Self-help building productivity : a method for improving house building by low-income groups applied to Kenya 1990-2000

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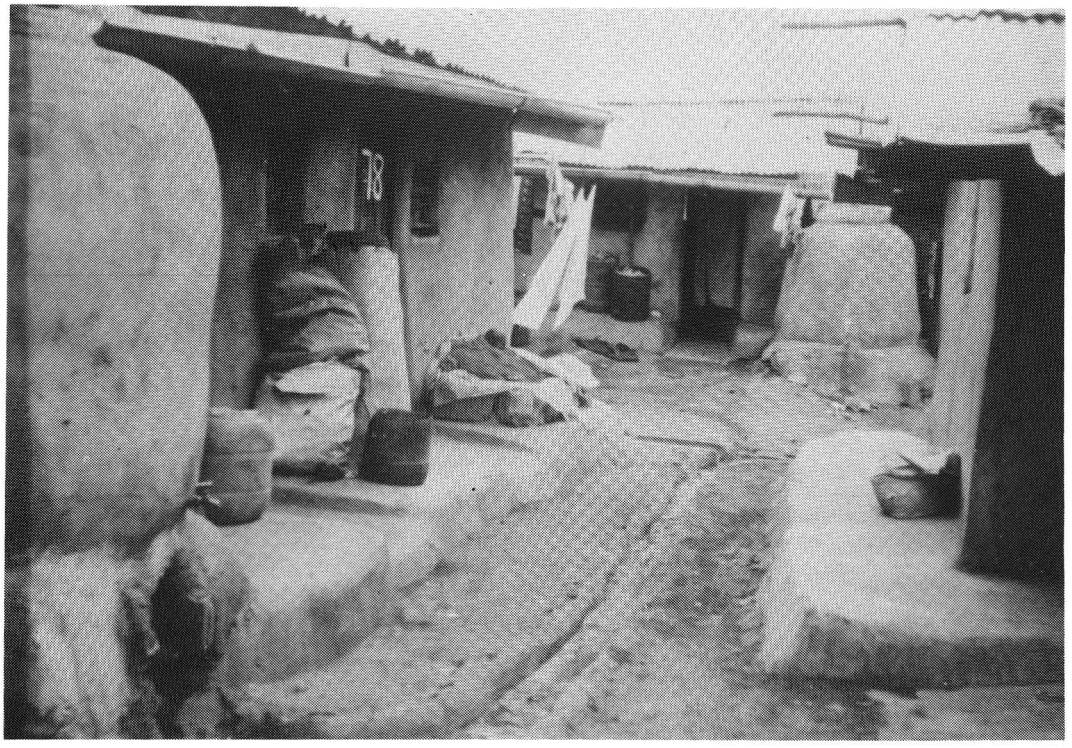
SELF-HELP BUILDING PRODUCTIVITY
a method for improving house building by low-income groups applied to Kenya 1990-2000

PETER A. ERKELENS



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Spring, 1991 Peter A. Erkelens

Curriculum vitae

Peter Alex Erkelens was born in 1946 in Assen, capital of the province of Drenthe, The Netherlands. He attended grammar school (HBS-B) in 's-Hertogenbosch and obtained his MSc. degree in Civil Engineering at Delft University of Technology in 1969. He worked for three years with Shell International Petroleum Company as a development engineer after his military service. In 1974 he joined the staff of Eindhoven University of Technology, as a lecturer in Construction Management in the Faculty of Building and Architecture.

During the period from October 1977 to December 1980 incl., he worked as a technical expert in Kenya in the Dutch Technical Assistance Programme. First as a housing planner for the Ministry of Housing and Social Services and in the second period as a Research Fellow at the Housing Research and Development Unit of Nairobi University as a building materials engineer. In this period he was responsible for research into low-cost building materials and constructions, and their related building costs.

On his return to Eindhoven he continued lecturing on construction management and started research on productivity related to low-cost housing in developing countries, on which themes he has published and presented many papers. He is a senior lecturer in the field of technology and management of building maintenance since summer 1990.

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SUMMARY

In less developed countries the housing situation, especially that of the low-income group deteriorates year by year. Those living in the urban areas suffer most. So far, solutions to this problem have not been found. Self-help building is still felt to be one of the few ways out. This study aims at improving the productivity of the self-help builder in order to reduce his building costs. Therefore a method has been developed for identification of the productivity factors influencing the self-help productivity which was tested in the field.

The nature and magnitude of the housing problem is studied in Part One. Topics like self-help and productivity can be found in Part Two, where the method is also developed and tested. Part Three evaluates the findings for Kenya in particular and the method in general. These three parts are described below (see also Fig. 0.1).

Part One. The housing problem in less developed countries

Relation model for housing and socio-economic development

For 19 countries, ranging from poor to rich, housing indicators have been related to socio-economic indicators. This revealed a significant relationship between the height of the Gross Domestic Product per capita (GDP/cap) and the housing indicators (such as the percentage of houses with water, number of rooms per house). For a given development of the GDP/cap, the related housing indicators can now give a qualitative indication of the housing stock.

Assessment model for housing needs and demand

For a better understanding of future developments, the basic housing situation is analysed for Kenya, which is representative of housing problems in developing countries. For a quantitative indication of the housing stock and for establishing the housing needs and demand up to the year 2000, a general assessment model has been developed. Some of its parameters are the population (growth), income (change), household sizes, costs of incremental housing and infrastructure and the various methods of financing. For this purpose, statistical data were collected and interviews were held. The model showed that, up to the year 2000, 60 percent of the urban population cannot afford a house which fulfils the requirements as laid down in the present building regulations or even what can be regarded as the bare minimum.

Widening gap

It was found that there is a widening gap between (A) the (decreasing) purchasing power of people and (B) the (increasing) housing costs. To close this gap it is proposed, for example, in (A) to allow subletting of rooms and the introduction of measures such as lowering of the building standards and the development of housing with a minimum of basic infrastructure in (B). Apart from these general approaches, we still expect that the majority of all the accommodations will have to be organized and/or built by the low-income groups themselves. Self-help assumes that family participation (finance, labour, administration) will result in cost reductions.

Part Two. Productivity of self-help building, Method development

Self-help building productivity

The aspects of self-help building, its pros and cons are studied in more detail. Attention is given to (i) the (free) availability of the production factor labour: work, skills and knowledge, (ii) the factors (possibly) to be paid for: materials, equipment and advice and (iii) hired labour and equipment. Many definitions of productivity were identified, but none was applicable without adaptation. The applied definition for self-help building productivity is the ratio of output (a house) to input (the expenditures on labour, materials and equipment). It is further argued that productivity can be improved by influencing the so-called productivity factors. Once these are known they can be influenced through certain measures. By improving self-help productivity, costs will be lowered to 63 percent of contractor-built housing. This means that the low-income group moves up 1-2 income deciles in terms of affordability of housing.

Main components

The main components of the method are a framework, analysis sheets and an instrument for field research.

- The framework was developed for structuring the productivity factors. It groups them under six different categories: labour, materials or equipment (as direct production factors), organization and information (as indirect production factors) and general (as an overall factor). The productivity factors can be placed at the national, household and project levels.
- The productivity-factor analysis sheet is developed for a standard form of presentation of each of the productivity factors. It describes in detail (i) the productivity factor, (ii) its impact on productivity, (iii) short-term and long-term measures to influence this factor and (iv) possible effect of measures on the productivity factor and other issues.

- The instrument is meant for further (local) validation of these productivity factors 'in the field' and for identification of 'new' productivity factors and measures. It contains a structured checklist and a set of open-end questions.

Some field results

Application of the instrument to (urban) Kenya resulted in the following most important impairing productivity factors: money borrowing problems; unavailability of infrastructure (roads, etc.); unavailability and disappearance/ theft of building materials and equipment. Some of these factors were also found to be important prior to the start of building. The role of women, the importance of community participation and the role of non governmental organizations (NGOs) were among the enhancing factors. The survey further confirmed that low-income groups increasingly have to help themselves.

Part Three. Epilogue

The case of Kenya

The present study suggests the need for short-term and long-term measures relaxation of the bylaws; the provision of materials yards and water kiosks near the building sites; stimulation of materials production and even self-help production; development of other credit facilities and setting up a security fund and building projects with an employment component. For implementation, a stepwise approach is promoted to begin with, so that a pilot project may, in time, result in an overall policy in which case strong support from specialized NGOs is expected from the start.

The developed method

The method has proved to be workable in practice. It didn't require important changes but is improved with new productivity factors and possible measures found from field research. It can be applied to other countries without many alterations.

SAMENVATTING

In ontwikkelingslanden verslechtert de huisvestingssituatie, vooral van de lage inkomensgroepen, ieder jaar verder. Mensen in de stedelijke gebieden lijden daar het meeste onder. Tot op heden is er voor dit probleem nog geen afdoende oplossing gevonden. Zelf-bouw wordt beschouwd als een van de weinige uitwegen. Deze studie beoogt het vergroten van de produktiviteit van de zelf-bouwer teneinde (zijn) bouwkosten te verminderen. Daartoe wordt een methode ontwikkeld om factoren op te sporen die de produktivitieit benvloeden. Deze wordt in het veld getest.

De aard en de omvang van het huisvestingsprobleem worden bestudeerd in deel Een. Onderwerpen als zelf-bouw en produktiviteit worden behandeld in deel Twee, waarin ook de methode wordt ontwikkeld en uitgetest. deel Drie bespreekt de resultaten van de methode in het algemeen en voor Kenya in het bijzonder. Deze drie delen worden hierna toegelicht (zie ook Fig. 0.1).

Deel Een. Het huisvestingsprobleem in ontwikkelingslanden

Relatie model voor huisvesting en sociaal economische ontwikkeling

Voor 19 landen, variërend van arm tot rijk, worden huisvestings-indicatoren gerelateerd aan sociaal-economische indicatoren. Deze vergelijking toont een significante relatie tussen de hoogte van het bruto nationaal produkt per hoofd van de bevolking (GDP/cap) en huisvestingsindicatoren (zoals het percentage huizen met wateraansluiting, het aantal kamers per huis). Voor een bepaalde ontwikkeling van het GDP/cap geven de daaraan gerelateerde huisvestings-indicatoren een kwalitatieve indruk van de woningvoorraad.

Model ter bepaling van huisvestingsbehoefte en -vraag

Voor een beter begrip van toekomstige ontwikkelingen wordt de bestaande huisvestingssituatie geanalyseerd voor Kenya, welk land representatief wordt geacht voor de huisvestingsproblemen in ontwikkelingslanden. Er is een algemeen model ontwikkeld voor het verkrijgen van een kwantitatieve indruk van de woningvoorraad en voor het vaststellen van de huisvestingsbehoefte en -vraag op langere termijn. Enkele van de parameters zijn de bevolkingsgroei, de inkomensontwikkeling, de huishoudgrootte, de kosten van stapsgewijze verbetering van huisvesting en infrastructuur en voorts de verschillende financieringsmethoden. Voor dit doel zijn statistische gegevens verzameld en interviews afgenomen. Het model laat zien dat tot aan het jaar 2000, 60 procent van de stedelijke bevolking zich niet een huis kan

permitteren dat voldoet aan de huidige bouwvoorschriften en zelfs niet iets dat kan worden beschouwd als minimaal acceptabel.

Vergroting van de kloof

Er ontstaat een steeds grotere kloof tussen (A) de (afnemende) koopkracht van de mensen en (B) de (toenemende) huisvestingskosten. Om deze kloof te versmallen wordt er, bijvoorbeeld, voorgesteld voor (A) om onderverhuur van kamers toe te staan en (B) maatregelen te nemen zoals het verlagen van de bouwnormen en de ontwikkeling van huisvesting met een minimale basis -infrastructuur. Niettegenstaande deze algemene benaderingen, zullen de meeste voorzieningen moeten worden georganiseerd en/of gebouwd door de lage inkomensgroepen zelf. De zelfbouwgedachte gaat er vanuit dat gezinsdeelname (b.v. financiële-, arbeids- en administratieve hulp) leidt tot kostenreducties.

Deel Twee. Produktiviteit van zelfbouw, Methode ontwikkeling

Zelfbouw produktiviteit

De voor en nadelen van zelfbouw worden nader behandeld, waarbij tevens aandacht wordt besteed aan (i) de (vrij) beschikbare produktiefactor arbeid: eigen werkkracht, handvaardigheid en kennis, (ii) de factoren die (mogelijk) iets kosten: materialen, materieel en adviezen en (iii) betaalde arbeid en materieel. Er zijn veel definities van produktiviteit gevonden, doch geen ervan is zondermeer toepasbaar. De gekozen definitie voor zelfbouw-produktiviteit is de verhouding tussen output (een huis) en input (uitgaven voor arbeid, materiaal en materieel). Verder wordt beargumenteerd dat de produktiviteit kan worden verbeterd door beïnvloeding van -zogenoemde- produktiviteitsfactoren. Wanneer deze onderkend zijn, kunnen zij worden beïnvloed door bepaalde maatregelen. Door het verbeteren van de zelfbouw-produktiviteit kunnen de bouwkosten worden gereduceerd tot 63% van de kosten in het geval van bouw door een aannemer. Dit betekent dat de lage inkomensgroepen er 1 à 2 inkomensdecielen op vooruitgaan ten aanzien van de daarbij passende huisvesting.

Belangrijkste componenten

De voornaamste componenten van de methode zijn een raamwerk, analyseformulieren en een instrument voor veldonderzoek.
- Het raamwerk is ontwikkeld voor het structureren van de produktiviteitsfactoren. Het groepeert deze onder zes verschillende categorieën: arbeid, materialen of materieel (als directe produktiefactoren), organisatie en informatie (als indirecte produktiefactoren) en algemeen (als een overkoepelende factor). Verder kunnen de produktiviteitsfactoren hierin worden geplaatst op drie niveaus: nationaal, huishouding en project.

- Het produktiviteitsfactor analyseformulier is ontwikkeld om per produktiviteitsfactor op een uniforme wijze de volgende aspecten te beschrijven: (i) de produktiviteitsfactor met literatuur verwijzingen, (ii) de invloed op de produktiviteit, (iii) korte - en lange-termijnmaatregelen om deze factor te beïnvloeden, (iv) mogelijke effecten van de maatregelen op de produktiviteitsfactor en andere gevolgen.
- Het instrument is bedoeld voor validatie van deze produktiviteitsfactoren 'in het veld' en voor het opsporen van nieuwe factoren en maatregelen. Het bevat ondermeer een gestructureerde checklist en een set open vragen.

Enkele veldwerkresultaten

Het gebruik van het instrument in (stedelijke gebieden van) Kenya leverde als belangrijkste negatieve produktiviteitsfactoren: problemen met het lenen van geld; het ontbreken van infrastructuur (wegen e.d.); het ontbreken en verdwijnen/of diefstal van bouwmaterialen en materieel. Enkele van deze factoren werden ook van belang gevonden voordat de bouw begint. De rol van de vrouw, het belang van de wijkgemeenschap en de rol van de niet gouvernementele organisaties (NGOs) werden als positieve produktiviteitsfactoren gemeld. Het veldonderzoek bevestigde dat lage-inkomensgroepen in toenemende mate alleen op zichzelf moeten rekenen.

Deel Drie. Epiloog

Kenya

De studie komt met voorstellen voor korte- en lange-termijnmaatregelen: verlichting van de bouwvoorschriften; het inrichten van bouwmateriaal werven en waterpunten nabij bouwplaatsen; stimulering van bouwmaterialenproduktie en het zelfmaken van bouwmaterialen; ontwikkeling van andere kredietfaciliteiten, het opzetten van een garantiefonds en bouwprojecten met een werkgelegenheidscomponent. Voor het invoeren van deze maatregelen wordt een stapsgewijze benadering voorgesteld, te beginnen met een proefproject uitmondend in landelijk beleid, waarbij, vooral bij de aanvang, krachtige steun is vereist van daartoe gespecialiseerde NGOs.

Ontwikkelde methode

De methode heeft in de praktijk zijn toepasbaarheid aangetoond. Er zijn geen belangrijke wijzigingen meer nodig. Ze is aangevuld met nieuwe produktiviteitsfactoren en maatregelen afkomstig van veldonderzoek. Ze kan ook worden gebruikt in andere landen na slechts minimale aanpassingen.

0 GENERAL INTRODUCTION

0.0 Aims of the present research

Housing is a basic human need like health, safety, food, drinking water and education. The shortage of housing is a matter for grave concern to many countries both developed and developing. The nature of the housing need is far from being the same in all of them. In the developed countries the problem can generally be addressed more in terms of 'improving' already reasonable housing, whereas developing countries are faced with fundamental needs in terms of a simple shelter with some basic provisions.

According to information from the United Nations, more than one fifth of the world's population does not have adequate housing and lives under extremely insanitary and unhealthy conditions. In most developing countries the shortage of (basic) housing has increased to an unacceptable level. Within these countries the housing situation is most problematic for the low-income section of the population. Although the higher-income people may also be affected, they can better afford the increased prices of the scarce housing units available, thus actually buying out the lower-income groups of housing. The problem is manifest in the rapidly growing urban areas.

The situation is recognized as worsening nationally and internationally and many measures have been taken in attempts by local organizations, governments and international bodies to resolve the problem. However, nothing proposed to date encourages us to believe that these attempts will adequately deal with the problem. We need not expect much change in the situation in the years immediately ahead, in fact only the continuance of what, in our view, is an unacceptable situation.

We can perhaps contribute to a solution. We think there is a relation between self-help building, productivity and the solution to the problem of low-cost housing. In other words, by increasing the productivity of the self-help builder, the shortage of low-cost housing can be reduced. This idea, we believe, can be further developed in a particular manner which, to the best of our knowledge, has not yet been done.

