of plot boundary from a house should be 5.0 meters. This is to prevent accidental fire from spreading to houses on neighbouring sites, more so for the houses built with grass or "***makuti***" (fronds) roofs. In the case of houses built with non – combustible materials like corrugated iron sheets the distance to be 2.5 minimum. This amounts to saying that the total distance to any neighbouring house should not be less than 10 meters or, if the roof is non combustible 5.0 meters suffices.

(c) ***Orientation of Houses***

Orientation should be such that as per the local tradition, a lot of activities which take place out of doors around in a yard, open or enclosed, be regarded as a unit providing or being an extension and functional connection to the outdoor space.

(d) ***Latrines – Waste Disposal***

Pit latrines are the most common types of latrines in the rural areas built not closer than 10 meters (33 feet) to houses where people live or where food and water are stored. The site for the pit latrine should be well drained to avoid flooding and far away from a well. Their use are necessary due to lack of piped water supply in houses. Their construction should have the health officer consulted.

A pit latrine consists of a hand-dug 2.6 meters minimum deep hole with 0.9 – 1.2m diameter to facilitate digging. This is sufficient for a family of five persons for 5 – 6 years.

The pit is covered with a properly built slab reinforced concrete finished smooth with cement rendering to attain surface of non-absorbancy quality.
It slightly slopes towards the hole for easy cleaning and attain floor dryness.

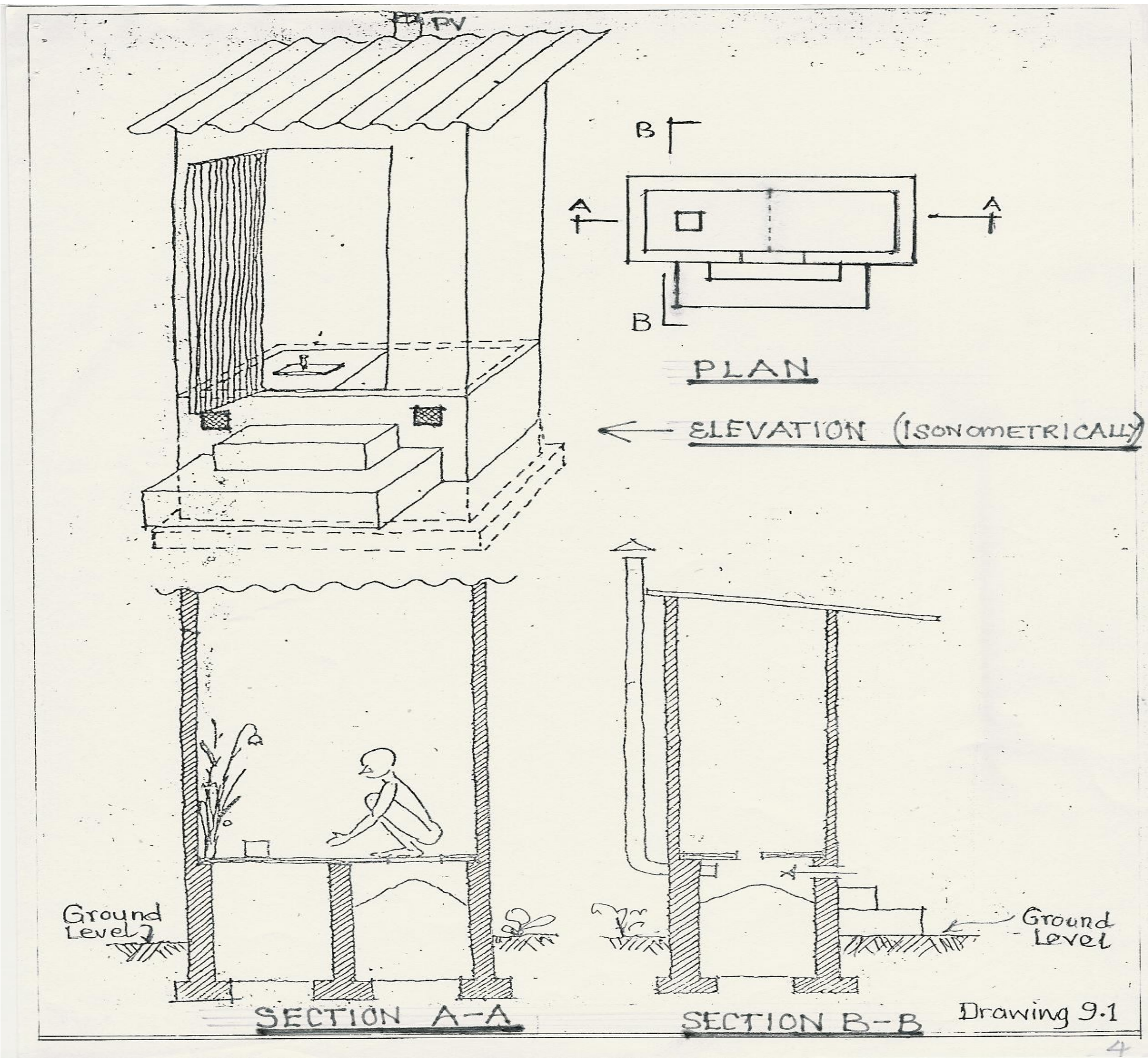
The holes positioned above the center of pit measures 150mm x 200mm wide and attain floor dryness and 300mm x 400mm long.

The hole should preferably be covered with a simple lid (may be wooden) for fly protection when the latrine is not in use.

A simple shelter for privacy, rain exclusion and limitation of flies attraction, is built. As such, provision of windows is not encouraged, but a shelter whose minimum size can be 1.5m x 0.9m should be well ventilated through shaded openings at the top of the wall.

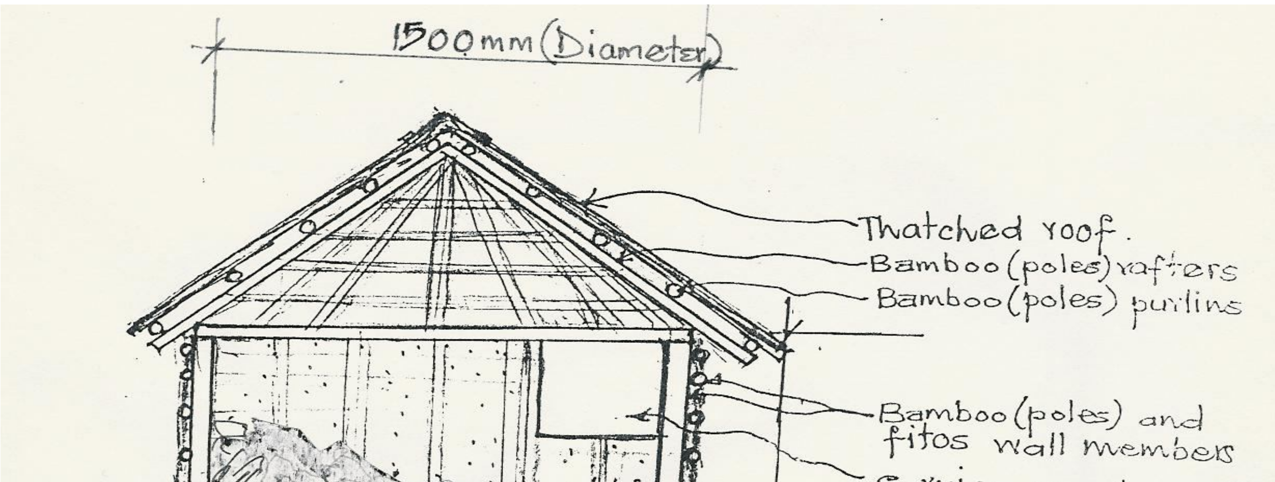
Alternatively, a simpler and cheaper construction is to cover the pit latrine with strong wood poles (extending approximately 500mm beyond the pit edge on each side of the pit) and sticks as a supporting structure and then cover this with a layer of well tamped soil, or preferably soil-cement, finished with a smooth cement rendering.