0.1 Objectives

The aim of the present study is to put forward suggestions on improvement of the housing situation by substantially improving the productivity of the self-help builder over the next decade. This relatively short period was chosen as it can be conveniently surveyed.

0.2 Method

Is it possible to contribute to a solution of the housing problem for low-income groups by developing a method which indicates measures for raising the productivity of the self-help builder? This question will be split up into three research questions, which will be elaborated below. In order better to understand the problem of housing, we need to know more about the housing situation in developing countries. The study therefore begins with a general picture of the problems in developing countries in order to show the housing problem in its proper context. We also want to know the degree to which the development of housing in a country is related to its level of development. A method will be put forward which enables us to compare the socio-economic indicators (like GDP/capita) and housing indicators at world level. By this we suggest a relationship between the level of housing development and overall income. Housing indicators are, for example, % of houses with water, number of rooms per house and % with toilet facilities. In this way certain key aspects of the future housing situation can be established (under given conditions) for any country with an estimated GDP/capita.

This general housing problem will be stated by using one country, Kenya, as an illustrative case for reasons given below. There is no standard work covering the whole country. Numerous studies were carried out on low-cost housing in developing countries and in Kenya by the World Bank, UNCHS-Habitat and local research institutes (like the Housing Research and Development Unit, Nairobi), but none of them were detailed enough for our purposes, so that we had to carry out a more extensive literature study before attempting an answer to the **first research question**: *what is the nature and magnitude of the housing situation now and in the coming decade for Kenya?* This question requires qualitative and quantitative answers on the housing situation, policy and practice, the expected situation an possible solutions. In this context, quality is given a limited, quantitative meaning. The quality of a house is expressed in terms of quantity, e.g. the number of rooms per house.

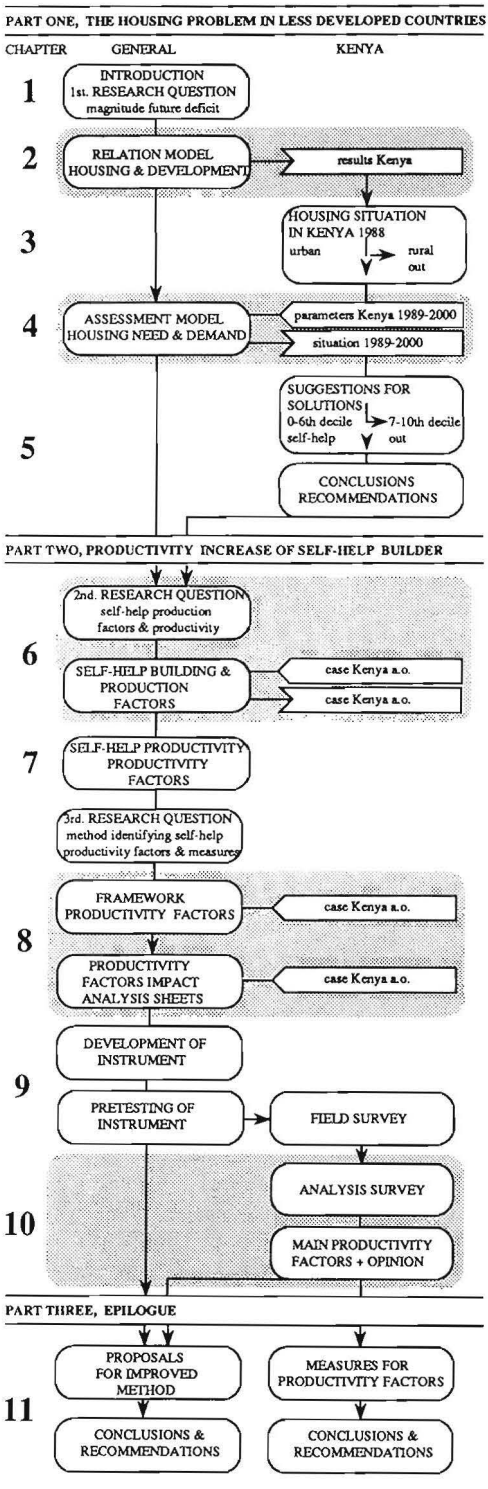
Fig. 0.1. depicts the stepwise procedure of the research and the structure of the thesis. Here the column 'General' contains the more general topics, while the column 'Kenya' covers topics which are typical of that country. In the case of research on another country, it is mainly the topics in the last column that need to be entered afresh.

For the current housing situation we take as our basis the year 1988 because it yields the latest available data. For an estimate of the expected needs and demand up to the year 2000 we develop a model for assessment of housing needs and demand. This model relates and extrapolates parameters, such as population, income, household size, various methods of financing and embodies an incremental housing layout model. We restrict ourselves to the urban situation only because of the many problems appertaining to just that area and for a number of reasons to be explained later. This results in a description of the qualitative and quantitative housing situation between 1988 and 2000. It indicates, for example, the number of households living in a 'substandard' type of house under an unchanged housing policy. We are now also able to define the target group for this research in more precise terms.

The main tendency is that (A) people's purchasing power is decreasing for all commodities, whereas (B) the cost of housing is increasing. The gap between (A) and (B) has to be narrowed if the housing problem is to be solved. There are roughly two categories of suggestions for closing this gap: (A) to increase purchasing power by improving income situation, introducing price stabilization etc. and (B) to lower the cost of housing by relaxing the bylaw standards. These suggestions were carried out but were not all successful and effective. Apart from other measures self-help building is also recommended and applied in many countries. This study will be at pains to show once again that the self-help option gives a notable cost reduction of at least one income-decile up in affordability under the current conditions. We shall continue to focus on this self-help option as we have the hunch that increase of its productivity may lead to further cost reductions.

Part Two of the study further concentrates on the **second research question** *as to the role of self-help, the production factors and productivity.* The self-help option is worked out in more detail. Self-help, as such, is not a new idea and there are conflicting ideas about self-help. Turner is one of its promoters while Ward, Harms et al. are critical opponents. Political arguments are not touched upon in this study but we do discuss the practice of self-help building. We concentrate on the production factors in the production process, which starts at the moment the self-help builder is organizing and/or putting up the construction. The ins and outs of self-help management and self-help building are reviewed, as are the production factors (labour, materials and equipment).

Fig. 0.1 Order of research and structure of the thesis



We are of the opinion that self-help building can be made cheaper than contractor building if productivity during construction is increased which, in turn, leads to reduced costs.

Many authors have published studies on productivity but not related to self-help building, like Turin [1975] and Ganesan [1984]. Although Moavenzadeh [1978] did studies in relation to self-help building, these were not related to productivity factors and measures. Based on literature we opt for the provisional definition of productivity as the ratio of output (=a house) and input (= the total of production factors). As a detailed literature survey did not result in a suitable definition of productivity of the self-help builder, we have defined one based on the findings. We postulate that this productivity can be improved through influencing the so-called enhancing (also called positive) and impairing productivity factors. Or, in other words, by influencing productivity factors, the resulting cost reductions can promote the self-help builder one or two income deciles upwards in terms of affordability. The next step is to develop actions to achieve this goal. We now formulate the **third research question** *as developing a generally applicable method for improving self-help productivity by identifying the impairing and positive productivity factors and indicating the measures by means of which these factors can be influenced.* The method consists of (i) a framework, (ii) analysis sheets and (iii) a measuring instrument. The framework (i) is developed for structuring the productivity factors and (ii) so-called productivity factor analysis sheets describing the productivity factor, literature references, its impact, possible measures to reduce its impact. In addition to this, we developed an instrument (iii) for identifying and validating productivity factors and related measures.

The developed method has been tested in Kenya during a field survey. The data of this survey have been collected and analysed. It leads to a number of locally relevant impairing and positive productivity factors and proposed measures and policy recommendations for the target groups in the case of Kenya. New ideas obtained from the field survey are presented as far as they contribute to problem solutions already presented in Part One. Based on the field experience, we assess the value of the developed method and improve its components.

0.3 Research tools

The used research tools are

- literature survey: extensive reading on low-cost housing, self-help building in developing countries (in particular Kenya), productivity and productivity factors. Local reading was done for updating and verifying the collected information.
- structured interviews with specialists in the fields of interest and with target-group members. Open interviews with government officials in departments dealing with housing, with officials from the National Housing Corporation and relevant members of the public, Nairobi University, etc. in Kenya.
- observations in the form of visits to low-income, self-help housing sites in Kenya.

0.4 The selection of Kenya for research

As has already been said, the housing problem is typical of many developing countries, as is the projected method. However, we need an illustrative case for a more detailed impression of the housing problems and for testing the method. Kenya was chosen for the purpose as

- it is considered as representative of a developing country,
- the housing problems occur here comprehensively and in full spectrum,
- the author of the present thesis was in the country from 1977-1980 inclusive, where he worked for the Dutch Technical Assistance Programme and was confronted with the immense housing problem. He has since briefly visited the country several times,
- access to people, authorities, information and documents was easy.

0.5 Restriction of research to urban target groups

The research is restricted to the urban areas, because of the magnitude of the housing problem there, compared with the rural areas (see Chapter 3). Furthermore, it is expected that the urban housing problems will become more acerbated in comparison with rural areas. Additional reasons are the limited available time, ease of access to respondents, available documents and literature. In the present research the main target group is the urban low-income group of people who are obliged to organize and/or build their own low-cost housing of a designated standard. Other groups which are considered instrumental in implementing the recommendations arising out of

this research are, in the case of Kenya, the government, semi-governmental and related institutions, non-governmental organizations, consultants, contractors and artisans.

0.6 Participants

The partners in the field were the staff members of the Housing Research and Development Unit (HRDU) of the University of Nairobi. They carried out many of the field surveys and commented on the study. Without their unstinting support this study wouldn't have been possible. Other assistance came from academic staff of the Faculty of Building and Architecture and the Faculty of Philosophy and Social Sciences of Eindhoven University of Technology, who greatly contributed to this study with their suggestions and ideas.

0.7 Relevance of research

Social contribution, the thesis discusses the vast problem of housing low-income groups in developing countries and puts forward some recommendations.
Scientific contribution, an original scientific method is used to solve the problem by means of the theory of productivity, which can be regarded as innovative and a contribution has been made to the methodology of a type of research which was, to the best of our knowledge, hitherto unknown.

0.8 Connections with previous research

The present thesis is based on knowledge and experience acquired in developing countries and industrialized countries. Part One is an extension of research done on low-cost housing by the author during his work with the HRDU in Kenya [see Erkelens, 1978, 1979a,b, 1980a-e, 1981, 1983a,b]. Part Two of this research continues with earlier research undertaken at Eindhoven University of Technology on 'Productivity and productivity factors in the building and construction industry' in 1980-1983. This project revealed the lack of knowledge in the building industry on this subject [see Sikkel & v.d. Heijden, 1983; Sikkel & Erkelens, 1984 and also Erkelens, 1984, 1985a-d, 1986, 1987a-b].

0.9 Structure of the thesis

The thesis is in three Parts (see also Fig. 0.1).

Part One. The housing problem in Kenya.
Chapter 1 briefly describes the housing problems that developing countries are facing and formulates the first research question. For insight into the present housing situation and that of the immediate future in Kenya, we must first briefly discuss the relationship between housing and general development dealt with in more detail in *Chapter 2*. In a number of different countries, their level of development (in terms of Gross Domestic Product per household) will be compared with the housing situation by means of so-called housing indicators. Graphical representation will show the degree to which Kenya fits into the total rural and urban situation and what can be expected up to the year 2000. *Chapter 3* will review the basic situation in Kenya (year 1988) as an example of the similar situation in other developing countries. This includes the demand for and supply of housing provisions made by the private and public sectors and what the building process is, as well as the part played in housing by the participants, the industries involved, etc. Housing standards relative to this will also be reviewed.

In *Chapter 4* we develop an assessment model for housing needs & demand. The parameters of this model will be analysed for the years 1989 up to 2000. We do a detailed study in order to estimate population growth, urbanization percentage, household size, etc. A standard housing layout for urban low-income households is developed; This plan contains incremental levels of housing and infrastructure with an indication of the costs of realization. The various methods of building (self-help, contractor-built) and other methods of financing will also be reviewed. The comparison of housing supply and demand will show how many households between 1989 and 2000 cannot afford to live in a house which meets the requirements laid down in the present-day building regulations or even in what is considered as just reasonable. *Chapter 5* discusses the implications and envisaged solutions of the problems. We also define, for further research, the target group which needs to be supported by other ways and means. Here self-help comes into the picture as one of the suggestions further elaborated in Part Two.

Part Two: self-help housing and productivity factors.

In *Chapter 6* we will work out the second research question. We will review the main characteristics of self-help building, its ins and outs and discuss the actual modes of self-help building in the case of Kenya in particular. In this context we consider the role of the 3 production factors (labour, equipment and materials). As these are available only to a limited extent, they have to be optimized. This cannot be done without considering output, when speaking of

the productivity of the self-help builder. *Chapter 7* reports on a literature survey on productivity. In particular, productivity definitions in the field of building and construction are required. We conclude with a definition of productivity of the self-help builder. We further find from the literature a number of factors affecting the productivity (so-called productivity factors), and we distinguish between impairing, neutral and enhancing productivity factors. With this background information we can now formulate the third research question and review the setup of further research. *Chapter 8* discusses an extensive literature survey on productivity factors, together with the required measures for influencing them, factor by factor. A framework is setup for proper structuring of the factors, together with analysis sheets, for a comprehensive review of the characteristics of the factors and the measures proposed. *Chapter 9* concerns the development of an instrument for in-field identification of productivity factors, finding new ones and measures affecting them. We discuss here the form of the instrument, the procedure for pretesting and processing of the survey data and the actual application of the instrument in the field (Kenya). In *Chapter 10* the data are analysed to establish the ranking of a number of the presented factors in order of importance but also report on newly detected ones. We present general information on the respondents and the background information for the most important productivity factors.

Part Three: Epilogue

The final *Chapter 11* discusses the measures to be taken for affecting the most important productivity factors and reviews the developed method as such. We further present suggestions for improving both framework and instrument and new suggestions resulting from the survey. This Part ends with a final set of conclusions and recommendations.

Appendices

In order to reduce the volume of the present thesis the appendices are not all given in full detail. A number of appendices are just a representative part of the original appendix, but enough to give an idea of its contents. Further detailed Appendices are available from the author on request.

Part One

The housing problem in less developed countries

1 INTRODUCTION TO PART ONE

1.1 Context of the housing situation

In the main introduction, we briefly described the dramatic housing problems obtaining in less developed countries. Developments must be seen as very unbalanced for example with regard to

- population growth,
- rapid urbanization,
- skewed income distribution,
- inappropriate technology.

These factors give rise to enormous short-term requirements and cause friction. Most of these problems lead to shortages and to a certain degree of failure to satisfy the basic needs (shelter, food, family continuity and security, health, education). The problems, to mention just a few, are generally interrelated

- inflation,
- heavy debt burden,
- local shortages of food,
- poor health circumstances,
- lack of employment,
- deficient infrastructure,
- lack of decent shelter,
- limited and deficient education at all levels,
- insecurity of land tenure, which hampers investment.

Measures taken to relieve these problems are mainly out of balance. This is also the case as regards the provision of housing, which leads to unacceptable situations. In the world, more than 100 million people are homeless and sleep in the streets, under bridges, in vacant lots and doorways. In the cities of the developing countries, about 50 percent of the inhabitants live in slum and squatter settlements. In some cities even 75 to 80 percent of the people live in such conditions [UNCHS, 1978a, p. 1].

It is thought [Horton, 1981, p. 21] that improvement of the housing situation will have considerable positive side effects for the population: greater satisfaction of personal aspirations, a more healthy environment, leading to lower job absentee rates and therefore to higher labour productivity, the

development of construction industries and supply industries, creation of employment opportunities, etc. The government of Kenya acknowledges this [Government of Kenya, 1978, p. 9]:

> *"Decent housing within the reach of each income group is recognized by the Government as a major contribution to family and community health, and to the morale of the working population. It leads to high productivity of labour and to reduced costs of public health, with consequent important gains for the nation's economic performance. In addition to being a major element in living standards and the general welfare, housing accounts for a significant share of capital formation and thus contributes importantly to the national output and employment".*

Most developing countries have laid down development plans. These plans formulate a planned development policy which includes their housing aims. There are however a number of external factors which interfere with the realization of such plans, assuming them to be realistic. Some of these factors were already mentioned above but, focusing our attention on housing, the following factors may be seen to play a role [see Ruhi, 1983, p. 31]

- population growth and social development which increases demand for more room for big families,
- housing needs a relatively large amount of capital,
- cost of housing is too high compared with household income for most of the population,
- lack of a comprehensive housing program that takes priority areas, population distribution and needs into consideration,
- rise in land prices,
- lack of skilled labour, coupled to the migration and movement of skilled labour to other countries in search of better pay,
- high and fluctuating construction costs due to inadequate supply of materials and scarcity of skilled labour,
- deterioration of old houses which were built of low-quality material never given the proper maintenance,
- the nonexistence in some countries of private firms or housing societies for the provision of dwellings for the low-income groups.

Need of housing

The need of housing for the poor is widely recognized, but its implementation depends largely on the availability of adequate funds [UNCHS Habitat, 1989b, p. 4]. In our western world we are accustomed to methods, standards and building techniques applicable to housing, which cannot just be applied unadapted in developing countries. We also tend to the idealistic views that

everyone is entitled to a minimum set of provisions, at the least. In western countries there is also an additional element for future modes of development: more equipment, more space (than strictly needed). It is also proposed to take into account climate, culture and religion etc., and last, but not least, the natural situation. Although all these factors should be taken into consideration, in practice things are different. When we examine the development of housing in more detail, the essential factors for realization are not only willingness, but also affordability. How much will/can people spend, and how much will/can government and the private sector spend in terms of money and time? We want to contribute to the solution of the housing problem, but we need to know all about the situation, the options, etc., which obtain not only now but also in the near future. This brings us to the first basic research question in which the study focuses on Kenya as a case in point, as already referred to in the introduction.

1.2 First research question, order of research

The first research question can now be formulated as *what is the nature and the magnitude of Kenya's housing problem now and in the coming decade?*

This question can be subdivided as follows

1. **What can we expect in terms of housing quality for Kenya when compared to the world in the near future?**
   In order to establish a relation between quality of housing and the level of development we have to gain insight from the developments in world housing. This can afford us a rough impression of the qualitative housing situation in a country when its overall income is known. That can be used as a basis for establishing the current situation and the situation of the near future, under certain conditions, however. We will apply this to Kenya (see chapter 2).

2. **What is the situation in Kenya now as to qualitative and quantitative housing? (1988).**
   Establish the current housing situation in terms of supply, need and demand. Who are the actors in the building process? What is the official policy and the practice, based on what legislation and financing system?

3. **What will the qualitative and quantitative housing situation be in the near future? (up to the year 2000).**
   To estimate the future housing situation we have (i) to develop an assessment model for housing needs and the demand for it, (ii) establish the parameter sizes of future housing, and (iii) apply and interpret the results obtained from this developed model.

4. **Solutions to the housing problems.**
   Solutions based on previous studies will be formulated and further research discussed.

1.3 Housing, a working definition

Housing does not only mean the physical product but also the process of its realization [Turner in Houlberg, 1978, p. 18]. For the purpose of this study we use a definition which is limited to housing as a product. Here a housing unit is taken as a dwelling unit. There are various definitions available. According to the building bylaws of Kenya [Republic of Kenya, 1974, p. 11]

> *'a dwelling is defined as a part of a building lawfully used or constructed, adapted or designed to be used as a residence for one family and consisting of at least two rooms'.*

This is a 'narrow' definition, which excludes squatter units and other informally erected units which are not approved. We, however, adopt a broader definition from the United Nations [1983a, p. viii], which does not take into account the level of quality of the unit

> *'a housing unit is defined as a separate and independent place of abode basically intended for habitation by one household, or one not intended for habitation but occupied as living quarters by a household.'*

2 HOUSING & DEVELOPMENT AND ITS RELATIONS

2.0 Introduction

In this chapter we review the relationship between the level of development in general and housing in particular. When we compare various countries, both richer and poorer, we will see that the type of housing is related to the level of development. This will be elaborated in the following paragraphs for quick reference and rapid insight into the housing situation in any country, and Kenya in particular.

2.1 Consumption and production aspects

At one point in time, housing is at different stages of development in the various developing and industrialized countries. We expect a relationship between the physical characteristics of housing (housing indicators) and development indicators. Thus, when these development indicators change in the course of time (diachronic), housing indicators also change and describe the historical past of a country, however, we don't have a clue to the future (apart from projections). The same occurs at world level. A change in the development indicators can be closely related with a change in (diachronic) housing indicators. This may provide us with data for comparison between countries. For example, we can, with some caution, presume from the data that a country now earning, e.g. US$ 400 per capita, when an income of US$ 600 has been attained, will have the type of housing of a country now earning US$ 600. This might be untrue owing to other changes during the relevant period of time. (We cannot compare the development of housing in the Netherlands from 1800 to say, 1910 with the development of Kenya 1950-1980, as many other factors play a role, such as technological, sociological and economical changes). This time factor can be 'erased' by a comparison of the contemporary situation of all countries (synchronic). Here it is assumed that a synchronic comparison, in which time is kept 'constant', is justified. When the other variables are changing (e.g. GDP/cap from US$ 400 to 600), housing is also changing in a similar way, assuming that there are neither crises nor technological breakthroughs (e.g. new machines).

Fig.2.1 Socio-economic and housing indicators, urban situation various countries

COUNTRY	BANG-LADESH	INDIA	BUR-UNDI	SRI-LANKA	PAKI-STAN	KENYA	ARAB/ YEMEN	THAI-LAND	CONGO	TUNI-SIA	SOUTH KOREA	BRAZIL	PANAMA	URU-QUAI	IRAN	JAPAN	NETHER-LANDS	U.S.A.	SWE-DEN
REFERENCE YEAR A 1)	1973	1971	1979	1981	1980	1975	1975	1976	1980	1975	1980	1980	1980	1975	1976	1978	1980	1980	1980
SOCIO-ECONOMIC INDICATORS																			
1. GDP YEAR A IN US$ 1980 2)	15432	120469	966	4007	28077	5121	2083	25080	1601	5901	57450	192960	3559	7380	136500	1076100	158131	2688470	120083
2. URBAN POPULATION IN MILLIONS	6.1	109	1.05	3.2	24.5	1.6	3) 0.42	3) 6.0	0.6	2.7	21.7	81.9	0.9	2.35	15.8	152.3	10.7	167.8	7.0
3. HOUSEHOLD SIZE	5.9	5.6	5.5	NA	'81 6.7	4.32	5.0	5.4	6.1	5.5	4.4	4.1	4.4	3.3	3) 4.8	3.1	NA	NA	2.3
4. PERCENTAGE URBAN	8.2	19.9	25.9	21.5	28.1	12.0	8.0	'75 14.0	35.6	48.0	56.9	67.2	49.3	83.0	47.0	75.0	76.0	73.7	84.2
5. GDP/CAP YEAR A IN US$ 1980	208	220	236	267	322	382	393	583	1001	1054	1508	1590	1955	2608	4050	9365	11215	11807	14449
HOUSING INDICATORS																			
6. RESIDENT. GFCF in % of GDP	NA	2.2	NA	3.3	1.7	3.6	NA	2.3	NA	4.1	3.4	NA	2.62	8.98	7.44	7.3	5.9	4.5	4.6
7. AVER. NR. OF ROOMS/HOUSE	1.9	2.0	NA	2.6	2.2	2.1	NA	2.1	4.0	2.2	4.4	NA	'81 2.8	3.4	2.6	4.1	NA	NA	4.1
8. % HOUSES WITH 1 ROOM	54.9	50.1	NA	30.8	42.6	44.0	NA	32.6	2.6	33.6	3.5	NA	'81 24.2	9.5	28.5	6.3	NA	NA	5.2
9. % HOUSES WITH 2 ROOMS	22.8	26.9	NA	29.2	31.6	25.0	NA	37.8	NA	30.9	17.9	NA	'81 21.8	18.8	29.8	15.6	NA	NA	9.2
10. % HOUSES > 2 ROOMS	22.3	23	NA	30.0	25.8	31.0	NA	29.6	NA	35.5	78.6	NA	'81 54.0	71.7	41.7	78.1	NA	NA	85.6
11. AVERAGE NO PERSONS/ROOM	3.1	2.8	NA	2.3	3.2	2.5	NA	NA	1.7	2.6	NA	NA	1.6	2.1	1.8	0.8	NA	NA	0.6
12. % HOUSES >2 PERSONS/ROOM	61.8	NA	NA	NA	61.9	NA	NA	NA	NA	46.8	NA	NA	21.3	40.3	31.4	0.4	NA	NA	0.2
		all 1973:				NA	NA												
13. % HOUSES WITH PIPED WATER	'70 41.0	67.0	11.0	50.2	58.3	NA	NA	79.4	30.5	54.7	83.1	75.8	95.6	87.8	83.9	95.0	99.5	99.9	NA
14. % WITH PIPED WATER INSIDE	'70 16.0	NA	NA	24.4	38.3	NA	NA	70.2	NA	NA	NA	NA	70.6	74.5	79.1	NA	99.5	99.9	NA
15. % HOUSES WITH TOILET	NA	66.7	39.2	83.6	72.9	NA	NA	95.4	86.2	79.7	98.0	92.8	97.6	95.7	NA	99.7	99.5	NA	99.3
16. % HOUSES W. FLUSH TOILET	NA	20.0	NA	15.6	25.1	NA	NA	3.4	2.8	NA	37.0	NA	70.5	69.3	NA	NA	99.5	NA	98.7
17. % HOUSES WITH ELECTRICITY	NA	53.5	22.5	45.9	71.0	NA	NA	92.2	NA	68.2	NA	88.5	NA	89.4	90.2	NA	99.5	NA	NA

1) All the indicators are from this year
2) GDP year A expressed in values of 1980 and than expressed in millions of US$ 1980
3) calculated from other data in table
NA: no data available

Sources:
CBS,(Netherlands) 1980, 1982, 1983, 1987, 1990;
Centrale Directie, 1975, 1977; IMF, 1983; NCIV, 1980;
O.E.C.D., 1984, 1987a,b, 1988; UNCHS, 1986c;
United Nations 1973b, 1974, 1976, 1979a,b, 1980a-d, 1981, 1982a-c, 1983a,b, 1985, 1986, 1987b; World Bank, 1973, 1978, 1979, 1980, 1982, 1983a,b, 1985

This is analogous to what Bertholet [1983, pp. 14,15] did when predicting the income distribution, and is justified if the projections are not too far ahead of us in time.

The following paragraphs first review the indicators expressing the level of development (in casu socio-economic indicators) and housing indicators, which can be considered as a result of effective demand for housing. Then we will indicate the existence of a relation between the various indicators when they are synchronic. The overall, urban and rural housing situations will then be distinguished in a number of countries. Now we will be in the position to see how well or how badly Kenya 'fits in' and what can be expected for the future in terms of its qualitative housing situation.

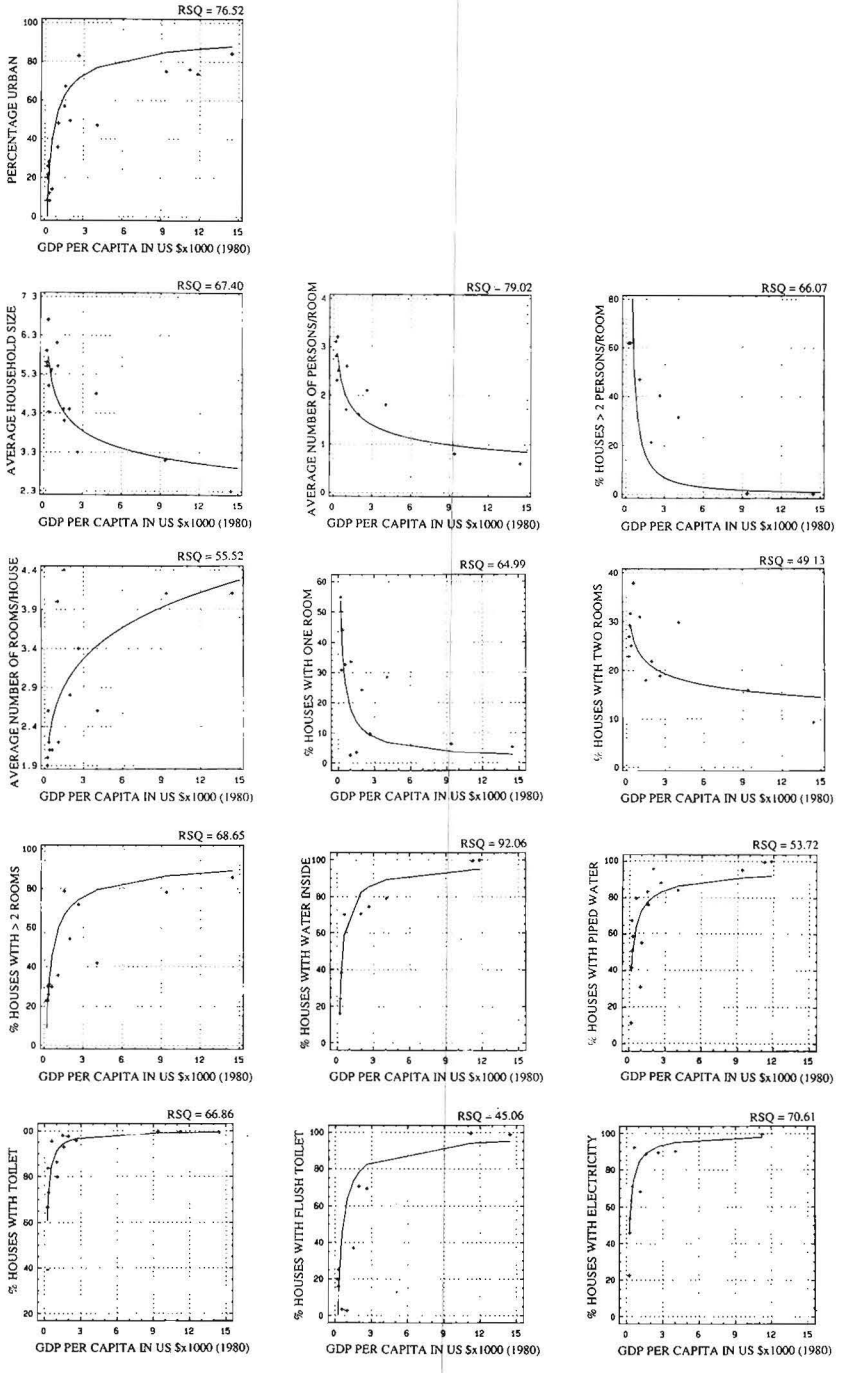
2.2 Socio-economic and housing indicators

Socio-economic indicators
Although more factors can be compared, such as health data etc., we shall restrict ourselves to some of the socio-economic data of a number of countries. For a comparison between the various countries, many socio-economic data can be of interest as indicators. However, we are under constraint because of the limited availability of data for a number of countries we wanted to include. Therefore we had to take Gross Domestic Product (GDP) as an indicator instead of Gross National Product (GNP). Other indicators of interest are the total population, the GDP/capita and the average household size. Most of these data are from World Development Reports [World Bank, 1978-1985 and OECD reports 1984-1988]. See Fig. 2.1 and Appendices 2.A & 2.B for the collected data.

Housing indicators
Selection of the housing indicators is based on the availability of housing data. The indicators stem from the UN statistical year books on housing [United Nations, 1973-1986] and give overall urban and rural data for many countries. The most recent publication covers the data up to 1981 [UNCHS, 1986c]. Although these statistics are not absolutely reliable, they are the 'best worst' available and the following housing indicators have been selected on the basis of the availability of data of a number of countries.
investment in housing
- residential gross fixed capital formation (RGFCF).

occupancy
- average number of persons per room,
- percentage of houses with more than two persons per room.

Fig.2.2 Socio-economic and housing indicators versus GDP/capita, urban situation



size of houses
- average number of rooms per house,
- percentage of houses with one room,
- percentage of houses with two rooms,
- percentage of houses with more than two rooms.

infrastructure
- percentage of houses with piped water,
- percentage of houses with piped water inside,
- percentage of houses with toilet,
- percentage of houses with flush toilet,
- percentage of houses with electricity.

At this point a warning is required. The collected data give a quantitative impression. Qualitative interpretation demands very great care. For example, on average the number of persons per room may be correct but the acceptability is dependent on the circumstances. For a household of say 6 persons it may be acceptable, but when it involves 4 members of different tribes it may be quite unacceptable.

2.3 Selection of countries

The first selection of countries is based on the availability of data on housing indicators at 'one point in time'. This is a problem, as most of these data stem from censi held in different years. Another point is that the data from more developed countries are in general more complete than those from the developing countries. Information from the urban areas is more readily available than from rural areas and from the country as a whole. As there are not enough data on different countries, this one point in time had to be stretched to cover several years. For this purpose we selected the period from 1971-1981. The time factor is not constant but it is assumed that this not-too-long period is more or less synchronic. The assumption is made that habits, attitude of people, etc., haven't changed dramatically and that therefore this period can be considered as synchronic. Kenya is included with data from the year 1975 (because of the availability of a number of housing indicators in that year).

The second selection was based on a dispersion in GDP/capita from poor to rich. This selection resulted in the following 19 countries: Arab Yemen, Bangladesh, Brazil, Burundi, Congo, India, Iran, Japan, Kenya, The Netherlands, Pakistan, Panama, South Korea, Sri Lanka, Sweden, Thailand, Tunisia, U.S.A. and Uruguay.