A ventilation pipe from the pit, protruding above and beyond the roof height may reduce the odors. When the pit is full, say 0.5m from the brim (top level) a new pit ought to be dug and the old one is well covered with well tamped soil. Materials used, like the pit covering slab and those from the old shelter, can be reused for the new latrine to be constructed to reduce cost.



(e) *Granary – Long Term Storage*

The Traditional small granary is necessary for long term storage of large quantities of food storage. Granary is an outbuilding built with its floor raised from ground – 200mm is enough. Its construction ought to be water tight, insects and rodent proof. The amount, type and length (time) of storage of food determines the size of the store and its technical construction. The amount and type of agricultural production is another factor of determination. Long term storage ought to be provided with permanent ventilation with sizable opening of enough lighting to enable easy cleaning and hygiene promotion.



Granary in Section

Drawing No. 9.2

(f) ***Area for Keeping Animals***

Location of keeping livestock should be separate area,. Set aside for layout of the plot. Sheds or pens for animals should be built not too close to houses where people live, where food is prepared or where food and water is stored. Large animals, such as cattle, should not be kept closer than 10 meters (33 feet). The further than this the better, particularly if the number is large.

9.2.3 ***Accommodation of Activities***

A successful accommodating/positioning, sizing and functionally arranged spaces of various functions, usually provided in a house, is the basis of an appropriate ***model of a house for the current need.***

(a) ***Space for Sleeping***

A room for sleeping should have a minimum area of 9 square meters per person (including Children). If the room functions as a living room, the area must be increased to a minimum of $16m^2$.

(b) ***Space for meeting, resting etc.***

A provision of say, $12m^2$ to $15m^2$ is sufficient, more so if meals is also taken in this space. As always is the case in the rural areas, and becoming common practice even in the urban centers, (may be because of population increase and breeze trapping), open space outdoors under trees fulfils this. The provision of a verandah to a house (about 3.0m x 1.5m) can be very useful as an outdoor space, and fulfils the need particularly in hot and humid areas.

(c) ***Space for taking meals***

This is a dining space. Meals are taken in the sitting room. Sometimes it is taken outdoors. (People in the coastal areas have it as common practice to take it in the verandah).

(d) ***Space for preparing and cooking food***

The preparation and cooking of food is done in the kitchen and not in the sleeping rooms. The preparation and cooking of food can take place inside a house or in a separate outbuilding as some rural households afford to do, or simply out of doors.

A kitchen (whether in a separate building or in the main house) must be well ventilated and have enough openings (windows and doors) to provide proper daylight inside, among other things, this makes the kitchen easy to clean.

A reasonable size of kitchen able to accommodate all the basics, such as fireplace or hearth, workbench/sink and cupboard can be 3.0m x 2.0m. Even if the kitchen is large enough, much of the work, like peeling potatoes, dissecting onions, tomatoes, lighting charcoal stoves etc, it done out of doors. As noted in the contemporary houses studied, a kitchen should, therefore, have a close access to the yard, preferably a direct entrance. A verandah outside the kitchen is very useful for such outdoor activities. Close connection between the kitchen and the place where meals are taken recommended as practiced.

(e) ***Space for Storing food and water***

Kitchen can be provided with space for storing foodstuffs and water for cooking and drinking. Water can be stored in clay pots (which is always the case in many parts of the rural areas) or other containers which preferably, should be positioned at a minimum of 200mm from the floor level. Sometimes the water container is placed on a 1.2m high pillar with three protruding triangularly arranged branches in a corner of the given space. Protection from contamination should be observed by covering the container with a lid. Foods should be kept on a deck, shelves or cupboards and not on the floor.

The rural people's practice of hanging containers in rope nets (masusu) from the roof or ceiling structure is also recommended. A well ventilated, but mosquito proof, cupboard is very useful for storing food.

If a separate store from the kitchen is provided may be due to kitchen limited space, habit of locking it up should be practiced to safeguard the intrusion of animals and burglars. A direct access from the kitchen should be provided. The average size of a store with shelves provided is 1.5m x 1.2m.

(f) ***Space for washing dishes***

As noted in the contemporary houses studied, washing dishes can be done in the same space (kitchen) where cooking and preparation of food is done.

A sufficiently large verandah connected to the kitchen, as noted in the contemporary houses studied, can be used.

(g) ***Waste Water***

The waste water ought to be taken care of in a proper way. The simplest solution is to carry it out and throw it away, not close to the house or houses, in a place where the water drains off and does not form a mosquito breeding pool.

(h) ***Space for Washing Clothes***

In the rural areas, it is common practice to wash clothes at a lake, a stream, a well or a communal water tap. In this case provision of communal washing facilities should be considered. A large workbench on a floor slab with a simple roof could be sufficient. Waste water should be drained away. The total floor area needed for this purpose is 1.8 x 1.5 meters.

(i) ***General Storage***

Clothing and small items can be stored in the sleeping room in the cupboards, boxes and cloth lines. Some of them can be hanged on the walls or pillars.

The ceiling top i.e. under the roof (for pitched houses) can conveniently be used for storage. An opening with a shutter is provided to the ceiling for this purpose.

Large items like farm implements, hoes, spades, shovels, firewood or charcoal can be provided with its own external access or near external outbuilding. A store of 2.0 x 1.5m could be taken as the minimum size, although this has to be estimated individually.

Conclusion

The functional spaces described above either in separate houses or in the main single house can all be combined in one large house creating an all purpose house with all the functional spaces under one roof. Or either have them separated in several smaller building according to functions. Whichever way, both have advantages. But it is worthy saying that when all functional spaces are in one house security is guaranteed and the house requires less building materials than many small houses and can be simpler to construct.

When all ***functions*** are in one house the possible future installation of say pipe water, electricity and waste water collection is cheaper and easier.

9.3 **<u>RECOMMENDED TYE/SHAPE OF HOUSE</u>**:

Types/shapes commonly found in the rural areas have been discussed at Chapter 7.0 – paragraph 7.3.

The mostly preferred type/shape of house is ***the rectangular with a pitched roof – BANDA*** type scoring 62 percent, as at paragraph 8.7.2, is recommended. More so that, discovered by the rural people, the perishing and effects of durability of building materials employed in the building due to exposure to environmental conditions is saved by the shape of the house – pitched roof. It is recommended that the roof overhand should not be less than 600mm.

The slope of the roof is determined by the roof covering materials.

The following minimum slopes should be used as a guide.

Corrugated metal sheets:	1:3(18o)
Asbestos cement sheets:	1:3(18^o)
Clay tiles:	1:2(27^o) -Preferably 2:1.5(33^o)
Makuti thatching:	1:2(27^o) -Preferably 1:1.5(33^o)
Grass thatching:	1:1.5(33^o) -Preferably 1:1 (45^o)

1.6(9^o) can be an acceptable roof slope for corrugated metal sheets provided the overlap is increased from 100mm(4") to 200mm(8"). When thatching is used the durability increases with a steep slope.

The favoured and recommended rectangular house with pitched roof is easy to construct and provides space between roof and ceiling for storage.

9.4 **<u>RECOMMENDED HOUSE DESIGN WITH CLIMATE:</u>**

As already submitted at Chapter Three the country has a variance of climate entailing different appropriate house design to suite.

(a) ***Coastal Tropical Climatic Zone***

Location: The Coastal Tropical Zone comprises the Islands and a stretch of land along the Indian Ocean, varying in width from 20 to 100 kilometers from the sea.

Siting: It is recommended that houses in this zone should be exposed to sea breezes sheltered sites should be avoided. Provision of trees for shade is necessary. Good drainage for rainwater. Houses should be widely spaced to allow maximum ventilation in and around building.

Building Plan: Single-banked house for maximum ventilation is recommended. Solar gain should be minimized by having main elevations of the house to face North and South. Advantage of land-sea breezes, where available to be taped by orienting the houses. Shaded verandahs are essential.