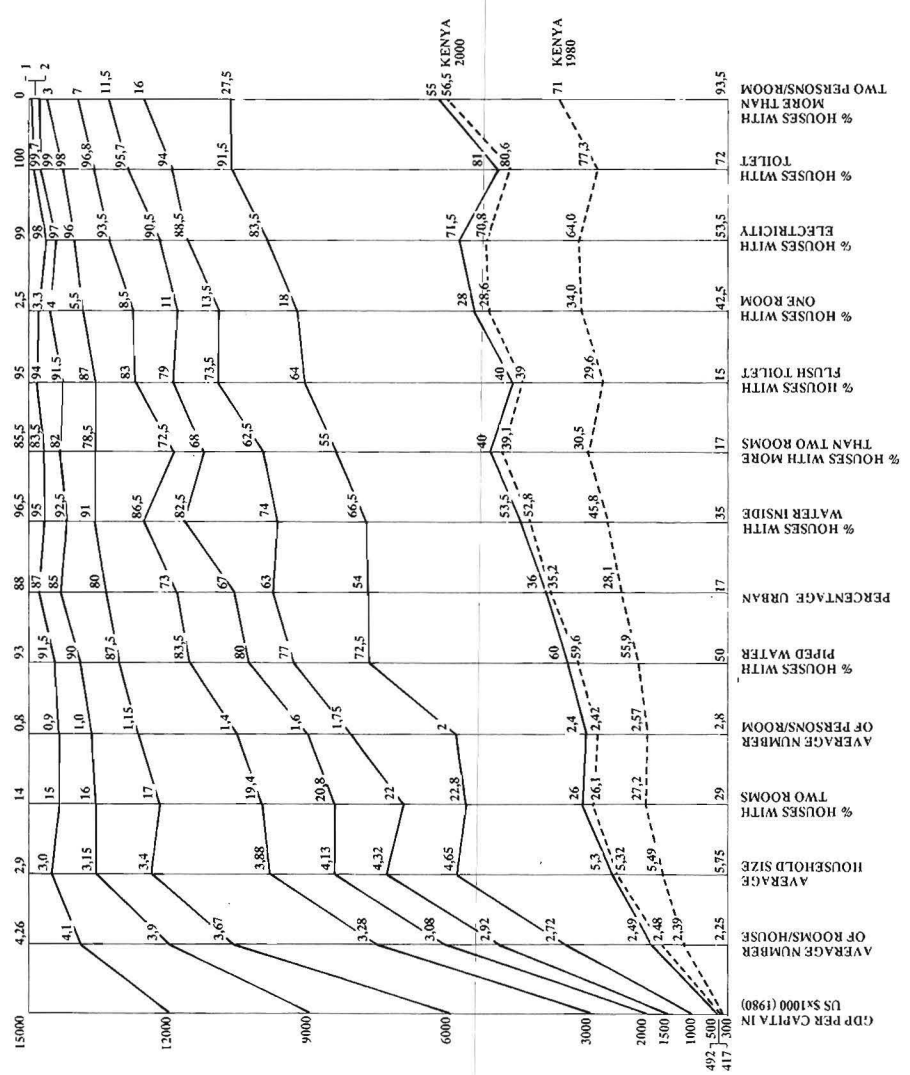


Fig.2.3 Compiled housing and socio-economic indicators versus GDP/capita, urban situation and Kenya 1980, 2000

2.4 Comparison of countries

The majority of the countries considered have data from the year 1980. However, there are also countries with data from earlier years. The year 1980 is selected as the basic year. For comparison with other countries the economic data GDP and GDP/cap were first expressed in the national currency values of 1980 and then converted into US$ 1980. For this conversion we took the official exchange rate based on IMF statistics [IMF, 1983]. The problem remains that the official exchange rate can be overvalued and may not reflect the local purchasing power. We have not tackled this problem as it lies beyond the scope of this exercise. After this operation the countries could be ordered in terms of increasing GDP/cap (US$ value 1980). See Figure 2.1 and Appendices 2.A & 2.B.

2.5 Correlation of socio-economic and housing indicators

The necessary calculations were carried out to establish the correlations between the socio-economic indicators and the housing indicators on the basis of the character of the data. The product-moment correlation coefficients were calculated as a measure of correlation since the data are of the interval type. Appendix 2.C shows the intercorrelations for overall, urban and rural circumstances respectively. From the intercorrelation tables we can conclude that GDP/cap can, at best, be used as the main basic variable (the correlation values are the highest). When taking the correlation criterion as 0.7 or above, the following picture arises
-*Overall situation*, 12 indicators out of 14 satisfy the criterion,
-*Urban situation*, 10 out of 14 satisfy the criterion, but for
-*Rural situation*, just 4 out of 10 satisfy the criterion.

From the above it can be concluded that, for the overall and urban situation, the basic assumption is justified that the housing indicators are highly correlated with the level of general development expressed in GDP/cap. This is to a lesser extent the case in the rural situation, as the rural data are not abundantly available for the countries considered and, if available, they may be less correct (because it is more difficult to collect detailed data from rural areas). Fig. 2.2 depicts the said housing indicators in graphs in relation to GDP/cap for the urban situation and in Appendix 2.D for the overall situation. On the horizontal axis GDP/capita is indicated from US$ 0 - 15000 (US$ for year 1980). The other indicators are placed alongside the vertical axis.

2.6 Kenya, housing indicators 1980-2000, conclusions

We will now apply the findings to the housing situation in Kenya. For ease of reference, the data in the graphs are aggregated into one figure for urban (Fig. 2.3), and for overall in Appendix 2.E. The schemes should be read as follows: at the extreme left-hand side if the GDP/cap changes, then at low level there is a slow change in size of the housing indicators. At the extreme right-hand side if the GDP/cap changes, then at low level there is a fast change in size of the housing indicators. For the year 2000 the expected GDP/cap is US$ 492 (value 1980, or US$ 424 value 1988, see Chapter 4). The housing indicators for Kenya for the years 1980 and 2000 are indicated with dotted lines in Fig. 2.3. This is summarized in Figure 2.4 and, if available, known data on Kenya have been added.

Fig. 2.4 Summary of housing indicators for Kenya various years

year	1980[1]		1975[2]	1983[2]	2000[1]	
GDP/cap in US$ 1980	417		382	395	492	
Kenya housing indicators	total	urban	urban	urban	total	urban
average number of persons per room	2.68	2.57	2.5	1.8	2.56	2.42
% of houses > 2 persons per room	75.4	71.0			64.5	56.5
average number of rooms per house	2.13	2.39	2.1	1.9	2.21	2.48
% houses with 1 room	42.6	34.0	44.0		36.6	28.6
% houses with 2 rooms	33.3	27.2	25.0		30.3	26.1
% houses with > 2 rooms	25.4	30.5	31.0		27.3	39.1
% houses with piped water	17.8	55.9		80.0[3]	25.9	59.6
% houses with piped water inside	12.95	45.8		27.5	19.32	52.8
% houses with toilet	58.6	77.3		64.0	62.9	80.6
% houses with flush toilet	7.6	29.6		21.8	12.48	39.0
% houses with electricity	27.3	64.0		44.0	35.2	70.8

1) From Fig. 2.3
2) Sources: Ministry of Housing 1977
: Ministry of Works 1986b
3) Within 100 m.

If we now compare the abstracted data for Kenya for the years 1980 and 2000 (as shown in Fig. 2.4) with the available data from 1975 and 1983, it fits the 'world situation' within certain margins. These data can only be used for abstracting a general tendency. What we do see is that if GDP/cap remains stable or increases over 20 years (1980-2000) to KShs. 492/- the estimated housing indicators don't change dramatically. The same applies therefore to the overall qualitative situation of housing.

3 THE 1988 HOUSING SITUATION IN KENYA

3.0 Introduction

This chapter describes the current housing situation in Kenya. The main types of (low-cost) housing are shown, followed by the description of the formal and informal building processes. Quantitative housing data are given, including a review of the deficit at the end of 1988.

3.1 Housing types (constructional and services standards)

In general the housing takes the form of high-rise buildings (walk up to 4 storeys sometimes higher buildings have an elevator); maisonettes (storey & terraced) and houses (single-storey terraced, grouped, semidetached or detached) [see Ast, 1979, p. 9]. In order to give a general impression of housing development, both urban and rural housing will be reviewed below, and will touch on aspects of construction, occupation, ownership, etc. A number of categorizations are possible, but for our purpose we use the physical development: one from housing made of less durable to that made of more durable materials and from a very low standard to a high-standard, self-contained house.

Squatter units and slums
'Squatter units' occur along the outskirts of the towns and are mainly illegal. The 'structures' are mostly of nondurable materials, such as cardboard, timber off-cuts, etc. They often comprise a single room subdivided by a curtain. Infrastructure, such as water and toilets, is either lacking or of very low standard. The squatter unit can be owner-occupied or sublet. In this case the landlord can live in a nearby unit. He or she may have moved out of the first squatter unit and constructed another one, or he may have bought one. The landlord can also live outside the area (absentee landlord). The squatter unit can also be owned by a 'company' run by its owner members. [Chana, 1973, p. 222]. The same types of occupancy as for squatter units apply to the 'slums', that is owner-occupant or (sub)tenant. In general the quality of slums is not different from that of squatter units, except that they are located on legal land (Fig. 3.1). Slums can also originally have been built of durable materials and provided with a good infrastructure, but are now becoming

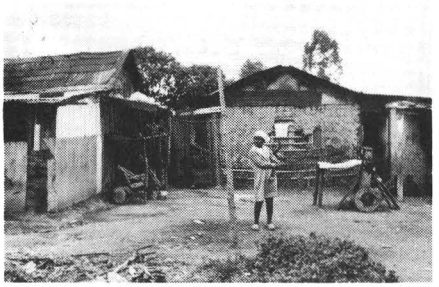


fig. 3.1 Slum in Kariobangi, Nairobi

fig. 3.2 Squatter-unit upgrading project, Kynyago village, Nairobi

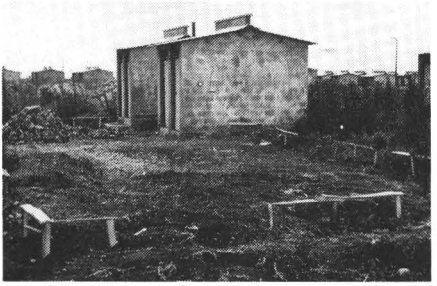


fig. 3.3 Dandora II Sites and services project, Nairobi

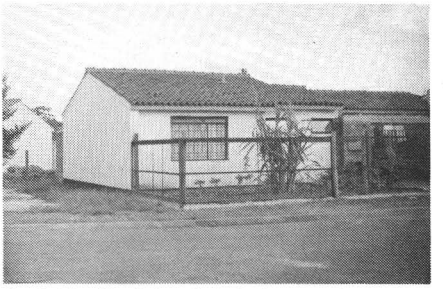


fig. 3.4 Semi-detached single-storey house (maisonette)

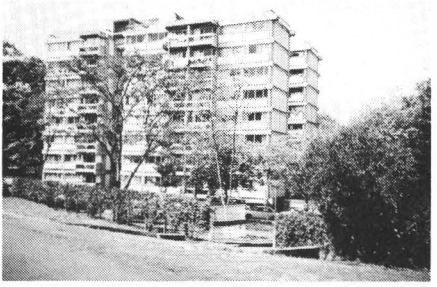


fig. 3.5 High rise flat, Nairobi

fig. 3.6 Traditional Luo house

fig. 3.7 Detached single-story house rural area

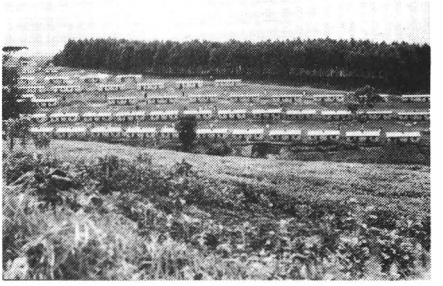


fig. 3.8 Company estate housing

gradually inadequate owing to overcrowding and lack of maintenance. Ownership can be private or be vested in a 'company' owned by its members [idem, p. 222]. Slums and squatter units are often improved.

Upgraded squatter units and improved slums
Some activities of the World Bank in the main towns of Kenya concern slum improvement and squatter unit upgrading. The first problem to be resolved in upgrading is legalization of the land. The next stage (slum and squatter units) mainly comprises providing or upgrading infrastructure, such as secondary and tertiary roads, (piped) water, sewerage, security lighting and refuse collection. Project assistance can be given in upgrading houses built of more durable materials. Often a number of squatter units have to be removed to allow a reduction in housing densities, see also Waweru [1977, p. 4]. Local organizations, such as the Undugu Society of Kenya (USK) are active in this field, see Fig. 3.2 [Undugu, 1986, p. 2].

Sites and services units
Sites and services is a form of housing in which the site and the services (water,sewerage, roads, drainage and eventually power) are available to the allottee at the plot boundary. The house is then constructed within a limited time (possibly 2 years for the construction of 2 rooms). Sometimes a core unit is provided by the contractor. This unit can be the toilet only, but may also include a shower unit and even a kitchen (see Fig. 3.3). The allottee may build a temporary room on the plot prior to actual construction. Formally, this temporary structure has to be demolished after completion of the first room. The basic idea is to construct the house on a self-help basis, eventually assisted by family and/or a building group. But usually an artisan (Kishwahili: fundi) is employed for most of the construction work (e.g. because of the self-help builder's paid job, may in fact 'prevent' him doing the building himself). Loans are provided on a tenant-purchase basis, the materials loan being paid to the allottee with vouchers giving entitlement to an amount of building materials. Additional rooms may be sublet to cover the expenses for loan repayment. A variant type of ownership is the so-called condominium in this type of housing, in which the allottees share ownership of the toilet facilities.

Complete self-contained houses
A completely developed house can be based on several standards, built from traditional materials or more durable materials. The higher-standard houses are mainly built by a small contractor but initiated by the owner, private developer, government or other institutions. These houses can be either single-storey (semi) detached (Fig. 3.4), grouped, terraced or multistorey (Fig. 3.5).

Traditional housing is still the norm in rural areas, although modern conventional units in considerable numbers are being developed in some areas [Ministry of Works, 1987, p. 5]. The traditional houses are built of locally available materials: mud, wattle, cow dung, loam, thatch and sometimes quarry stones and (imported) corrugated galvanized iron (cgi) roofing sheets. Variations in layout and materials are mainly due to the lack or (un)availability of building materials, the climate and tribal traditions. For example, the Akamba tribe build their huts with walls of cedar poles and thatched roofing, while the Luos use loam, wattle and cow dung (Fig. 3.6). The thatch used for roofing grows on marginal land or is cultivated on special plots. Roofs may last around 10 years. Special timber can also be grown for the purpose [Majoor, 1980, p. 7]. External influences have changed housing. We see more 'huts' constructed of durable materials on a square floor plan, so that rectangular corrugated iron roofing sheets can be applied, not to mention quarry-stone or concrete block walls (see Fig. 3.7). Fig. 3.9 summarizes the main aspects discussed under 1 up to 4.

***Fig. 3.9** Housing types, legal situation of plot and housing unit, builders*

no.	housing type	plot	structure	built by	reference
1	- squatter unit	illegal	illegal	owner, fundi	
	- slum	legal	illegal	owner, fundi	Fig. 3.1
		legal	legal	owner, fundi	
2	- upgraded squatter unit	legal(ized)	legal	owner, fundi building group	
		semi -legal [1]	semi -legal [1]	owner, fundi building group	Fig. 3.2
	- improved slum	legal	legal	owner, fundi building group	
3	- surveyed plot	legal	n.a. [2]	n.a. [2]	
	- plot with temporary structure	legal	legal	owner, fundi building group	
	- plot with developing permanent structure	legal	legal	owner, fundi building group contractor	Fig. 3.3
4	- fully developed housing	legal	legal	owner, fundi building group contractor	Fig. 3.4, 3.5, 3.8
	- traditional housing	legal	legal	owner, fundi building group	Fig. 3.6 Fig. 3.7

1) allowed under temporary occupation license
2) n.a.: not applicable

3.2 Building process and actors

In general, the building process can be defined as all the activities involved in the realization of constructions which are manageable and controllable in terms of time, cost and quality. This process can be split up into the following process phases: initiative, financing, programming, design, preparation of specifications and contract documents, tendering, execution and delivery. Sometimes maintenance and demolition are also included [see Stichting Bouwresearch, 1977, p. 13]. Formal and informal housing provision will be reviewed.

3.2.1 Formal versus informal

The informal sector is very important in developing countries, in particularly for the provision of housing. The UNIDO reports that, in Egypt this sector provided 50% of all housing and in Honduras even 90%. [UNIDO 1985, p. 117]. In Kenya the 'informal' sources accounted for between 60 and 80 percent of all housing of any standard whatsoever in the urban areas [Ministry of Works, 1987, p. 2]. For Kenya the size of the informal building and construction sector (residential, non-residential, maintenance, etc.) is estimated as in the order of 30% of the total contribution of building and construction to its GDP [Central Bureau of Statistics, Statistical Abstracts 1950-1988, table: GDP of construction, monetary and non-monetary contributions].

There is no hard distinction as to where formal ends and informal begins. Although much has been written about the informal sector, a simple definition cannot be given. As it is not our intention to formulate one, we will refer to some descriptions only to give some idea of what is meant by informal as far as housing construction is concerned. The ILO [1973, p. 6] gives the following general characteristics of the informal sector;

- its activities are mostly not registered,
- it is labour-intensive,
- usually small-scale production,
- no statistics of input and output are kept,
- there is a low number of employees,
- low capital investment,
- it uses local resources and markets,
- financing comes from families,
- home crafts,
- training on the job,
- simple tools and machines.

Sethuraman [1985, p. 303] defines the informal construction sector as "unnumerated construction activity, it includes construction in rural and urban areas involving self-help or paid labour, whether recognized as legal or not, and involving a wide variety of techniques: traditional, adapted traditional or simple modern methods". According to Habitat [UNCHS, 1987b, p.19], informal housing development is defined as unapproved building or a group of buildings developed on land not intended for the purpose. Informal housing usually lacks basic services and is most often built with temporary materials.

The process of providing housing can take place solely in the formal or informal sphere but one or more of the building-process phases can also occur 'in the other sphere'. For example, an officially registered contractor may subcontract the 'informally operating' artisan for small jobs (such as repair work) even in large projects. In any case the process phases are always gone through. The following paragraphs review these phases in detail.

3.2.2 Initiative phase

The initiative for the creation of (low and middle-cost) housing units can be taken by both public and private sectors. The latter also provides for high-income housing.

In *the public sector*, the Ministry of Lands and Housing (MOLH) is responsible for giving overall guidance. It formulates the overall national housing policies as laid down in the National Development Plans and in policy papers. This ministry is also responsible for the provision of land through the Commissioner of Lands. Other ministries provide electricity (Ministry of Energy, MOE), water and sewerage (Ministry of Water Development: MOWD & Ministry of Public Works: MOPW) and roads (MOPW). The MOPW also develops housing for its own staff and government institutes: so-called staff and pool for rent or owner occupation. The larger municipal councils (under the responsibility of the Ministry of Local Government and Physical Planning (MOLG) like Nairobi, Kisumu and Mombasa have their own housing planning departments (HPDs).

Private developments can originate with a professional private developer of a housing-finance institution, a building society, a private company estate developer, an individual private developer or an individual self-help builder, but Non-Governmental Organizations (NGOs) can also be involved. The private individuals may develop a house for ownership and for sale/rent. Private organizations do the same, but on a larger scale, e.g. the Loresho estate in Nairobi. This development can also be carried out by big industries,

such as the Kenya Pipeline Company and Delmonte for renting by their employees (Fig. 3.8) and, in the past, the East African Railways. We also see that individuals organize themselves in a cooperative in order to develop housing. Such cooperatives can be supported by the state-organized National Cooperative Housing Union (NACHU). These developments are all in the formal sphere, officially registered and well known [Kiamba, 1987, p. 1,2].

The private sector is involved in the provision of low-cost housing which is generally not fully legalized

- It puts up substandard, unapproved structures based on unapproved subdivision plans, but on land legally owned by cooperative societies (Kariobangi Housing), family holdings or land-buying companies. Mathare Valley, for example contains a number of company housing units. Some companies erected houses strictly for their own members, others as rented accommodation. Most housing blocks used to have 4 to 8 rooms back to back (see also Amis, 1982, p. 9]. Nowadays up to four-storey flats are built.
- Structures put up on either private or public land to which the occupiers/ owners of the structures have no legal rights, but have sometimes obtained temporary occupancy licenses. These are squatter housing units and (NGO-assisted) resettlement programmes [see also Yahya, 1982, pp. 45, etc.].

Non-governmental organizations (NGOs): the very poor people are often left to their own devices, but are sometimes supported by these NGOs in the provision of housing [Smith and Lambda, 1987, p. 214]. Approximately 40 NGOs are directly or indirectly involved in improving housing circumstances. They develop income-generating activities or are directly involved in low-cost housing provision. The activities of the Undugu Society and the National Christian Council of Kenya are well known [Agevi, 1987, p. 11] see also Appendix 10.F.

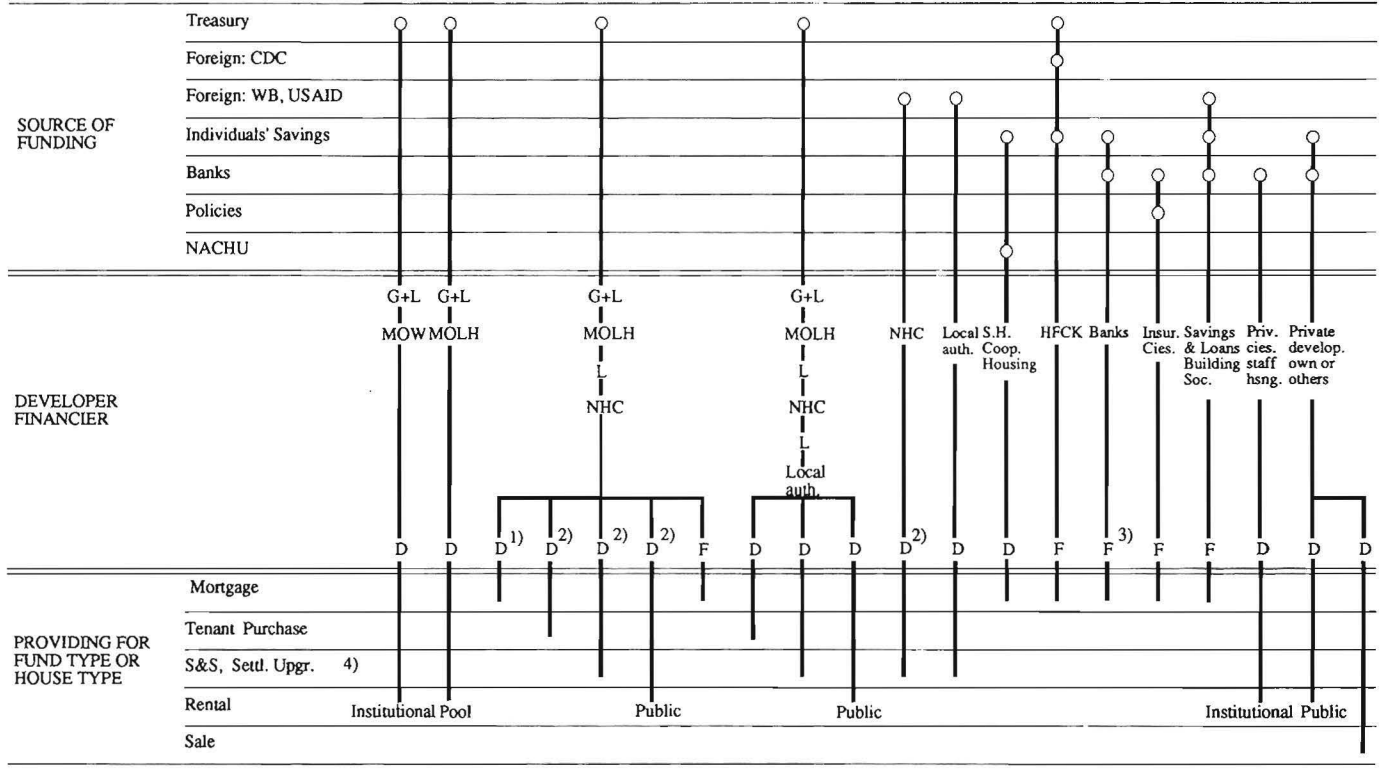
3.2.3 Financing of housing

There are roughly three methods for financing housing in the public and private sectors and sometimes a mixture is applied. We can distinguish formal, quasi-formal and informal financing [see Mazingira, 1983, p. 10]

formal

- The financing of housing (projects) in the public sector comes from the Ministry of Planning and National Development. The Treasury channels

Fig.3.10 Framework of financial institutions and housing developments



Notes:

D = developers
F = financiers
G = grant
L = loan

1) Acts as project developer
2) Can also act on behalf of small local authorities
3) Long term loans to own employees for mortgages for customers: bridging finance for construction to be repaid within 3 years
4) Services brought in in existing area using same funds as for S&S

Sources: Hagger, 1978, p. 5
Interviews 1988

funds through various ministries which pass them on to various institutions, such as the NHC, local authorities, financial institutions (e.g. HFCK).

- The private sector financing of housing (projects) comes from banks, financial institutions, financial institutions for housing (Home savings & Mortgages Ltd), building societies, life insurance companies, savings & credit cooperative societies and individuals. Sometimes companies provide loans to their employees, or have started an 'Employee Based Cooperative for Credits and Savings' [1982, Yahya, pp. 85,86].

- Apart from local resources, international agencies provide loans to Kenya for financing of housing settlements
  -The World Bank Group: IBRD and IDA.
  -USAID: United States Agency for International Development
  -CDC: Commonwealth Development Corporation providing mortgage finance for housing lower-middle income groups in Nairobi and supporting the HFCK and other Kenyan bodies [Government of Kenya, 1978, p. 9].

Figure 3.10 shows a comprehensive picture of formal housing financing with loans and mortgages. The scheme is built up of three levels
level one: indicates the source of funding,
level two: gives the developer or the financier,
level three: shows the type of finance and housing developed.
For example, the World Bank provides the National Housing Corporation (NHC) with funds for developing Sites and Services projects and for settlement upgrading. The NHC, at the request of local authorities, does the further development.

Other financing methods, not indicated in the figure, are
quasi-formal
The provision of money by a legally constituted body which does not have the characteristics of a formal loan, such as employment-related cooperatives, welfare revolving fund and building groups. (Housing cooperative societies which mobilize individuals' finances and labour on a community basis also operate in this sector. They do not function very successfully).

informal
Finance with no legal basis or even written agreements are the flows of funds within family, friendship or employment networks of the individual and own resources. In the low-income groups this form of financing often occurs. Research in the Dandora sites and services project has revealed that informal financing accounted for 72%, quasi-formal for 10 % and formal financing for 18 % [Mazingira, 1983, pp. 10,29].

3.2.4 Programming/planning phase

The programming for the *public housing sector* is done mainly by the Ministry of Lands and Housing. The design work comes under the supervision of the National Housing Corporation (NHC) and in the main towns under the Housing Planning Departments (HPDs). For institutional and staff housing, the Ministry of Public Works is involved in programming.

In *the private sector*, programming and design is undertaken by local and foreign firms of consultants. Consultants are not involved in very-low-cost housing. When people want to build in such a case they rely on a fundi or contractor, who doesn't need a proper drawing, or uses an old one. As off-plot infrastructure cannot be planned by individuals, they are generally dependent on whatever is provided by the public authorities.

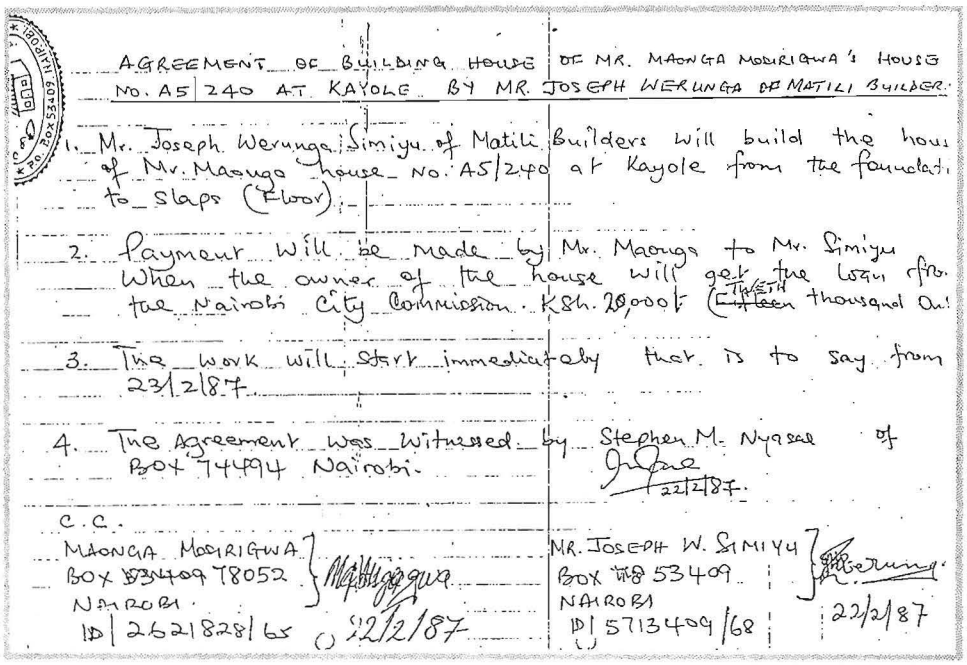
3.2.5 Tendering/contract phase

The building industry in Kenya works with the U.K. system of quantity surveyors (QS). A schedule of rates for materials, with specifications and drawings is adequate for smaller projects. *Competitive tendering* is the most common method, particularly in the public sector. *Negotiated tendering* is another method, commonly used in the private sector and to a slight extent in the public sector. Combinations are also found when a contractor is initially chosen on a competitive basis, after which other obligations and offers are established by negotiation [Mbaya, 1981, p. 24].

The most common types of building contracts are
fixed price/lump sum: this type of contract works well for small developments but requires everything to be preplanned,
fixed price Schedule of Rates or Bills of Quantity: most of the contracts in Kenya are of this type [see also Yahya, 1982, p. 60].

Contracts can also be awarded without tendering, etc. Sometimes a simple contract is drawn up in writing (see Fig. 3.11) or there may even not be an official contract but only a mutual agreement, e.g. that a fundi does the job in a number of days at a fixed daily rate.

Fig. 3.11 Example of a simple building contract



AGREEMENT OF BUILDING HOUSE OF MR. MAONGA MOIRIGWA'S HOUSE NO. A5 240 AT KAYOLE BY MR. JOSEPH WERUNGA OF MATILI BUILDER.

1. Mr. Joseph Werunga Simiyu of Matili Builders will build the house of Mr. Maonga house No. A5/240 at Kayole from the foundation to slaps (floor).

2. Payment will be made by Mr. Maonga to Mr. Simiyu when the owner of the house will get the loan from the Nairobi City Commission. Ksh. 20,000/= (~~Twenty~~ Fifteen thousand Only)

3. The work will start immediately that is to say from 23/2/87.

4. The Agreement was witnessed by Stephen M. Nyasa of Box 74494 Nairobi. 22/2/87.

C.C.

MAONGA MOIRIGWA
BOX 53409 78052
NAIROBI
ID 2621828/65 22/2/87

MR. JOSEPH W. SIMIYU
BOX 48 53409
NAIROBI
ID 5713409/68
22/2/87

3.2.6 Building costs

Building costs index

For pricing and contracting it is important to have an overall idea of the building costs. The Kenya Central Bureau of Statistics publishes the residential building cost index for middle and high-cost housing at regular intervals. There is an index for materials costs, labour costs and total costs. The index doesn't meet the requirements for houses made from 'nonpermanent' building materials. Therefore it was advised [see Erkelens, 1980e, p. 200] to publish the indices for this type of housing as well. So far this hasn't materialized.

Materials prices
The prices of a number of essential materials are regulated by the government by gazetting maximum prices as applicable for a period of more than one year. At the beginning of such a period the prices are too high, while towards the end prices are on average 'correct' [Interview with Timsales, Nairobi, 1980]. For that reason the prices are rectified at the beginning by a discount from the supplier. The prices for building materials differ from one area to the other and mostly depend on the transport distance, resulting sometimes in costs double the at-factory price. An exception is the cement price, which depends on the distance to the nearest railway station only, as cement transported by rail used to be almost uniform in price throughout the country.

3.2.7 Construction phase

Constructors' organizations
There is a great shortage of qualified Kenyan construction firms and skilled craftsmen, for which reason the government established in 1967 the now defunct National Construction Corporation (NCC). This organization was created for financial and technical support of small contractors who could become registered members of the NCC. In 1988 another organization was set up, the Kenya Association of African Contractors with a membership of 4000 [1988, interview chairman]. This organization hasn't yet developed clear initiatives for the support of contractors [Ministry of Works, 1987, p. 4]. Big building projects are mainly dealt with by foreign companies owned by Asians, Israelis and Europeans. The smaller projects are in the hands of the Kenyans. The big contractor, the medium-size contractor, the small contractor, the artisan, the unskilled labourer and the self-help builder will be discussed below. The letters (A-H) refer to a grading system of the Ministry of Public Works indicating the qualification for certain sizes of contract.

Big contractors (grades A,B)
The big construction companies are financially and technically well equipped and to a great extent comparable with European firms. Some of them are subsidiaries of foreign firms. There are in all about 15 of them, like Zakem (Arabic), Mowlem (U.K.), Sterling Astaldi (Italian) [Agevi, 1987, p. 30].

Medium-size contractors (grades C,D,E)
These contractors are organized to the extent that they have a workshop, some staff and equipment and are able to put up one or more houses, schools, etc. They are in many cases owned by Kenyans of Asian origin, who are also active in trade, business and manufacturing. There is an estimated total of 75 of them [Yahya, 1982, p. 146].

Small contractors (grades F,G,H)
The small contractor is registered as a contractor, usually in the lowest categories F,G,H. These people (mainly Africans) are basically individuals who may organize their own teams. In many cases they are retired artisans (Africans) (masons, carpenters) or come from other callings. They often have a core unit of workers but no permanent staff. Their estimated number is 1400 as registered by MOPW.

Artisans
The artisan (or fundi) works either on a specific job (e.g. masonry or carpentry) in the self-help sector or he may even construct a complete housing unit. He can be employed on a business contract and is not necessarily registered. There are thousands of them. His skills are often acquired 'on the job' but there is also a limited number of schooling facilities available. The so-called 'Village Polytechnics' provide training in carpentry, masonry, etc; the Industrial Vocational Training Centres which train for apprenticeships and the 'informal schools' like the Undugu village polytechnic in Nairobi turn out well-trained craftsmen. Advanced courses in civil contracting is given by the Kiambu Institute for Science and Technology.

Unskilled labourers
The unskilled workers constitute the majority of the labour force in the construction industry. In general, the younger ones have some primary education but not in a certain trade. Usually they assist different craftsmen on any job which doesn't require skills (e.g. earthwork). Often they are employed and paid per day as casual labourers ('Kibarua'). In that case the official wage and other regulations do not apply to this category. They line up every day near a building site and are selected by the foreman. As there is no continuous attendance, transfer of knowledge and some form of regular training are difficult to acquire.

Self-help builders
They also contribute to construction. Self-help building is in general the cheapest method for the owner, as he may use his own labour force and his own time. He needs some basic knowledge of organizing the process of construction. He may also call in a craftsman for certain jobs, for example a carpenter for the roofing work. The self-help builders sometimes form a building group to assist each other during the process of organization and construction (see further Chapter 6).

3.2.8 Trade Unions

The system of trade unions has been inherited from the former colonial power. A considerable number of the labourers in the formal sector are organized [Bigsten, 1984, p. 9]. Wages are settled through collective bargaining. Their power is limited as the trade unions are financially weak and cannot afford strike pay. In 1976 overall union membership was 415,000. The main body is the Central Organization of Trade Unions (COTU) with 257,000 members. Outside the COTU there is also the Kenya National Union of Teachers with 80,000 members (figures 1976). These figures compared with the officially registered employees represented half the total work force of 857,000 people in wage employment [Central Bureau of Statistics, 1980, p. 235, table 237].