Structure and Materials: It is recommended that roofs and walls should be lighweight with highly reflective surfaces and emissive to long wave radiation. Ceilings are highly desirable for heat and sound insulation. Roof overhangs should not be less than 0.6 meters preferably as wide as 1.0m.

Openings: Size of openings should be at least 50 percent of the north and south walls. Openings should give maximum air movement in rooms. Openings should be large with canopy or sufficient roof overhand. Ventilation control devices such as louvers and shutters may be desirable. Mosquitos should be controlled by provision of mosquito wire gauzes to openings (windows).

(b) ***Intermediate Tropical Climatic Zone***

Location: The Intermediate Tropical Zone comprises a strip of land with varying widths from 10km wide, between the humid Coastal Tropical Zone and the Plateau Climate Zone.

Siting: Houses should be located on sites exposed to cooling breezes: sheltered sites should be avoided, particularly near water, due to mosquito breeding.

Keep shading trees, but trees should not screen off breezes. Houses should be widely spaced to allow breeze penetration. Good drainage is necessary.

Building Plan: Orientation of the houses should aim at complete sun control, i.e. main axis East-West. Where breezes are pronounced, orientation may be modified to catch these. Single – banked houses are desirable. If double-banded houses are used, interior walls should have ventilations openings to allow maximum cross-ventilation. Verndahs are recommended.

Structure and Materials: This is as for the Coastal Tropical Zone above [9.4.2(a)] but less rust problem is experienced if metal roofing sheets are used, and decay of timber.

Openings: Recommended as for the Coastal Tropical Zone above [9.4.2(a)].

(c) ***Lake Plateau Zone***

Location: The Lake Zone comprises of 4 – sub-zones, the land around the four large lakes in Tanzania.

Lake Victoria (at 1,233 meters altitude)
Lake Tanganyika (at 773 meters altitude)
Lake Nyasa (at 475 meters altitude)
Lake Rukwa (at 793 meters altitude)

Siting: Locate site exposed to lake/land breezes, avoid sites liable to erosion, flooding and poor drainage. Trees should be left for shade. Houses should be widely spaced.

Building Plan: Good cross-ventilation is required (controlled ventilation for West Lake). Sun effect should be excluded. Main elevations to face North and South. Orientation should aim to catch breeze shades areas and the provision of verandahs is essential.

Structure and Materials: Walls of houses in this zone should be close to heavy weight. If light-weight should be insulated. Roofs should be light-coloured and reflective insulated. Ceiling is necessary if corrugated metal roofing sheets are employed. Roof overhand of 0.6m – 0.75m is recommended.

Opening: Size of between 25 – 40 percent of wall area on North and South walls is recommended. Mosquito screens to openings necessary to keep off mosquitoes and flies especially the lake fly which is a menace in this zone.

(d) ***Plateau Climatic Zone***

Location: The Plateau Zone comprises the greatest parts of the country ranging in altitude from 450 – 1200 meters. The Plateau Zone consists of 3 sub-zones.
The Central and Western Plateau, comprising the area West of the ridge stretching from Lake Nyasa to Mount Kilimanjaro. It consists mainly of woodland (miombo). Along rivers there is wooded grassland. Large areas have permanent swamp vegetation. Around Tabora and North of Nzega the vegation is actively induced.

South – Eastern Plateau comprising Ruvuma Region and Ulanga District. It consists of woodland, but with considerable areas of wooded grassland.

North-Eastern Plateau: The Masai-steppe, comprising most of Arusha District. It consists of mainly areas of grassland and semi-desert vegetation. Some small areas of grassland and wooden grassland have been actively induced.

Siting: It is recommended to locate houses in exposed sites except when wind blown dust is troublesome. Badly drained or sites likely to be flooded to be avoided. Complete sun exclusion required. Lay-outs more dense than at lower altitude. When established, no obstruction. Trees, hedges and other vegetation to reduce dust, glare, reflected heat and erosion, should be plated.

Building Plan: The plan should minimize solar again. No bedrooms should be facing west. Double banked houses are suitable and should be provided with internal ventilation. Various court-yard types, **"L"** and **"U"** shaped, traditionally well established and appropriate.

Structure and Materials: Heavy walls are recommended and roofs with 8 hours time-lag to offset hot days and cool nights. Sheet metal roofs should have ceilings. Heavy soil roofs suitable if stabilized and water-proofed. Walls and roofs should be light-coloured. Walls should not be less than 20cm thick, unless insulated light-weight. Large roof over-hangs should be, at least, 60cm.

Openings: Size – 15 – 20 of north and south walls. Opening should be shaded. Windows should have wooden shutters or louver shutters. It is essential to control ventilation. Fly-screen are required where mosquitoes are found.

(e) ***Uplands Climatic Zone***

Location: The zone lies between 1200 – 1800 meters above sea level, mainly being the lower parts of the ridge of land stretching from Lake Nyasa to the Kenya border, along the Western perimeter of the country, some high lying arts of the interior plateau and other mountain areas. The zone is woodland in hilly areas, wooded grassland and grassland. Where sufficient rainfall, vegetation is actively induced – agriculture, grazing, forestry.

Siting: It is recommended to avoid exposed sites. Spacing of building not required. Orientation is not crucial but still important. Surface water drainage control is required when building on a terraced plot (cut and fill) on sloping sites. Vegetation near houses to prevent glare, dust and erosion is essential.

Building Plan: Double banked houses are desirable. Court-yard houses are suitable. Yards should face east. Shaded verandahs favoured. Roof overhangs should not be less then 600mm, preferably 750mm. Heating is required.

Structure and Materials: Heavy roofs and walls with 8 hours time-lag are recommended as most suitable. Walls should be preferred if insulated. Corrugated metal roofs should have ceilings. Walls and roofs should be coloured to improve heat absorption.

Openings: Size – 10 – 25% of north and south walls. Louver windows are not suitable for bedrooms and living rooms. Glazed windows or tight fitting wooden shutters should be used. Separate adjustable small ventilation openings are required at high level. It is an advantage to have windows on the east facing walls.

(f) ***High Uplands Climatic Zone***

Location: This is 1800 meters above. Few people live above 2500 meters. The area is mainly around Mbeya, Njombe and Iringa. It also includes the highest altitudes of the Mountains Mbizi, Morogoro, Nguru, Kilimanjaro, Meru, Loliondo, Ngorongoro and Mbulu between Hanang and Endabash.

Siting: Windy sites should be avoided particularly where catabatic (cold night) – winds are pronounced. Sheltered sites should be preferred. Compact lay-outs for wind are required. Good drainage is required and drainage control on sloping sites is required.

***Building Plan*:** Designed compact double-banked houses are an advantage. Ventilation should be controlled to avoid draught. Cross-ventilation is not required. Bedrooms should be located on the western side of house to utilize heat storage in walls. Living rooms and kitchens should be located on the eastern side for utilization of the morning sun. Fire places are required in the living rooms, centrally located for maximum heat utilization.

Structure and Materials: Walls and roofs should be heavy with 8 hours time-lag and not less than 300mm walls thickness. The use of burnt bricks, soil or soil-cement/lime blocks are appropriate. If metal sheet roof is constructed the provision of ceiling is required.

Openings: Size of openings should be located on the eastern and western walls. Glazed windows or tight fitting shutters are preferred to louvers. Mosquito screens are not required. Separate adjustable small ventilation openings at high level to avoid draft should be provided.

Application of Building Materials in general terms have been discussed at Chapter 6.0 – paragraph 7.4

9.5 RECOMMENDED DESIGNS OF HOUSE ELEMENTS

9.5.1 *Introduction*

It has been studied and noted that many rural houses which are produced by using traditional technologies are built without technically prepared foundations and floors.

In order to improve the durability and performance of traditional houses, or come up with ***a model suitable for current need*** in Tanzania, the technology of anchoring elements of houses should be properly designed in line with the existing production methods.

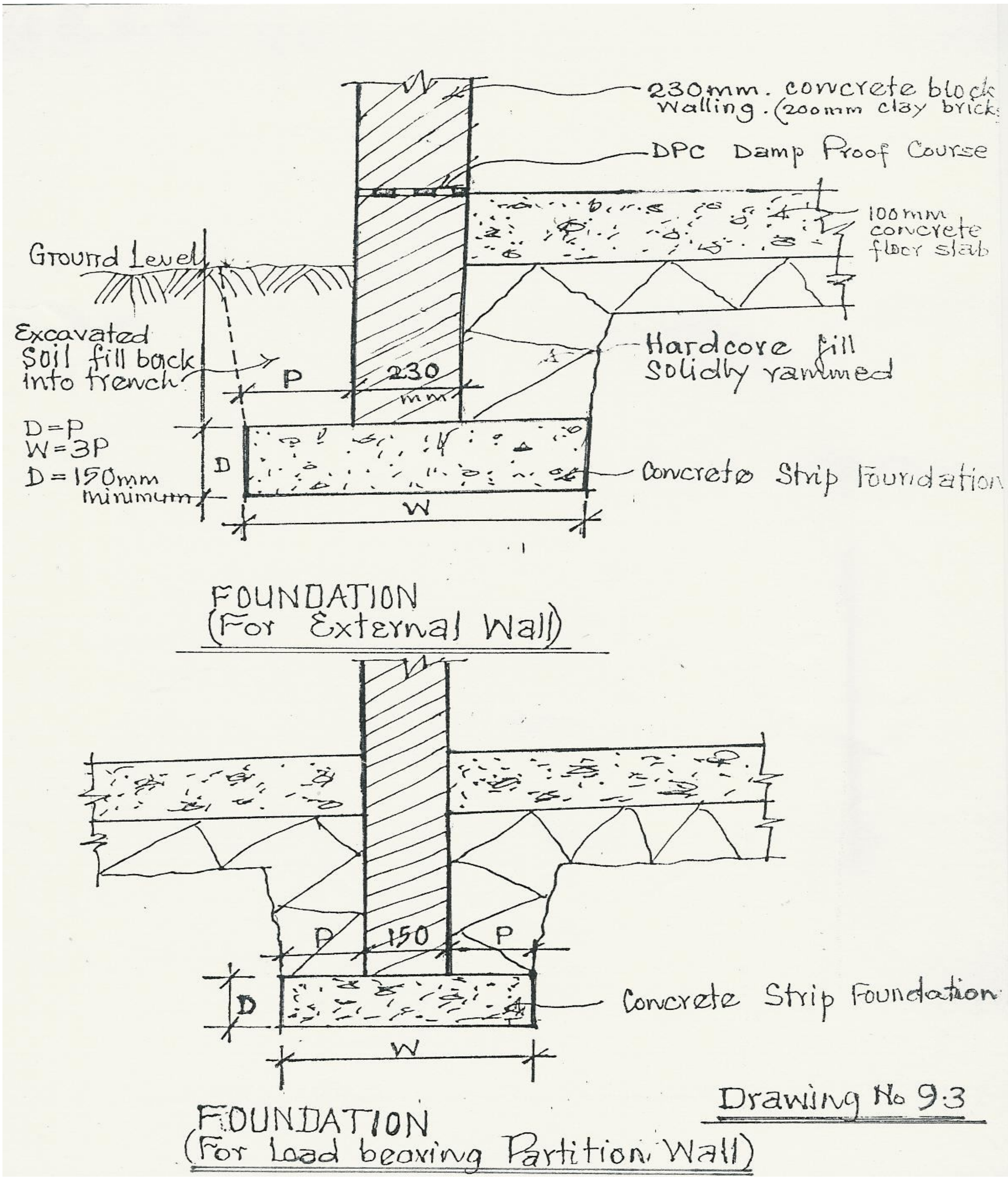
9.5.2 *Foundation*

The bases of all walls, columns and brick or concrete block partitions bear on natural soil or rock. The soil or rock on which they are built and the bases of the wall column or partition bearing directly on the soil or rock are collectively called the foundation.

Foundations for houses produced by using traditional technologies must be protected from ground moisture, during rain and flooding. It is recommended that houses should be built on a raised ground. Water proofing of the outer surface of the foundations in order to keep off ground moisture can be accomplished by building the foundation on a plastic membrane cover all round the house.

The constructions of foundations as noted in the contemporary houses researched should be such that the underside of the foundation concrete must bear on natural subsoil below vegetable **top soil** and the concrete must therefore be, on average at least 150mm below ground level which is below the vegetable top soil. The thickness of this layer of vegetable soil varies from 25mm or 50mm to 300mm or more. ***Vegetable top soil*** is composed of loosely compacted soil, growing plant life and the accumulation of years of decaying, dead vegetation. It is generally soft and very easily compressed and if the foundations of even the smallest building were built directly off it the building would sink into the ground by compressing the vegetable top soil. It is the soil below the vegetable top soil which forms the natural foundation of buildings and it is referred to as the subsoil. The average thickness of vegetable top soil is 150mm.

Compacted granular sub soils such as gravel have good bearing capacity and do not suffer volume change.



Soil-cement for Foundations

Soil-cement is cheaper than concrete for foundations in most lateritic areas both because of savings in cement and only simple tools are needed for compaction.

Well rammed hardcore fill (or broken burnt bricks/blocks) around the foundation below floor level is necessary.

9.5.3 *Floors*

In the findings of the rural traditional houses it was established that all the houses are of earthern floors and thus dusty during dry season, or damp during the rainy season, and thus difficult to clean and unhealthy for the occupants.

The floors or contemporary houses studied are of about 12mm thick sand-cement screed on 150mm thick aggregate/sand/cement (concrete) which in turn rests on a hardcore fill solidly rammed.

Most of earth floors can be improved simply by adding cement to the top-layer, which will make cleaning easier with the provision of capillary moisture barrier of fairly sandy soil or stone to prevent dampness. On top of this layer or a screed of ***soil-cement*** will be cheaper than the corresponding ***concrete-screed*** in all places where sand must be paid (unless only very clayey soils requiring high cement contents to stabilize are available).

9.5.4 *Walls*

The findings gathered from the contemporary houses have it that the walls are primarily of sand/cement concrete blocks and burnt clay bricks with excellent performance for the purpose. Soil-cement materials composition have proven as excellent alternative with reduced cost and easily obtained.

Sand-cement blocks

They are easier to compact than soil-cement blocks and many people are already familiar with their production.

There are, however, certain cases where soil-cement would prove an economic and realistic alternative to improved traditional materials and even to concrete block. These include community buildings and construction in Ujamaa Villages in sand-deficient areas where technical assistance can be provided e.g the Rural Construction Units.

In places where the demand for traditional building materials is high, as in the case with bush poles in Dar-Es-Salaam, ***soil-cement*** might also prove an economic choice for outer wall material (and for inner walls as well). At present the material cost of a soil – cement wall of 7% cement is about the same as for the wall constructed of mud-and poles with plastering.

The relatively cheapness of soil-cement walls (compared to the improved mud-and-pole construction) is therefore, expected to be further enhanced in the future, and thus highly recommended, opening the way for the use of either soil-cement or concrete blocks.

Along side the soil-cement and concrete blocks, clay burnt bricks are recommended for walling where the suitable clay and firewood for burning the bricks are available.

9.5.5 *Roof*

Roofing of traditional rural houses is primarily of thatch and soil, while contemporary houses are of metal roofing sheets, asbestos, burnt clay tiles and reinforced concrete roofs with metal roofing being on the lead. Risk of fire, heavy rains leakage, harbouring of insects and snakes can be their major disadvantages of thatch (although chemical preservatives, but complicated and expensive, for water, insects and fire proving are available). Despite of the disadvantages 80%, as per 1969 HBS, thatch is regarded as a suitable roofing material in the rural areas.