3.2.9 Building materials industry

Expenditure on building materials represents 3 to 5 percent % of the GDP in developing countries, inclusive of Kenya. This means that, compared with other branches, the building-materials industry is an important component of the economy [Unido, 1985, p. 16]. Appendix 3.A gives a brief review of building materials used in low-cost housing [see also Erkelens, 1981, pp. 13,15]

Locally manufactured building materials
Most of the building materials and components are manufactured locally either by the formal or the informal sector. In 1978 the HRDU carried out a survey on building materials produced in the Nairobi area by officially registered companies [Eygelaar, 1978]. This survey gives an in-depth view of the various materials produced. Also small and unregistered companies produce building materials: stone from quarries, roofing thatch, sisal cement roofing sheets, etc.

Imported building materials
Studies have shown that as much as 60% of the materials for all kinds of building and construction work were imported [UNCHS, 1984b, p. 93]. This high percentage refers to all the developing countries together. Some of the causes for this are the problems facing the local building market (e.g. demand) and/or the poor quality of the locally produced materials, which do not always meet requirements. Examples for Kenya are steel in profiles, PVC as a raw material, sanitary fixtures and fittings, rivets & screws [Erkelens, 1978, p. 4]. Even for specially designed low-income housing such as Umoja II, Agevi [1988, p. 28] found that the amount of building materials imported used in construction still accounted for 36% of the total materials costs.

3.2.10 Building research

The costs of some imported building materials are high, due to the high cost of overseas transport, etc. This is a heavy burden because of the increasing shortage of foreign currency. The government promotes the development of viable local building materials & industries (see various Development Plans). Research on (local) building materials and structures is done by manufacturers and other organizations. The Housing Research and Development Unit is one of them [see further Erkelens, 1985b, pp. 87,88].

3.3 Kenyan building bylaws and standards

The Building Bylaws were introduced in colonial times and brought up to date in 1968. The bylaws as such don't favour low-income housing of less durable materials in high-density population areas.

New legislation
The government of Kenya, supported by the World Bank, initiated a study of the building bylaws. A complete review was carried out in the period 1979-1980 and revealed numerous anomalies. The consultants not only presented policy ideas but also proposals covering the whole field of building legislation oriented towards low-cost housing. Although the bylaws study [Yahya, 1980] was completed in 1980, the Kenyan government has not yet approved its enactment. The reasons for delay may be more political than technical. Some of the recommendations on materials were acted upon as they required no parliamentary approval.

Standards applied in this research
The envisaged new legislation still governs too high a standard for a considerable group of low-income households. In our study we use affordable-cost standards as these refer to a housing unit of one or two rooms built of less durable or durable materials plus an affordable infrastructure. For the higher income groups the affordable housing is assumed to be in accordance with the existing grade I & II Bylaws.

3.4 Housing shortage 1988

In this paragraph we will review the housing situation both quantitatively and qualitatively up to the end of 1988. We will first examine the national housing programme and the actual output, followed by the official prognosis of the needs and review the quality and quantity of the existing housing stock. Aggregation of the data gives a total picture of the shortage at the end of 1988.

National housing programme
The national housing programme for the period '84-'88 is presented in Fig. 3.12 (and for 1955-1988 in Appendix 3.B) Per annum the government projected 3,593 serviced plots on sites and services projects, 1,962 rental units, 1,566 mortgage and tenant purchase units, in total 7,121 new housing units and 2,640 upgraded squatter units, mainly in urban areas. The plan assumed that the private sector produced 860 rental units and 1,280 mortgage and tenant-purchase units, that is a total of 2,140 per annum. Total production of programmed public and private 9,261 new units and 2,640 upgraded units p.a. (at official standards 2 rooms made of durable materials). Data on other housing construction are unavailable as the Central Bureau of Statistics [Ministry of Finance, 1983, p. 168] neither collects nor provides data on traditionally built and not-officially registered units, such as housing built by the informal sector. Forecasting is even more difficult as the new development plan for '89-'93 provides no figures on future housing programmes.

Actual production of new and upgraded housing
Considering the past performance, the projected 9,261 new formally built housing units of durable materials per annum is overoptimistic. From Fig. 3.12 (and Appendix 3.B) it can be seen that the annual output over the years 1984-1987 was 2,719 new housing units or 29.4 percent of what was planned. This production is exclusive of the informal output. According to the Economic Survey 1985 [Central Bureau of Statistics, 1985, p. 38], the recorded output accounts for only 20 percent of the total production. Therefore another 80 percent of the production in urban areas (or 10,900 units) comes from outside the 'formal system', raising the total of formal and informal production to 13,600 new units p.a. [Ministry of Works, 1987, p. 2 and Sethuraman, 1985, p. 308].

No figures are available on upgrading, but if we assume the same performance as for the new housing referred to above, the formally realized upgrades would be 29.4 % or 776 of the projected 2,640 upgraded units. Combined with another 400% or 3,104 informally produced units, the total is

Fig. 3.12 Projected and realized housing programme 1984-1988

type of units[1]	public		private		total	
	plan	actual	plan	actual	plan	actual
serviced plots (S&S projects)	3593	814			3593	814
rental units	1962		860 }	836	2822 }	1905
mortgage & tenant purchase	1566	1069	1280 }		2846 }	
subtotal	7121	1883	2140	836	9261	2719
squatter upgrading	2640	776[2]			2640	776
total	9762	2659	2140	836	11900	3495

Source: Ministry of Finance 1983, p. 168
All figures are per annum
[1] minimum of two habitable rooms according to the By-laws
[2] estimated as 29.45% of 2640 units being same % as for above subtotal

3,880 upgraded units per annum. As has already been said, no information is available on the production of new housing made of less durable materials.The poor 'formal' output can be partly explained by the low priority given by the government on housing compared to other sectors: the amount set aside by the government for housing is around 12 % of the budget for health, 3.8 % for education and 7.1 % for defence. It is found that in government expenditure on housing over the period 1955-1989 (see Appendix 3.C), the total percentage on housing and community affairs together was lowest (0.1%) in 1955 and highest (5.4%) in 1970 and that, in the period from 1986-1989, it dropped from 1.0% to 0.7% of the total disbursements.

Estimate of housing stock end 1988
-stock and quality 1988

For Kenya as a whole there is no up-to-date detailed inventory of the existing housing stock and related infrastructural facilities, such as water, roads, lighting, sewerage, etc., although some surveys were undertaken. A rural housing survey was already undertaken in 1983, but has so far remained unpublished. The Urban Housing Survey of 1983 [further referred to as UHS'83, Ministry of Works, 1986b] covered 32 of the larger towns in the country, representing 89% of the 1979 urban population. According to the survey, the reported number of housing units in urban areas is 604,245, while the total estimated number is 678,930 units containing 1.3 million habitable rooms giving on average, 2 rooms per housing unit, which sounds reasonable when compared with a rough estimate for 1983 of 2.7 mio people and a household size of 4.0 which gives 672,000 units! The survey found the following types of structures: 42% houses (defined as a self-contained detached residential unit on its own compound UHS'83, p. 10), 7% flats,

3% maisonnettes, 19% Swahili-type housing and another 29% shanties. This means that the last two types, that is about 48%, is housing below the ascertained standards [UHS '83 p. 40]. Appendix 3.D gives more details.

-permanent stock end 1988
For an estimate of the housing stock at the end of 1988 we start with the UHS'83 [idem, p. 22]. This indicates that 52% or 352,000 units are acceptable. If we add the estimated formal and informal production of 13,600 units p.a. or 68,000 units over '83-88 discussed in section 2, the total acceptable stock was 420,000 units by the end of 1988. These units have on average two rooms, built of more durable materials and have a reasonable infrastructure [idem, p. iii].

-less durable stock end 1988
What remains of the 1983 stock is 48% or 327,000 units of the categories Swahily-type, shanty or others, which need either replacement or upgrading (we assume 1/3 replacement and 2/3 upgrading). Due to lack of data we have to estimate the production of less durable housing between 1983 and 1988. According to UHS '83 there was no overcrowding [idem, p. iii]. If we still assume no overcrowding for 1988 and 3.9 million people or 980,000 households in any form of shelter, the informally built addition between '83 and '88 is (980,000 - 420,000 - 327,000 =) 233,000 units of any standard whatever. Of this sum we again assume that 2/3 needs upgrading and 1/3 replacement.

-estimated composition of stock end 1988
The estimated urban housing stock of 980,000 comprises of
-420,000 acceptable units of on average 2 rooms,
-187,000 less durable units with 1 or 2 rooms to be replaced and
-373,000 less durable units with 1 or 2 rooms to be upgraded.

Urban shortfall 1988-end of 1989
When the stock of durable housing is estimated as in the order of 420,000 units, the shortfall is of course 560,000 units at ascertained standards by the end of 1988. For estimating future shortfall we have assumed that the volume of new housing production according to ascertained standards, partly meets the new housing requirement, and that the volume of substandard production equals the number of new households requiring housing in that year. Of this production, one third has to be replaced later and two thirds to be upgraded. In Figure 3.13 we have indicated the urban housing situation between 1988 and the end of 1989.

Fig. 3.13 Review of urban housing projections, production, shortfall and backlog of housing 1988-1989

		shortfall new housing	shortfall upgraded housing	shortfall total housing	total acceptable stock	total needed
situation end 1988		187000	373000	560000	420000	980000
1989						
1988, stock to be replaced		187000		187000		
1988, stock to be upgraded			373000	373000		
new households 1989		69000		69000		
supply to standards formal	1)	(-) 2719	(-) 776		3595	
informal	2)	(-)10876	(-)3104		13980	
substandard supply						
to be replaced later	3)			22770		
to be upgraded later	3)	22770	46230	46230		
situation end 1989		196175	415350	611525	437475	1049000
increased shortfall over 1989		9175	42350	51525		

1) the production figures for the year 1988 were taken
2) informal assumed 4 times formal production
3) 1/3 of units built by new households were assumed to be replaced later and 2/3 to be upgraded later

We read from the figure that, by the end of 1989 the required number of new units to be built would be 196,000. In spite of an estimated formal and informal production of 13,600 units the shortfall of new housing has increased by 9,200 units over 1989. It seems that each new household by the end of 1989 could be provided with 1/5th of a new housing unit of durable materials. By the end of 1989 the number of required upgrades would have risen to 415,500 units. Subtracting the estimated 3,900 upgrades per annum the backlog of upgrades has increased by 42,000 to 373,000 by the end of 1988.

Consequences of shortages

Housing shortages are experienced at all income levels. Chana [1980b, p. 6] confirms that the housing problems in the urban areas reach to quite high up the income scale. The housing shortages affect the market prices. There is a certain price level at which potential demand can be met. This (price) level of satisfaction is higher than the actual construction costs (inclusive of a reasonable profit margin) so that the households in the higher income brackets which can afford it, will occupy housing originally meant for households in the lower-income brackets etc. [Ministry of Works, 1986b, p. 33 and interview Mugo, 1988]. From a survey carried out in Dandora Sites and Services Project it was found that 50% of the original allottees do not live on

the plots. Lower-income households are bought out. The same is reported from a project in Thika, where 60% of the plots are not occupied by the original allottees but are rented out or sold [UNCHS, 1987b, p. 68]. In future this will lead to (over)crowding more than one family in one house; room occupancy instead of house occupancy [Chana, 1980b, p. 6]. Cases have already been reported where a household sleeps in shifts because of shortage of bed space (Communications with HRDU 1989), postponed household formation and keeping units in stock beyond the time when they should have been demolished [Ministry of Works, 1987, p. 2].

Rural shortfall end 1988
Seen against the background of ascertained standards for rural housing, according to the same MOW report, the shortfall would be 3,121,000 units by the end of 1988, if nothing more were built. Although there are no figures available, this may probably not be the case. It is not unrealistic to assume that the shortfall is just a limited one, as much of the housing is of traditional materials and most of the people build their own housing [idem, p. 14].

3.5 Conclusions

We have presented a detailed picture of the housing shortages in the urban areas and to a lesser extent in the rural areas. In the remainder of the study the focus will be on the urban situation for a number of reasons.

- The rural housing problems are substantially different from those of urban housing.
- The people in the rural areas have the solution to their shelter problems much more in their own hands, as they face fewer administrative barriers, more land is available to them and they are experienced in using the traditional building materials that are readily available to them and their sanitation needs are less costly [Churchill, 1980, p. 4].
- The urban low-income group is the fastest-growing category of people in the near future that will require adequate housing.
- The expected increase in construction costs in excess of the average inflation is leading to growing affordability problems.
- There are few changes, if any at all, to be expected in upward economic mobility, that is household incomes moving to a higher decile [Renooy, 1982, p. 107].
- The problem of room occupancy and overcrowding in urban areas.
- The limited number of housing plans for urban low-income people.

The future of the urban housing situation will be considered in detail in the next chapter.

4 HOUSING NEEDS AND DEMAND 1989-2000 ASSESSMENT MODEL

4.0 Introduction

This chapter discusses the setup of an assessment model for housing needs and demand, as well as the parameters, such as number of households, household size, income development, building costs, etc. The parameters mainly cover the urban data. This results in approximate housing requirements assuming that, over the considered period of time
a) every household will be able to afford some type of housing,
b) inflation is compensated for in wages and
c) inflation keeps pace with building-costs development.

4.1 Needs and demand definitions

There are different sorts of needs and demand; socio-economic needs, tribal needs, felt needs, ascertained needs, etc. and effective demand, potential demand.

Needs
The need for housing is determined by a number of factors

1. the climatological circumstances; in extreme climates the need for shelter is higher than in moderate climates,
2. socio-economic circumstances; once people are aware of better housing possibilities and are able to afford them, they may want to improve their housing,
3. cultural circumstances; a tribe, for example, can inherit certain housing needs (e.g. separate huts for women and men).

All these factors are the basis for the **felt needs**, which are based on the requirements of individuals. They exist independently of the market and the government [Turner, 1972, p. 75] and, for the lower-income groups, are often below the level of the **ascertained needs**. The ascertained needs are established by third parties like governments in order to ensure certain minimum acceptable standards. Building legislation, including the housing standards, is based on ascertained needs.

Demand
The **effective demand** for housing is demand at existing prices which can be met. Willingness and the ability to pay for housing depend mainly on the household income and factors, as already specified. Effective demand is therefore economically determined. When people have more to spend, they will demand for housing of a higher standard [Verbeek, 1978, p. 2]. **Potential demand** is a need that is not now being satisfied but is expected to be satisfied when some condition is met in the future [Moffat, 1976, p. 310]. *This study will be based on ascertained needs and potential demand of future household formations.*

Shortage
Shortage of housing can be defined as the difference between ascertained needs and availability of housing, both in terms of the same standards. Or in other words, the difference between the total number of households to be given a house (of a certain standard) and the number of available houses deemed to be of that standard [Verbeek, 1978, p. 2]. The measure of shortage or surplus of housing is dependent on the applied standards. In general it can be said that when the standards set are higher, there is more chance of a shortage or of a lower surplus. Alternatively, when the level of applied standards is lowered, the shortage decreases theoretically to 'zero', if a cardboard box is defined as acceptable.

4.2 Set-up of needs and demand assessment model

This paragraph discusses the required parameters of the assessment model for housing needs and demand for estimating the urban, rural and total housing situations. The parameters are discussed in the following paragraphs.

The search for a model
There are many assessment models, some of which take into account increased quality requirements, changes in household composition and changes in housing requirements. We don't need this refinement because a), the data available to us are not very detailed and b), the average type of housing output will remain the same for the coming years (according to Chapter 2) when income changes slightly. We developed our own model, as none of the simpler models satisfied specific requirements, for example the models known in Kenya:

- Verbeek [1978, p. 17] used reported incomes but did not include the detailed costs of housing. It was not meant for predicting the future situation.

- The UHS'83 [Ministry of Works, 1986b, p. 33] just used a general formula which had some parameters which could not be checked, though it claimed that the housing situation could be predicted several years ahead.
- Rourk [1984] made the most advanced model for Kenya, but it did not include the detailed building costs of housing and methods of financing.
- UNCHS-Habitat [1983a] had some sort of a model just showing the parameters but these were neither further detailed nor related.

The application of the model calls for a warning; the model is only suitable at national level and certainly not at local level. as the parameters may differ in composition, thus invalidating the model.

Development / structure of the assessment model
Most of the parameters were put into modules on spreadsheets, so that they can be calculated separately. The assessment model is depicted in Fig. 4.1, showing the parameters, interrelations and references to relevant paragraphs. The model produces three categories of output for a certain year: (i) ascertained needs, (ii) potential demand and (iii) total housing stock as follows

(i) output ascertained need
- Estimate the population size for a certain year (par. 4.3).
- Estimate the mean (urban) household size in that year (par. 4.4).
- Determine the ascertained standards (pars. 3.3 & 4.5).
  output of model: ascertained housing needs for that year (par. 4.5).

(ii) output potential demand
- Find the average household income for a certain year (par. 4.6) from the projected urban population (par. 4.3), household size (par 4.4) and the estimated urban share of projected GDP (par. 4.6).
- From the income distribution (par. 4.6) and the average household income (par. 4.6) the average household income per decile can be determined (par. 4.6).
- The household income per decile (par. 4.6) combined with the affordable percentage of income for housing (par. 4.7) give the annual capital available for housing (rental/ownership, par. 4.7).
- The available capital (par. 4.7) + the available savings (par. 4.9) and type of financing (par. 4.9) give the affordable capital (par. 4.9).
- The various housing and infrastructural options and building costs (par 4.8) together with the affordable capital (par. 4.9) result in potential demand (par. 4.10).