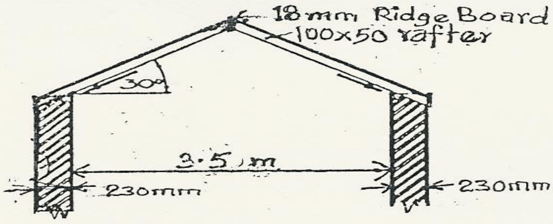
Although soil which, as per the 1969 HBS has taken about 10% as traditional roofing covering material for the ***TEMBE*** houses (flat roofs) provides positive thermal insulation, heat storage useful when cold threatens, but soil may be eroded when it rains. Remedy to this can be stabilized with cement or lime. More so to render the roof water tight a plastic foil polyethylene or polyvinylchloride may be placed under the top layer of the soil, with a check up of a termite resistance of the foil. Soil is heavy, especially when soaked with rain water and thus demanding a very strong supporting structure made of poles and branches which are also vulnerable to termite attack. As such, soil cannot generally be considered a suitable material for roof covering except in arid zones.

Burnt clay tiles, already satisfatorily in use in the contemporary house/buildings, are indigenous roofing local product, and are very good covering material, durable, water tight and have acceptable thermal properties. However, tiles cannot be expected to attain the anticipated solution of roof covering promotion for rural low cost houses in Tanzania due to being very expensive, short and heavy, and thus necessitating a strong supporting structure with closely spaced sawn battens and cannot be laid on pole structural members. Clay tiles have not featured much on the Contemporary houses.

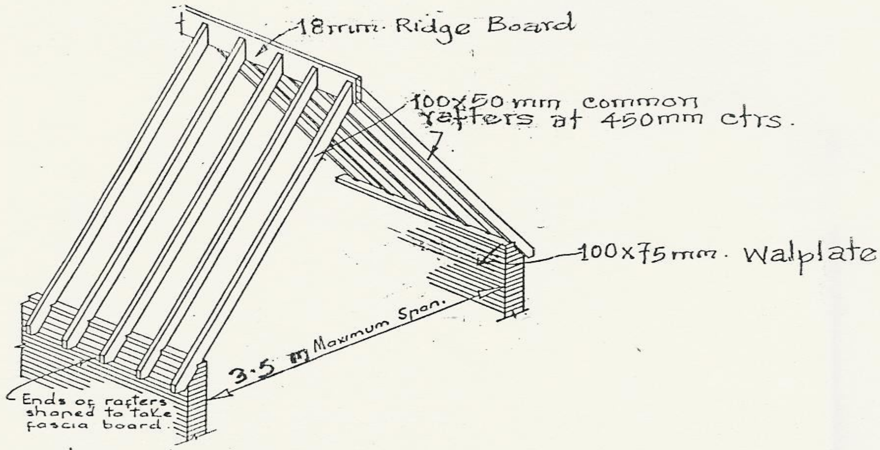
The proper use of space, safety sand attainment of economical levels of use of resources, design of structural details is essential. Sawn timber which, to a certain-extent, is being used for roof structures will give a much better result where metal sheets, asbestos cement sheets or tiles are used as roof covering.

As already noted corrugated iron sheets(although attention to rust by painting is sought) and corrugated aluminium sheets (durable, maintenance free, possession of solar reflection qualities), have taken the lead in the roof construction of contemporary houses. Provision of ceiling is necessary to improve the thermal insulation.

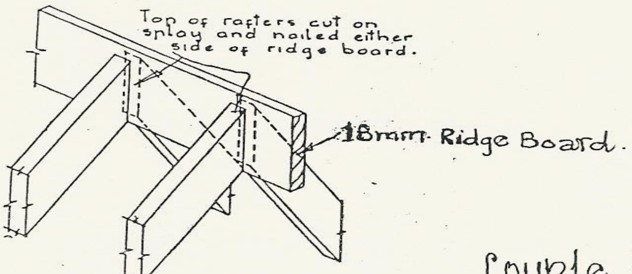
Asbestos cement sheets though possessing better heat insulation than aluminium and iron sheets and less noisy in heavy rains, may not be an appropriate choice of rural low cost houses because of its cost, heavy weight and break easily. They are therefore difficult to transport and require more skill in construction, as well as a good and assured sawn timber supporting structure.



Section



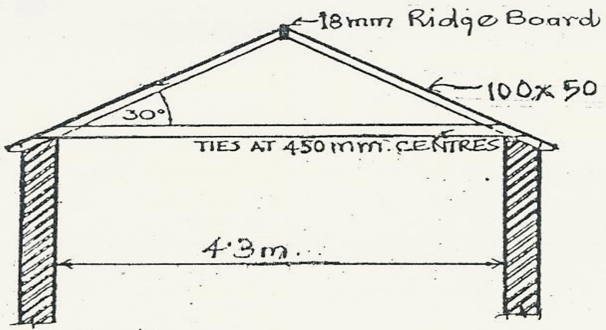
Isometric View



Detail at Ridge

Couple Roof

Drawing No: 9·4(a)



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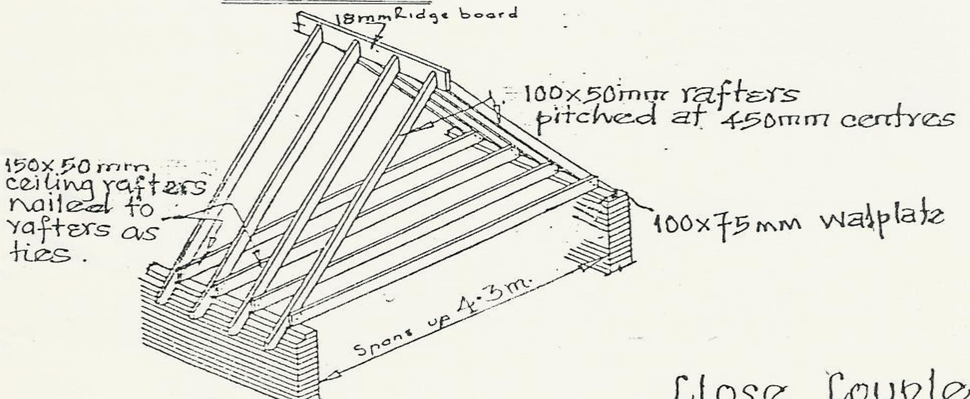
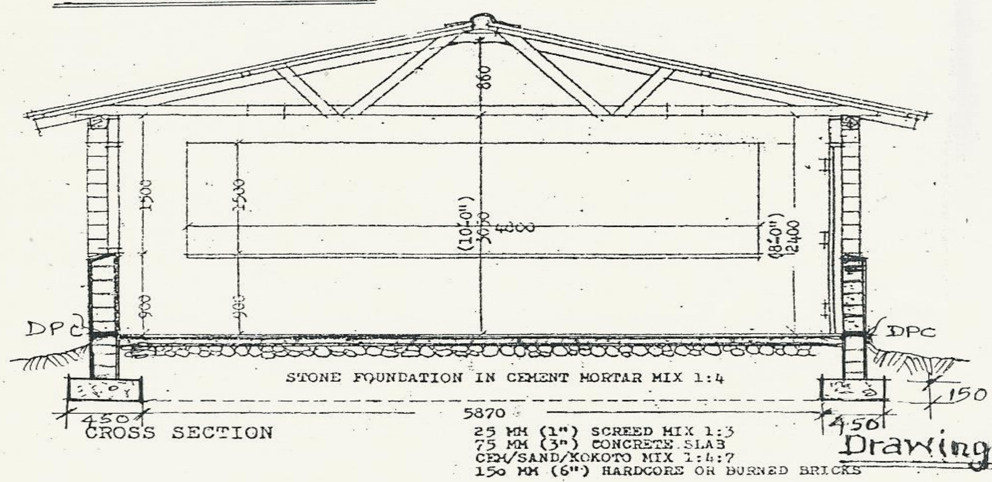
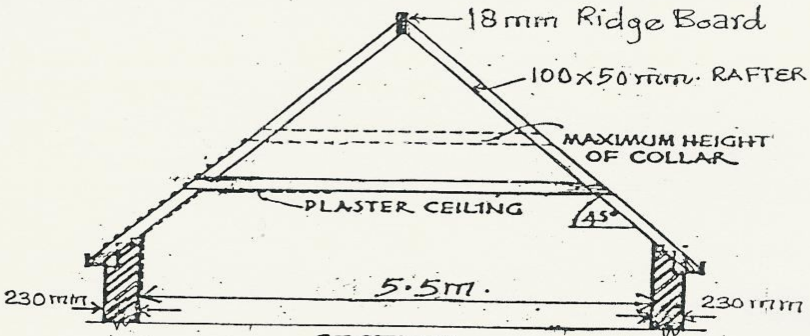


Isometric View

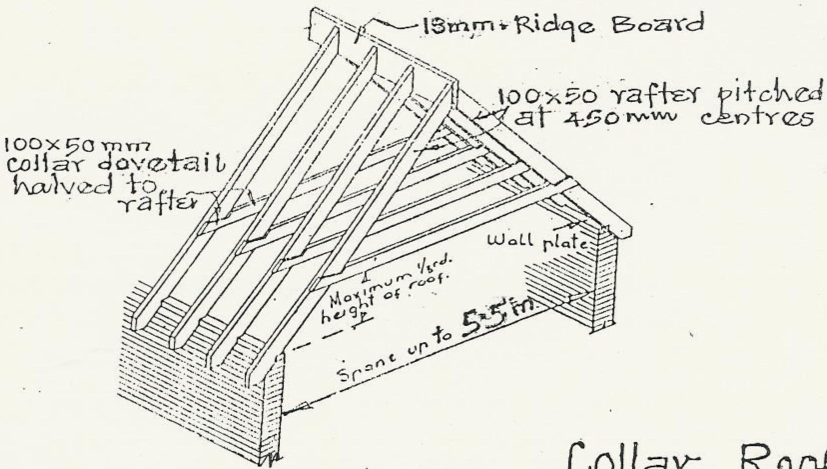
Close Couple Roof



Drawing 9.4(b)

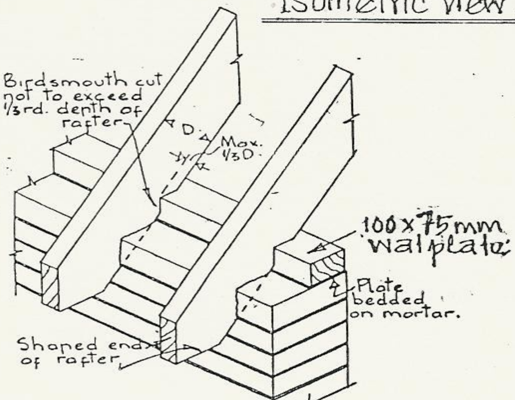


SECTION



Isometric View

Collar Roof



Detail at Walplate

Drawing No. 9·4(c)

9.5.6 ***Doors and Window***

(a) ***Doors***

The best solution for a door is normally the ledged and braced door. It is durable, simple to make and relatively cheap.

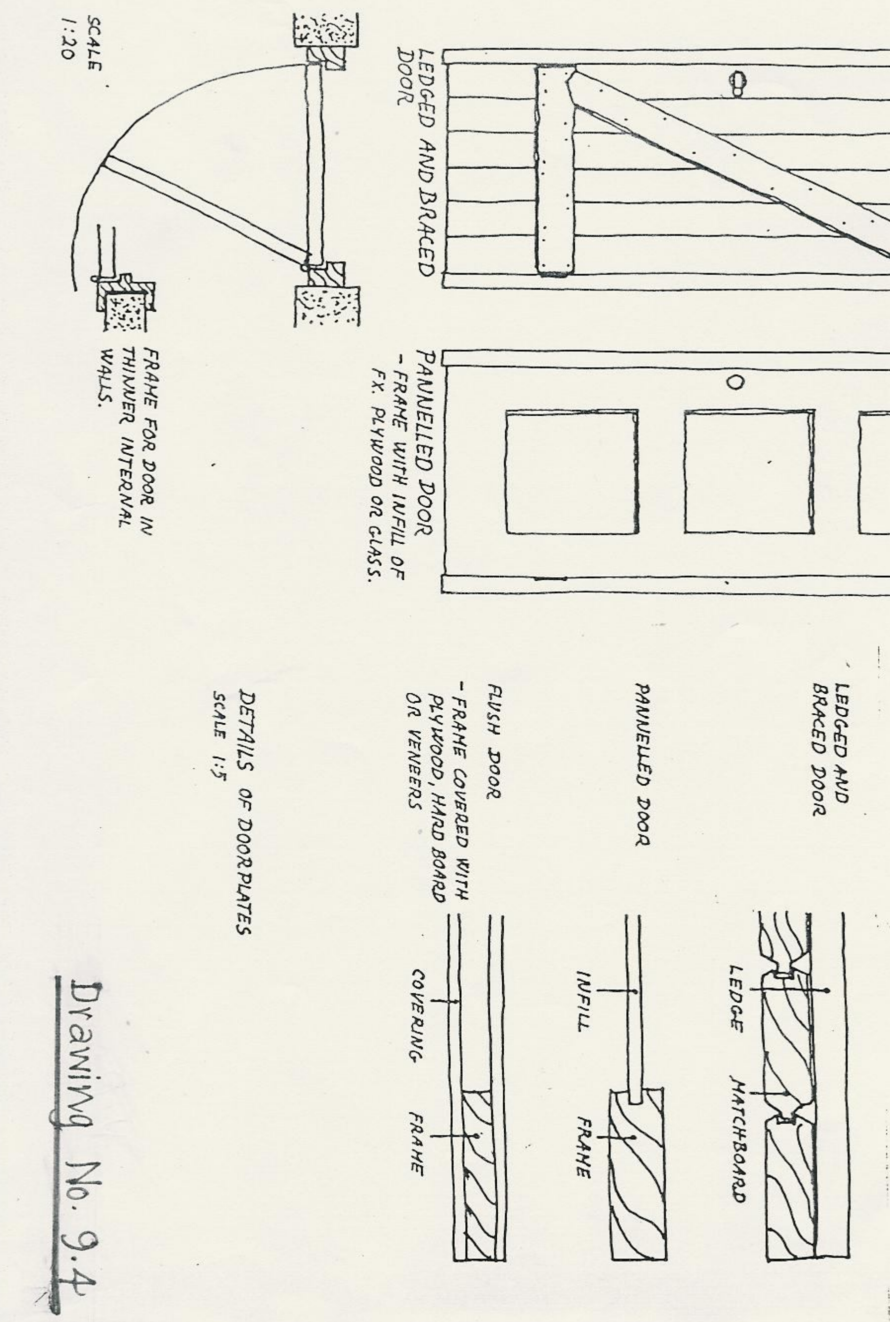
Panelled doors are a good and attractive alternative but are more complicated to make and thus more expensive.

Flush doors of an acceptable quality are very expensive and thus an unrealistic alternative.

When sawn timber is scarce, a simple frame poles covered with flattened corrugated iron or reeds can be used successfully.

Internal doors are not always necessary – only to *obtain privacy*
They can be replaced by cloth.

8·5·6 DOORS AND WINDOWS



(b) ***Windows***

A window has to fulfill the following functions:

- To admit and direct ventilation
- To admit daylight
- To permit vision out (or in)

For security and climatic reasons it must be possible to close the window openings.

The wooden, ledged and braced shutter is a simple, good solution.

Side-hinged shutters are the most common, but top-hinged are a very good alternative with the advantage of being able to act as a *"shading device"*.

Glazed windows have an advantage in very cold areas only where windows have to be closed because of low temperatures.

The window openings can be improved with burglar bars/mosquito net.

Shutters with wooden louvers, for ventilation could be simplified by using permanent ventilation above/and under the window in the form of permanently fixed wooden louvers and then ledged and braced shutters for the window.

Window frames can be made with permanently fixed wooden louvers which can be changed to adjustable glass louvers when available.