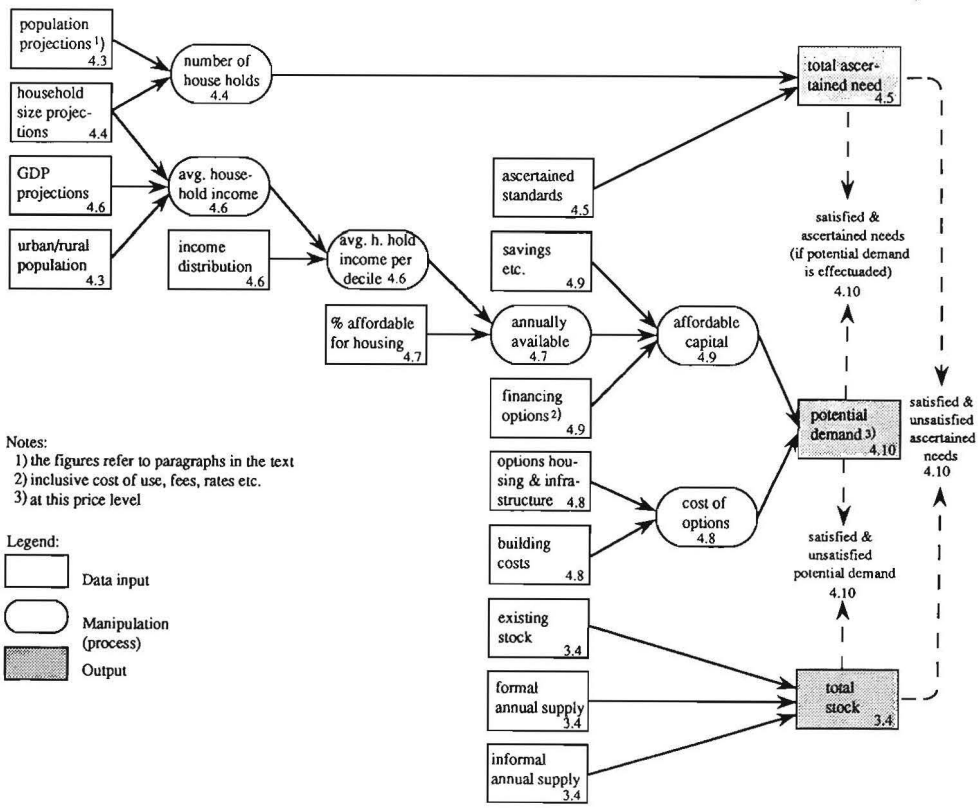
(iii) output total housing stock

- The existing housing stock aggregated with the newly produced housing + upgraded housing either (formal or informal), result in total housing stock (par. 3.4 and par. 4.11).

Comparison of outputs produces the following information

- Ascertained needs (i) versus potential demand (ii) gives satisfied and unsatisfied ascertained needs if the potential demand is effectuated at this price level,
- Ascertained needs (i) versus available housing stock (iii) gives satisfied and unsatisfied ascertained needs,
- Potential demand (ii) compared with the available housing stock (iii) gives satisfied and unsatisfied potential demand.

Fig. 4.1 Housing needs and demand assessment model



4.3 Population projections for 1980-2000

According to Kenya law, a population census has to be carried out every ten years. The results of the 1989 census haven't yet been published, so that we have to rely on the data of the 1979 census. In that year there were 16.141 million people (adjusted for undernumeration) of whom some 13.8 million lived in localities defined as rural areas, of less than 2000 people [Central Bureau of Statistics, 1984, p. 15].

Population projections
The CBS of Kenya made three population projections (A, B and C) for the period from 1980-2000 [Central Bureau of Statistics, 1983, p. 7].
A: declining fertility & mortality ('low' growth), by 2000, 34.7 mio;
B: constant fertility & declining mortality ('high' growth), 38.4 mio;
C: constant fertility & mortality ('medium' growth), 37.5 mio.
We base our selection on the views expressed in the New Development plan ('89-'93) and the Sessional Paper on Employment no 1 of 1986, both referring to the low-growth scenario (A) [Ministry of Planning, 1986, p. 41].

Urbanization
The urban population growth can be explained by the following factors
a. Natural population growth
Information so far available is insufficient to give insight into growth rates of population in urban areas solely due to births. Although it is believed that the birth rate is lower than in rural areas, the death rate is also lower, resulting in a higher natural population growth.
b. Rural-urban migration
It is estimated that migration from rural areas accounted for almost 60% of the total growth of the urban population [Ministry of Lands, 1978, p. 38].
c. Boundary expansion
The extent of an urban centre is defined by fixed boundaries as established by the local authorities. Sometimes these boundaries are revised.
d. Emergence of new market centres
Due to the above factors (a,b,c), an increasing number of (rural) centres will become an urban centre, which attracts more people since market centres with proper infrastructure are the fastest-growing places [Ministry of Works, 1986b, pp. 17,18].

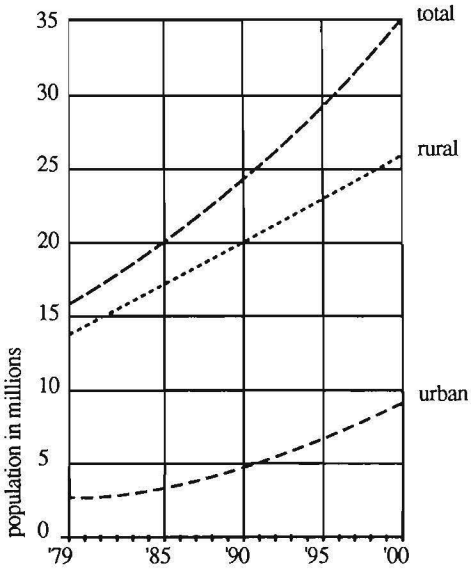
Detailed urban and rural population projections
Few studies are available from which an estimate of the urban population growth to the year 2000 can be given.

- 11.4 million people in the urban areas, 1985 estimate
  [Central Bureau of Statistics, 1985, p. 28]

- 8.91 million in the event of low urban growth scenario at 7.1% per annum [Ministry of Planning, 1986, p. 41] or
- 10.21 million in that of high urban growth scenario at 8.0% p.a., 1986 estimate [idem].

The Development Plan 1989-1993 [Ministry of Planning, 1989, p. 74] takes the 7.1 % growth figure. We will use this figure as it is the latest available information (see Figure 4.2).

Fig. 4.2 Population projections urban, rural and total based on low-growth scenario (A), 1980-2000 in millions



year	popula-tion million	rural in million	rural % of total	urban in million	urban % of total
1979	16.141	13.831	85.69	2.311	14.32
1980	16.667	14.236	85.41	2.431	14.59
1981	17.342	14.784	85.25	2.558	14.75
1982	18.047	15.356	85.09	2.691	14.91
1983	18.784	15.954	84.93	2.831	15.07
1984	19.482	16.502	84.70	2.980	15.30
1985	20.241	17.050	84.23	3.191	15.77
1986	21.021	17.604	83.74	3.417	16.26
1987	21.826	18.167	83.24	3.659	16.76
1988	22.657	18.738	82.70	3.919	17.30
1989	23.513	19.317	82.15	4.196	17.85
1990	24.397	19.903	81.58	4.494	18.42
1991	25.308	20.496	80.99	4.812	19.01
1992	26.247	21.094	80.37	5.153	19.63
1993	27.214	21.696	79.72	5.518	20.28
1994	28.211	22.302	79.05	5.909	20.95
1995	29.237	22.909	78.36	6.328	21.64
1996	30.292	23.516	77.63	6.776	22.37
1997	31.375	24.119	76.87	7.256	23.13
1998	32.487	24.717	76.08	7.770	23.92
1999	33.626	25.306	75.26	8.320	24.74
2000	34.792	25.882	74.39	8.910	25.61
2010	52.000	37.000	38.00	15.000	28.85

Source: Ministry of Planning, 1986, p.41

From Figure 4.2 it can be seen that in 1990, 18% or 4.5 million people are living in the urban areas, a number which will increase to 8.9 million in 2000, that is 25% of the total population. The Development Plan '89-'93 [idem, p. 75] forecasts that population growth rates in the bigger urban centres (at present in the order of 6.5%) will decelerate, whereas smaller towns (2,000-20,000 inhabitants) will be stimulated to grow faster at 7.5% per annum. The model uses a total average growth rate of only 7.1%.

4.4 Household size

Household size and distribution
The term household is important when determining the number of housing units, etc. According to the 1979 census documents [Central Bureau of Statistics, 1981, p.16] *' a household is defined as a group of persons who normally live and eat together, whether or not they are related by blood or marriage'*. A household may consist of one or more persons and may occupy a whole building, part of a building or many buildings. In Appendix 4.A we have worked out the results of the literature survey on household sizes. On this basis we will assume an unchanging urban household size of 4.00 and 5.65 for the rural areas. A detailed distribution of household sizes is not available for the urban and rural areas. Some information in the rural areas can be found in the Agricultural Production Survey '86 [Central Bureau of Statistics, 1989, p. 27], see also Appendix 4.A, Fig. 4.A.2.

Relation between household size and income
Par. 2.5 showed the negative correlation between household size and general level of income. Information on the relation between income and household size in Kenya is very limited. Although the UHS'83 [Ministry of Works, 1986b, pp. 54,55] tries to do so, the data provided contradict this correlation. Increased sizes of households with higher incomes were found in Kenya. This is might be explained by more members of the extended family coming to stay with the basic household when income increases. This tendency may stop after a higher general income level is reached. We assume no change in household size when income changes. Fig. 4.3 gives estimates for the number of new and aggregated rural and urban households for 1989-2000.

Fig. 4.3 *New and total number of urban and rural households for 1989-2000, indicating ascertained housing needs*

	year	urban		rural		national	
		new	total	new	total	new	total
(End)	1988		980000		3316000		4296000
	1989	69000	1049000	103000	3419000	172000	4468000
	1990	75000	1124000	104000	3523000	179000	4647000
	1991	79000	1203000	105000	3628000	184000	4831000
	1992	85000	1288000	105000	3733000	190000	5021000
	1993	92000	1380000	107000	3840000	199000	5220000
	1994	97000	1477000	107000	3947000	204000	5424000
	1995	105000	1582000	108000	4055000	213000	5637000
	1996	112000	1694000	107000	4162000	219000	5856000
	1997	120000	1814000	107000	4269000	227000	6083000
	1998	126000	1940000	106000	4375000	232000	6315000
	1999	140000	2080000	104000	4479000	244000	6559000
	2000	150000	2230000	102000	4581000	252000	6811000

4.5 Ascertained housing standards and needs

In our study, the ascertained standards are based on the Building Bylaws (see also Chapter 3). Fig. 4.3 indicates the total ascertained needs based on a two-roomed housing unit per household. We assume here that these needs will not be changing in the near future.

4.6 Household income projections

Due to lack of better information, income growth will be based on the projected growth of GDP over the years 1988-2000. This paragraph discusses income and its distribution in urban areas. For rural areas the same calculations were done but not included in this book. In addition to the projection of income and its distribution, the GDP at factor cost is discussed.

Projections of GDP at factor cost (=GDPafc)
The average height of urban and rural household incomes can be derived from GDP at factor cost (=GDPafc), where it is assumed that the total earnings of people are reflected in the total GDPafc (which equals GDP at market prices - taxes + subsidies). The total rural income can be considered as the agricultural factor income of GDPafc plus some other incomes, such as from education, health and small trading which are the earned in the rural area, whereas he total urban income is considered as the balance. In Appendix 4.B we have worked out in detail the projected GDP and urban and rural GDP at factor cost.

Urban income
For urban household income we take as our starting point the limited number of publications available, the latest of which date from 1983 [Rourk, 1983 and Ministry of Works, 1986b]. When it is combined with the urban GDPafc, we can estimate the urban income for 1983 (see Appendix 4.C).

Urban income distribution, expectations
The wage earners' income distribution (see Appendix 4.C, Fig. 4.C.2) is roughly in line with that of household incomes as found by the UHS'83 (see Appendix 4.C, Fig. 4.C.3). When comparing with the CBS wage-employment data over 1980-1987, we find no remarkable changes in skewness. We have no clue as to the overall income distribution. However, at international level, too, when looking at the official Unido figures [Unido, 1988, p. 16], we see that, for Africa as a whole (without Republic of South Africa) the distribution of wages has not indicated a levelling-up trend: from 1975-1985 the (1%) high-income group almost doubled its share of income, the middle-income

group (43% of the total) received a slightly higher income, whereas the low-income group (66% of the total) received slightly less. In spite of official sources in Kenya, we quote, *'it remains the policy of the government to address the problem of income inequality through taxation, pricing system, tariffs, provision of services to specific groups, wages guidelines etc.'* [Ministry of Planning, 1989, p. 204], we don't expect a remarkable change near the year 2000. There may even be a tendency to concentration of income at the top deciles [Bertholet, 1983, p. 131]. Based on the above information and on Appendix 4.C, for 1983 we arrive at the following estimate of urban income and income distribution, see Fig. 4.4.

Fig. 4.4 *Estimated mean income per decile and quintile and income distribution for urban households per decile, 1983*

decile	mean of range	earnings as % of total	quintile	mean of range	earnings as % of total		
1	629	1.53					
2	825	2.00	1	727	3.53		
3	999	2.42					
4	1279	3.10	2	1139	5.53		
5	1499	3.64					
6	1664	4.04	3	1582	7.68		
7	2331	6.06				mean:	4121/-
8	6000	14.56	4	4166	20.62	0-95%:	3083/-
9	10000	24.27				0-69.17%:	1262/-
10	15815	38.38	5	12907	62.25	median:	1349/-

Projections of income per capita and per household to year 2000
For the projections of income per household we have assumed that

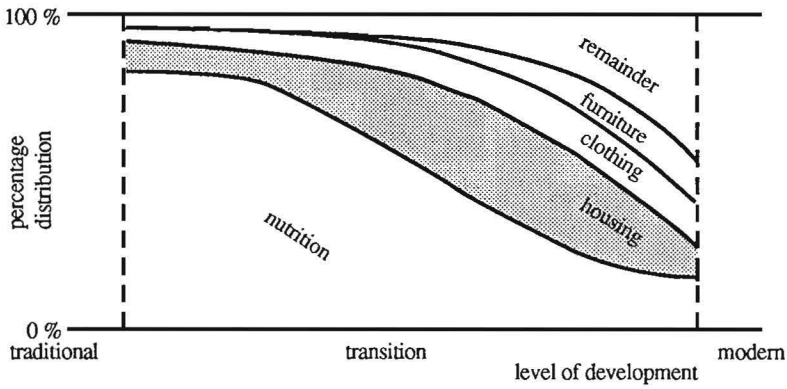
- there is a one to one ratio between household income growth and growth of GDP at factor cost,
- an unchanged income distribution.

Combining the figures for mean household incomes in urban and rural areas with the assumed income distribution gives the incomes per decile. As a result Appendix 4.C, Fig. 4.C.4 shows the data for 1988 and 2000. It can be seen that the rural incomes increase slightly while the urban incomes decrease.

4.7 Spending on housing, Law of Engel

For an estimate of demand, we have to know how much money a household is prepared to spend on various items. The Law of Engel indicates a relation between the level of a household income and the percentage of income which is spent on nutrition, housing, clothing, etc. Basically this is a sliding scale which shows that proportionally more money is spent on housing when income increases up to a certain income level, beyond which we see a decrease in spending, see Fig. 4.5 for an overall view [Bertholet, 1981, p. 87].

Fig. 4.5 Law of Engel, indication of expenditures as % of income



Source: Bertholet 1981, pp. 86, 87

Appendix 4.D reviews in detail the affordability percentage for housing. For the urban areas the percentages taken are 14% of the household's income for the lowest 6 deciles, 20% for the 7th and 8th deciles and 23% for the 9th and 10th deciles (see Appendix D, Fig. 4.D.2).

4.8 Model of low-cost housing layouts

General

For a cost analysis of the different housing options we used an overall plot layout grid (see Appendix 4.E, Fig. 4.E.1) incremental infrastructure (on and off plot) and incremental housing options A,B and C (see Appendix 4.E, Fig. 4.E.2 and 4.E.3). The design of the options allow that both the infrastructure and the house can be upgraded to a higher standard with a minimum amount of capital wastage. For cost estimates we assumed three forms of realization of the housing and infrastructure through a) self-help management and self-

help construction (SHB), b) self-help management and subcontracted construction (SHM) and c) self-initiated but fully contractor-built (CB) See Chapter 6 for more specific details of these forms.

Summary of the incremental housing and infrastructural option costs
There are numerous combinations possible in the case of incremental housing and infrastructure options. Appendix 4.E, figure 4.E.5 summarizes the cost of 9 combinations of housing and infrastructure. Combination nr. 1 has the minimum of infrastructure and housing and nr. 9 the maximum incremental infrastructure + housing. The relation between the combination number and the housing option is stated below in Fig. 4.6 in tabular form.

***Fig. 4.6** Combination of infrastructure and housing options*

housing		used materials	infrastructure
nr.	option		nr. of combination
A	plot only + squatter unit	less durable	1
B1	one room	less durable	2
B2	two roomed unit	less durable	3
B3	two roomed unit	less durable + concr. floor	4
C1	kitchen and toilet (=core)	durable	5
C2	core + one room	durable	6
C3	core + two rooms	durable	7
C4	core + three rooms	durable	8
C5	core + four rooms	durable	9

For cost estimating, we used the Ministry of Public Works rates as researched by Tuts [1990], information from Undugu [interviews 1988] and own research results [Erkelens, 1980e], which were checked by a quantity surveyor. We estimated the costs for contractor-built (CB), self-help management (SHM) and self-help construction (SHB). The cost reduction in case of self-help management (SHM) is based on assumed savings on overheads (15%) and profits (10%). In the case of self-help construction (SHB) we assumed a further cost reduction of 21% for the housing units (use of own labour), allowing for some skilled labour for special jobs. For the infrastructure we assumed a 50% cost reduction on labour as, on average, 50% was needed for hiring professionals (see Tuts, 1990 and Appendix 4.E). The cost reductions resulting from self-help are based on the assumption that the work is done under the same (ideal) cost circumstances as assumed for the contractors (see further Part Two). These rates can therefore only be reached when the self-help builder has organized everything properly and can work under ideal circumstances.