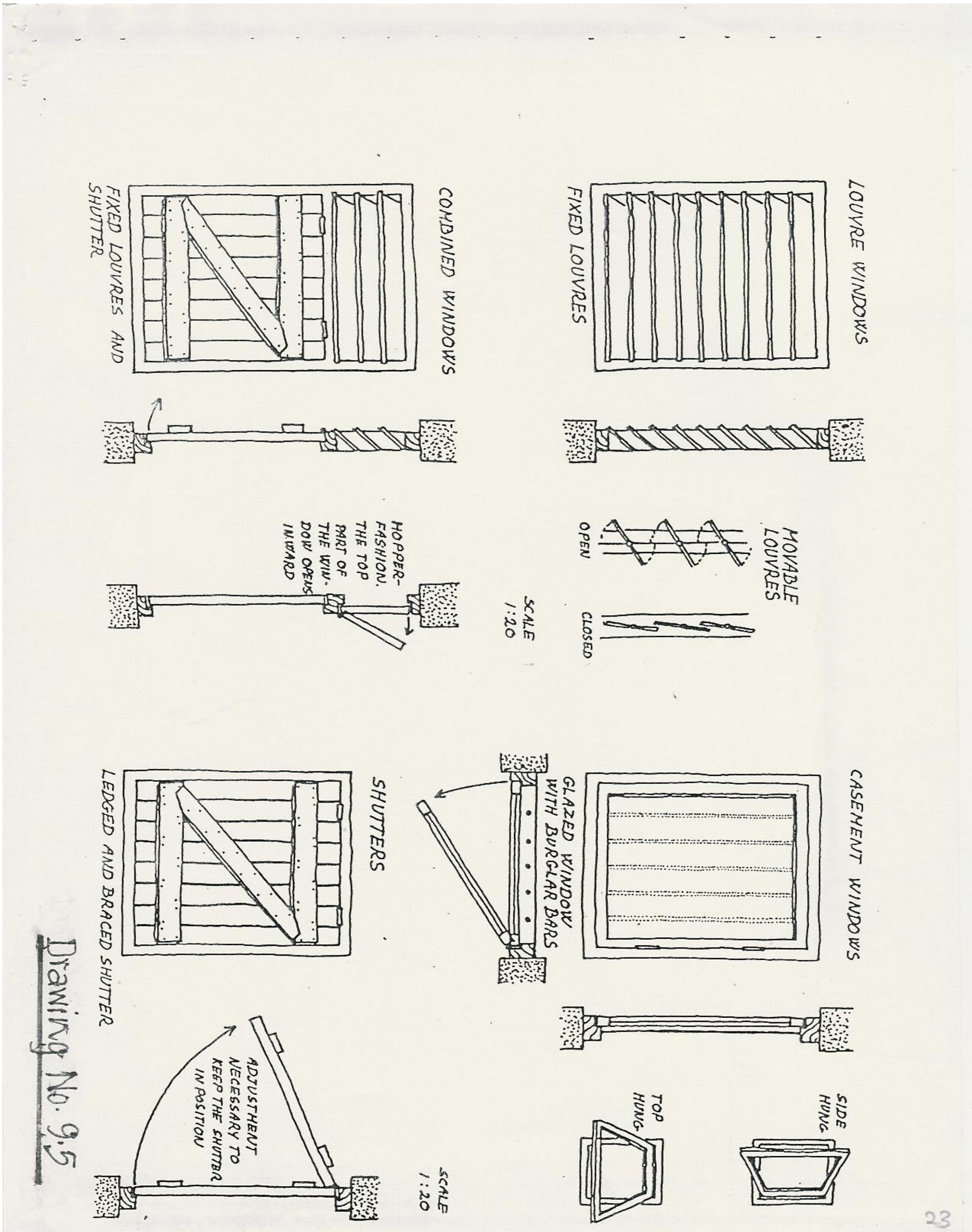
Casement windows can be used as inward opening mosquito screen together with an outward opening jalousied shutter, which, when closed and bolted together from the inside, act as burglar proofing. They can be made entirely from timber without glass.

Top-hung open out casement windows boarded or shuttered, can be used together with an inward opening mosquito screen.

Louvered windows are, in principle, a series of horizontal pivots (if movable) and can be made from timber, metal or glass.

Windows are often best opening in two parts. The lower part to let in all the air possible, the upper part arranged so that it is 1) shaded by the roof from rain and so it can be left wide open quite safely in wet weather, or 2) arranged so that it slopes inwards, hopper fashion, thus letting in the air while throwing off the rain. Air bricks can be used to ventilate the upper and lower parts of walls when windows are not desired or are likely to be kept shut (for security reasons).

The louver window has the advantage of letting in the air and throwing off rain and sun at the same time. It has the disadvantage that it lets in but little light. Where glass cannot be afforded, windows can be arranged in two sections with the upper designed to be shaded from the weather and yet left wide open and let in light. White eaves or overhangs will improve the quality of this light, which is largely reflected.



9.6 TRAINING AND APPLICATION OF BUILDING CRAFTSMEN AND ARTISANS

Training of Building craftsmen and artisans has been discussed at Chapter 5 (5.3). The system of training in construction skills should be evolved so as to meet the rural/local requirement skills as well conform to the social and economic situation in line with what the National Vocational Training Centre is doing. (NVTC Acts 1974 and 1994)..

The provision of centres in the rural areas should be scaled down in size then the present sizes so as to increase their number and provide the services at reasonable reach, if not at the doorstep of the peasants, and in turn prevent the immigration of the trained personnel into the urban centres from the rural areas and the hindrance of poor road infrastructure. This will be in support with the National Housing Programme.

Exemplification of the Federal Republic of Germany (FRG) as one of the nations which benefited heavily from a well programmed Vocational education and training which played a key role in the country'' industrialization process (***Guardian – 7/10/2002)***should be emulated.

The presence of technicians/artisans in the rural areas will open up the availability of modern tools, plants and equipments which are now lacking, which are essential for construction purposes, for effective, speedy production and good workmanship.

9.7 RECOMMENDED PROGRAMME TO BE EMULATED FOR HOUSING DEVELOPMENT.

Mwanza Rural Housing Programme

The Mwanza Rural Housing Programme (MRHP) based in Misungwi in north-western Tanzania, works in partnership with low-income rural communities, NGOs government departments and the local District Council to improve housing standards of living of the people in the region. It does this by providing skill straining for local artisans and disseminating knowledge and information on appropriate building materials and affordable construction practices. The programme currently covers 11 village and neighbouring Inonelwa Divisions.

MRHP which was started in 1990 is documented in Tanzania National Report on Human Settlement Development as one of the best practices, in the Habitat II Conference preparatory process. It mainly emphasizes community participation and the use of indigenous knowledge and local resources.

9.8 CONCLUSION

Findings of the ***Contemporary Houses*** have notably complied to Building Standards and Regulations applied in Tanzania, covering: use of seasoned/treated/sized local building materials, standard and functional spaces as per building regulations, size and details of house elements/components, appropriately used durable local building materials, conventional, factory manufactured and imported materials (modern).

Services, ventilation, finishes, general hygiene are adequately addressed to security and climatic factors have satisfactorily been handled in the design , and thus, contemporary houses studied, recommended for emulation towards developing a **MODEL FOR CURRENT NEEDS** in the country.

As for the Traditional Rural Houses, primitively and locally built as they are, much has been noted some achievements made in fighting the unfriendly weather conditions, and thus putting up the houses to suit their local climatic conditions. As such, the recommendations for the rural traditional houses are given to cover where the shortfalls have been noted and general improvement to the housing, and indeed, ***poverty*** being the main cause.

(a) ***General Situation of Rural Housing***

The unpalatable rural house situation in the country has it that practically all traditional built rural houses have problems of short life span, not being hygienic, structurally unsafe and have shortcomings in connection with foundations, floors, walls and roofs. They are generally of low and poor quality, lacking adequate ventilation and lighting. All the above is mainly due to wide spread poverty, as well as lack of improved affordable construction materials, poor building skills and technology as no trained artisans are incorporated in the investment.

The draft country profile report submitted to **UNHS** (Habitat) in 1997 points it out the prevailing inadequate shelter conditions in the country that are partly due to lack of comprehensive **human settlements and shelter policies.**

What is urgently required are ***realistic policies,*** as integrated approach to houses and rural development, ***a political will***, explicit and consistent polices, and ***government support*** for the people's local initiatives to improve their built environment. It is noted that most people have been designing their own housing over many generations and have proved capable of solving their own housing and rural development problems using readily available local building materials like poles, mud, and straw, wattle, adobe, thatch, bamboo, traditional construction technology and skills and with little assistance from the Government and qualified architects, engineers and quantity surveyors.

(b) ***Economic Context and Conditions of Rural Houses***

Most of these houses are sub-standard in terms of durability and hygiene and their life span has been estimated to be an average of 8 years. This is due to poorly handled building materials used and techniques employed; in most cases unstabilized mud and untreated poles walls thatched with untreated grass.

The only non-locally produced materials which has notably increased in 20 years is corrugated iron sheets which covered 26 per cent of the houses in 1977 compared to 17 percent in 1969. The use of cement in the said period either for reinforcement of floors, walls or foundation has remained in rural areas as a reflection of several reasons including.

(i) High price- most peasants cannot afford

(ii) Short supply of the material – because the industries are producing under capacity, also the government cannot import enough cement to satisfy the internal market demand due to shortage of foreign exchange.

(iii) The transportation is still a snag in remote areas, as a result, cement cannot reach the peasants in time and amount they require.

(c) ***Rural Housing Consumption and Affordability***

Housing affordability can be defined as the ability of households to pay for the costs of housing without imposing undue constraints on the living costs of the consumer.

Payment of rent for the rural households is not an issue for the rural houses. The issue is the constructional costs. The households need to possess a house that meets well-established norms of adequacy whose constructional costs ought to be within the peasant's to afford to pay or repay when a loan is given.

The problem of unaffordabilty then, which is the major huddle of the rural households, arises when households face difficulties in either meeting the constructional costs or lack of a bank/housing loan for a decent and a durable and functional house.

As stated elsewhere in this dissertation housing units in rural Tanzania are built by the owners themselves with no financial support from the government. The type and size of houses people build and the building materials they use depend on their minimal primitive agricultural income levels scaling down the household requirements. This, then, counts to having the majority of houses in rural areas earthen floors, roofs, which by conventional housing standards is considered to be poor and unhygienic.

(d) ***Poverty and Housing Affordability***

Poverty situation in Tanzania contributes immensely to the society's failure to improve the housing situation in Tanzania
as poverty reduces the ability to afford decent housing with its commensurate basic services. Tanzania is one of the poorest countries in the world. According to the World Development Report (WDR) 1999, Tanzania was ranked the seventy poorest country with (a head count ratio is the proportion of people living in households where total expenditure per adult is below the poverty line which is $1.0 dollar a day). A significant proportion of people in the country are unable to secure an adequate diet or meet their nutritional requirements.

Rural Housing

It is often that the problem of housing in the rural areas is not so much of shortage of the dwellings, but rather one of low quality. Evidence available, however, shows that apart from poor quality housing, there is also considerable shortage of housing unit brought about, not by the increase in absolute terms of the rural population but also by natural catastrophes e.g. earthquakes, floods, fire and man-made calamities such as civil strife.

Quoting ***Daily News*** of Thursday, 20/05/2004:

> "Two people died, three injured, while over ***600 other have been rendered homeless following torrential rains which have destr0yed their residential houses*** in Bukoba town early this week".
>
> …………..''Speaking from hospital bed, Anamery Said, "The moment it started raining I was struck by lighting. ***Our house is completely destroyed, and I will have to start from the scratch again."***

(e) ***To Develop Models for Current Needs***

Traditional rural houses and Contemporary houses have been researched studied and analysed with the aim of appreciating the standard of the houses. Areas and limits of fulfillment and shortfalls and thus determine the level, limits, resources and approach towards developing or coming up with the suitable, functional, workable, affordable and acceptable ***MODEL FOR CURRENT NEEDS*** with low – income rural people towards achieving advisory submission to modernize the traditional rural houses.

The model is within limits of the acceptable Findings as presented at Chapter Sven and Eight, covering types/shapes of houses, space arrangement (layout), house functionalism, building materials, construction expertise, services such as toilets, latrines, kitchen, water supply and waste water disposal; storage and cost consideration with climate influence. This covers general situation of the traditional rural housing as discovered, poverty as a constraint to housing affordability, distribution of households by housing tenure, building materials, role of informal construction sector, house construction technical knowledge (apprenticeship), planning, house elements, foundation, floors, walls and roofs, technology application, finance, design standards/manuals, construction industry policy, human resources development, application of appropriate building regulations and standards.

9.9 RECOMMENDATIONS

The goal of coming up with a ***development Model for Current Needs*** from the Traditional and Contemporary Building Styles used in Tanzania have all along aimed at providing a good home rather than a mere physical provision of a house aiming at improving functionalism, human scale relationship, flow of activities of the occupants, evolving a house into a social concept, of a home so as to improve people's health and their contacts and relations with neighbours and other members of the society.

The philosophy of building materials has a big role to play towards achieving the goal for a suitable mode. Much as its abundance and availability in the country for all the major element/components (foundations, floors, walls roofs, ceilings, doors, windows and finishes) of a house stabilizing. Seasoning, treating and standardizing them is necessary for the end result of the house promotion.

Movement, from one place to another, some of the modern building materials, which are manufactured in the country, such as metal roofing sheets, cement, ironmongery and paint) from the urban centers, ought to be encouraged.

Timber components should be replaced where necessary, say with some metal components, ironmongery etc., while conventional doors and windows with no frames should be substituted with treated timber work.
Recommendations are given as advice to modernize the traditional rural houses within the limits of affordability of the rural people without spoiling or interfearing with harmless cultural or traditional myth of the people. These are centred on seeing that a house in the rural area attains the above standard by looking at and accomplishing the following:

-Siting and orientation of a house and other facilities on a suitable area/ground with a healthy environment. Drainage of plot or surrounding area should be possible.

-Arrangement of functional spaces in the house with their standard/suitable sizes; and handling/positioning of major storage facilities (granary) of agricultural products and livestock keeping (kraal).

-Provision of adequate number and sizes of windows for ventilation and lighting.

-Provision of a good foundation to promote suitability, strength and durability of the house.

-Water proofing treatment of mud walls by providing effective roof overhead and height of floor level from ground level.

-Water proofing treatment for roofs and prevention of dampness in a house.

-Treatment of building materials improving their performance, durability and resistance to various hazards.

-Materials exposure due to poor design affecting durability.

-Considerations, introductions and adherence to maintenance principles,

-Achievement of climatic comfort as a development aspect to a good house.

-Use of skilled technicians/artisans and Application of Design and Standard Manuals.

-Solution to Bottlenecks in provision of technical services in rural areas.

-Rural house financing.

-Development of Communities towards house improvement.

-Village Councils towards house improvement.

-Importance of trees preservation and planning surrounding the rural habitation or settlement contribute to indoor comfort as an additional/alternative “house” shadow for relaxing and charting.

-Essential house amenities, such as toilets, pit latrines, kitchen and waste water disposal system coupled with clean ground, to be addressed.

Recommendations lead to being able to build or produce or repair or transform a house which invites qualities of not necessarily costly and complex but ***durable, functional, strong/stable, hygienic and easily maintained*** with some ***aesthetic*** qualities where possible.

The Building Research Unit in Dar es Salaam under the Ministry of Lands and Urban Development and the Tanzania Bureau of Standards under the Ministry of Trade and Industry have carried out ample research and tests towards the goal for promoting the above qualities and the use of the associated materials. Efforts to promote application of this technological innovation should be made and that are available for improving housing in the rural areas, and indeed slums and squatter settlements. This calls for dissemination of technical know-how and demonstration projects. The government should spear ahead with this by making sure all its development projects built in rural areas, such as schools, medical centres, courts adhere to the demonstrations and indeed including other social welfare centres and political party buildings which are already spreading all over the country in the rural areas.