4.9 Financial aspects of housing and affordable capital

The potential demand for a certain combination of housing and infrastructure depends on the available funds (= savings + loans). Savings will not be accounted for as these are not common in low-income households. For the loans we will review the existing financing systems for owner-occupation and for rental accommodation. Finally, the affordable amount of capital is presented.

Existing financing systems
***Owner-occupation,** combinations 5-9 (durable housing options C1-C5) can be financed through tenant-purchase loans and combinations 6-9 (options C2-C5) through mortgages. For combinations 1-4 (less durable housing options A-B3), people have to depend on quasi-formal and informal systems of financing. Some form of formal financing needs to be developed to promote home-ownership within the limits of these combinations. We expect this can be made possible with some incentives (e.g. 'council guarantees'). Yahya [1982] has already discussed about new forms of financing suggested for development. In this light we propose the introduction of a 'site-only loan', e.g. in the form of a tenant-purchase loan, similar to sites & services financing in combinations 1-4. We further propose to extend mortgage options to combination 4 (option C1, kitchen + core unit with durable materials).

*As regards **rental accommodation**, combinations 5-9 (durable housing options C1-C5) are generally developed and financed through local authorities or by employers and individuals. We propose a gradual extension of formal financing systems to the less durable accommodation for rent, starting with combination 4 (option B3, superstructure of less-durable materials erected on a concrete floor).

The assessment model accounts for these proposed financing systems.

Annual capital cost
The annual capital costs of a combination of housing and infrastructure depend on the method of financing. The difference lies in the repayment periods, interest rates, administration costs, council rates, etc. We distinguish financing between home ownership (i,ii,iii) and rental (iv). The differences between the annual payment percentages can be explained a) by the interest rates charged commercially and those by the government (owing to cheaper foreign loans) and b) the repayment conditions (see also Appendix 4.F).

(i) ***Site-only loan**, interest rate of 11.0%, repayment over 20 years incl. administration costs, etc., 15.3% annually.

(ii) ***Sites-and-Services loan**, interest rate of 11.0%, repayment over 20 years incl. administration costs, etc., 16.8% annually.

(iii) ***Mortgage**, interest rate 14.5%, repayment over 20 years, incl. administration costs, etc., 17.2% annually.

(iv) ***Rented-housing loan,** interest rate 6.5%, repayment over 40 years incl. administration costs, etc., 11.6% annually (financing is assumed to be through local authorities).

The affordable capital can be found from the formula

$$\text{affordable capital} = \frac{\text{affordable annual expenditure}}{\text{percentage of annual payment}} \times 100$$

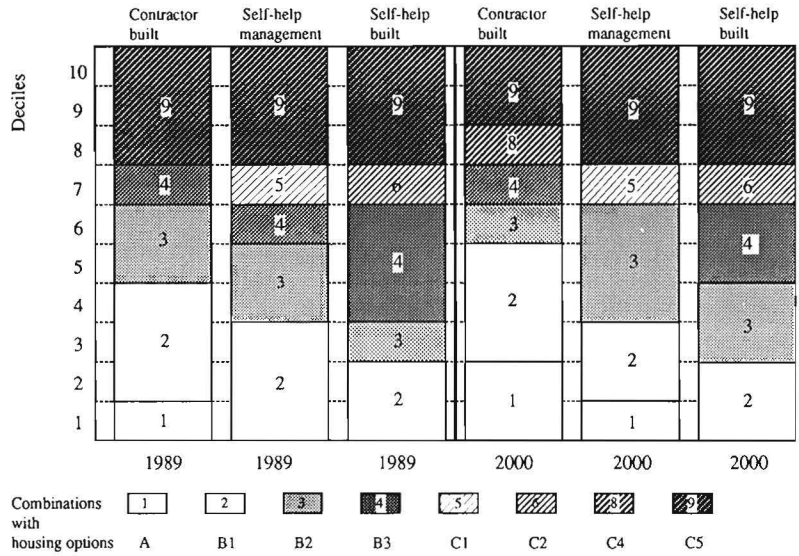
The affordable capital per type of financing is given in the table in Appendix 4.G for urban areas, which also indicates the annually affordable amount in the case of rental. We made the calculations up to the year 2000, from which we present 1988, 1989 and 2000 only.

4.10 Projections of urban demand and supply 1989-2000, conclusions

Qualitative potential demand

Comparison of the affordable capital per income decile in any year (Appendix 4.G) with the building costs of the 9 combinations, give the affordable combinations. Figure 4.7 shows the maximum per income decile affordable combination for the years 1989 and 2000 in the case of contractor-built (CB), self-help management (SHM) and self-help built (SHB). Although combination 9 (with durable housing option C5) is indicated for the highest income deciles, they can afford more, but that is not further discussed here.

Fig. 4.7 Qualitative urban potential demand for housing and infrastructure; combinations per income decile 1989 & 2000 (CB, SHM, SHB)



The following can be said when looking at Figure 4.7

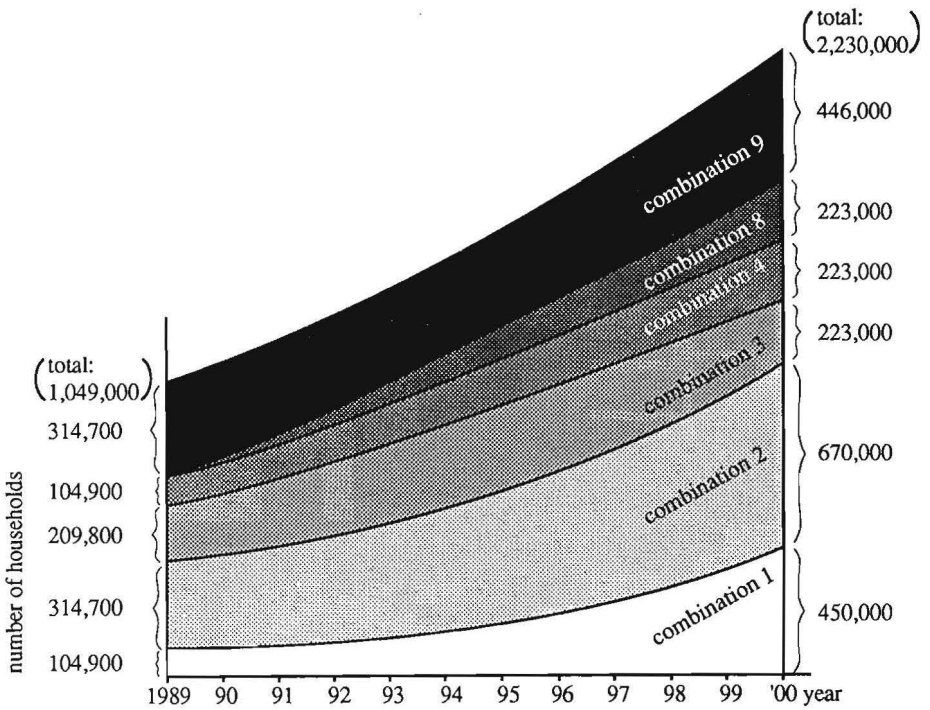
1. Reviewing the figures shows a worsening of the situation towards the year 2000, although households in income deciles 8-10 remain almost unchanged in terms of affordability.
2. Self-help management moves the households one decile up in terms of affordability, which is also true in the case of house construction through self-help.
3. Just 30% of households can afford a house of durable materials (40% in the self-help case). In other words, housing built of more durable materials (C1-C5) intended for conventional sites & services, mortgage or rental, serve the top 3 deciles only, or top 4 deciles when some form of self-help is involved.
4. 70% of households can only afford a house made of less durable materials, with a simple infrastructure.

Note that even with unchanging labour and materials costs, we can conclude on good grounds that *housing prices will go up due to scarcity. That is why, in future, the households can only afford a house of lower standards for purchase or rental.* The picture of the future housing situation is therefore worse than that presented here. This is not further elaborated.

Quantitative potential demand

For 1989-2000 the potential demand for contractor-built combinations 1-9 is depicted in Figure 4.8 By the turn of the century the cumulative number of households to be provided with one of the combinations 1-9 should be more than double (2,230,000) compared with the situation of 1989 (1,049,000). It is assumed that the type of this potential demand will not change dramatically over the coming years. In other words, the potential demand remains homogeneous. The only change is one of volume.

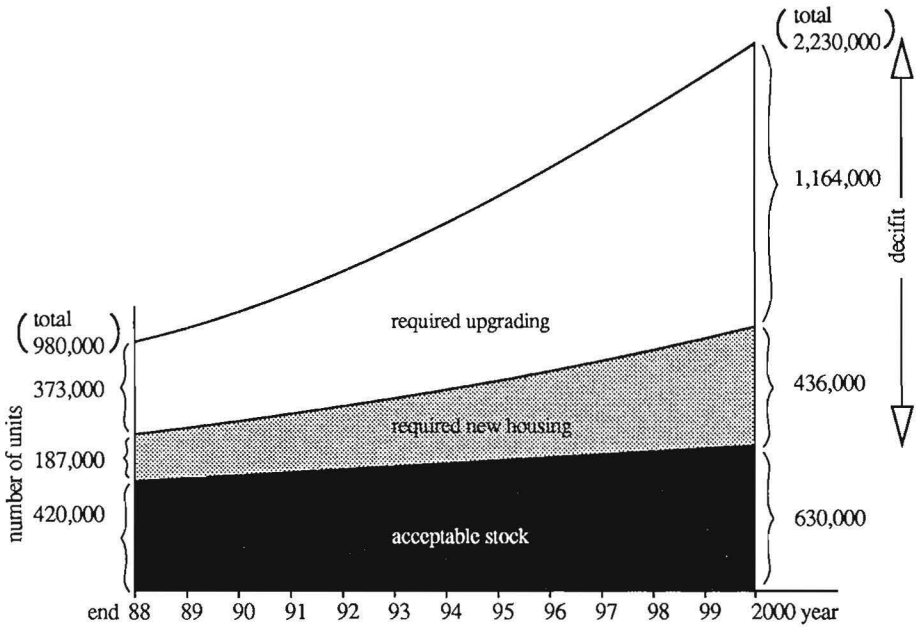
Fig. 4.8 *Quantitative and qualitative potential urban-household demand for combinations 1-9, cumulative 1989-2000, in case of contractor-built*



Conclusions

With the assessment model we concluded that, on the basis of ascertained needs, the required number of new housing units will have increased by the year 2000 from 187,000 ('88) to 436,000 units, and housing will be upgraded from 373,000 ('88) to 1,164,000 units. Meanwhile, the acceptable stock will have increased from 420,000 units ('88) to 630,000 see Fig. 4.9.

***Fig. 4.9** Qualitative and quantitative urban housing stock 1989-2000*



If the potential demand by new households is compared with only annual production (Fig. 3.12), then just 20% of the households can be supplied with a housing unit of 'durable materials' (if not used for relieving existing overcrowding or replacement or upgrading). Figure 4.9 shows that, by the year 2000, the ascertained housing needs will be 2,230,000 units and the shortage of acceptable units made of durable materials will have increased from 560,000 units (in 1988) to 1,600,000 units, assuming an unchanged policy and unchanged annual output. The stock of more durable housing units satisfying the ascertained needs for 43% in 1988 will by then have decreased to 28%.

5 MAIN TARGET GROUP, CONCLUSIONS OF PART ONE

5.0 Housing situation and prospects

The results given in Part One are discussed here and possible solutions to the problems raised are considered. We also define the main target group for our further research, on which we put forward some recommendations.

The housing situation
In the near future, urban households will be facing a decrease in income (based on our extrapolations and confirmed by respondents during the survey). The drop in household income means that less and less money is available for housing. This effect is even more dramatic when we take into account the higher cost increase of housing compared to other commodities.

In par. 4.10 we found that the production of *durable housing* is just a fraction of the potential demand and mainly serves households in the 7th. to 10th. income deciles. This supports what was already reported in par. 3.5 from UNCHS sources [1987b, p. 68]. We also found that inability to pay for durable housing is found quite high up the income scale. This, too, confirms the findings reported in par. 3.4.

Although the informal sector will alleviate the housing shortage for households to a certain extent, this supply (with mainly very simple housing of less durable materials and low level of infrastructure) does not fully cover the potential demand and certainly not the ascertained needs. This is proved by the mushrooming of shacks in urban areas. What is more, it seems clear that *the population will have to depend increasingly on their own efforts to obtain housing. In the coming years, people will not only have to do more, but (due to their reduced income) for an amount of money that they are less able to afford* (see par. 4.6).

Prospects
On the one hand the government has its own philosophy and the staff to carry out the policy as laid down in the Development Plans. On the other, there is understaffing, bureaucracy, corruption to be overcome and limited financial means at the government's disposal, too little, even for part achievement of the targets set, as can be seen from past performance (see e.g. Appendix 3.C). The described limitations of the government, as regards housing, means that

little is to be expected, even if it were willing. Also, the private individuals and private housing-development organizations are not expected to supply good housing at a price level which low-income groups could pay. They do erect (il)legal housing units with rooms, which are offered at high rents [Yahya, 1982, p. 46]. They prefer letting properties instead of selling, because of the higher returns on investment [1988, interview Mwenda]. This all leads to the conclusion that dramatic improvements in the field of housing are most unlikely in the near future. With this in mind, we note that *households in the lowest-income brackets continue to face serious problems in their attempts to find a housing unit either for rent or for owner occupation.* (This was also stated by the authorities during interviews, 1988).

5.1 Main target group of this research

Households in the upper income brackets (7th to 10th decile) are assumed to have enough means to provide for their own housing. We will restrict the present study to the urban low-income population. This main target group is now defined as the urban low-income households in the 1st. to 6th. decile, earning between KShs. 0 and 29,300/- per annum (0 and 2450/- per month, 1989) and living in urban low-income areas. In 1989 this covered 629,400 households (or 2,517,600 people) increasing to 1,338,000 households (or 5,352,000 people) by the year 2000, together representing 60% of the urban population.

5.2 Envisaged solutions

Now the question which arises is, what can be done for the main target group in order to alleviate their housing problem? In general it can be said that the gap has to be closed between (A), the purchasing power of the people and (B), the cost of housing, see also ILO [Ghai, 1979, p. 85]. The literature [on World Bank projects, UN Habitat projects, local projects in Kenya, etc.] provides many suggestions and examples for closing this gap.

(A) - *INCREASE IN PURCHASING POWER*
One basic improvement could be obtained by **(i) improving the income situation** of the household, see also The Urban Edge [TUE, 1982, p. 1] and Sethuraman [1985, p. 308]. However, so long as population growth keeps rising faster than the average economic growth, the income distribution pattern must be expected to remain as skew as it is at present and the income situation of the poorer segments of the (urban) population (the majority!) is unlikely to improve. From Chapter 2 we see that the level of housing

development is closely related to the income level of the country. Therefore, in the first place, the government should increase its efforts to develop and implement an active population planning policy to achieve a stabilized population within a few decades. By that time we might see an increase in (household) income for the low-income people, provided that **(ii) income distribution** is also readjusted.

Because of the urgency of the housing situation, just sitting and waiting until the income improvement has materialized is tantamount to failure. Meanwhile, other actions will have to be undertaken, a limited number of which are referred to below. Measures can be taken to **(iii) reduce inflation**, so that people can at least retain the same purchasing power; another step would be **(iv) price stabilization** [see also Ministry of Works, 1987, p. 24, and interviews 1988]. In this context, likewise **(v) an increase in gainful employment opportunities** and **(vi) allowing subletting**, could all help to improve the income situation. These options are beyond the scope of the present study and will not be further dealt with. At the other side of the gap some steps could be taken to

(B) - *LOWER THE COST OF HOUSING*

Towards this end the World Bank considers three cost components of housing that have to be tackled. Finance, land and services, [see v.d. Linden 1986, p. 25]. We use the same components for grouping our main proposals.

Finance

Create an adequate financing infrastructure, providing for more, cheaper and easier ways of financing loans with limited collateral. We refer to the already proposed site-only loan (see par. 4.10). Access to credit facilities has to be improved for individuals and their organizations [e.g. cooperatives, see Gatabaki, 1987, p. 10].

Land

Provision of free or leasehold land so as to reduce the land scarcity, land speculation and land prices. The government has the powers to acquire land for housing at short notice. At the same time it should simplify and shorten the procedures for individuals and bodies deserving to acquire land.

Services

For this cost component there are various suggestions

- Lower the required building standards. When the building standards are lowered, housing construction may get cheaper. Lowering the official standards may also increase finance institutes' willingness to provide loans.

- Promote development of low-cost rented accommodation and infrastructure for the lowest income groups. This may need further research in developing possible options. For instance if rented units could form part of owner-occupied units, but also specially erected housing units for rent and made of less-durable materials and, even better, put up by 'socially minded' private enterprises [See also UNCHS Vol. 12, nr 1, April 1990, p. 29).
- Promote development of minimum housing with a minimum of basic infrastructure for home ownership. For example, plots with incremental levels of services; demarcated sites and a system of public water taps to begin with (see combination 1, Chapter 4). This view is supported by Yahya [1988 interview], Dijkgraaf [Leentvaar, 1986, p. 12] and others.
- The housing stock should also be properly looked after on the basis of an overall policy for upgrading houses [Miles, 1987, p. 17]. Maintenance of existing structures is vital, as it saves housing from dilapidation [idem] and keeps new structures in good condition. It is recommended that, in new projects, more attention during the design stage, should be given to cost of future maintenance [see also Ministry of Works, 1987, p. 29].
- Strengthening the NGOs. As the NGOs are active in effectively assisting the very poor people, these organizations should be strengthened. We have already mentioned the self-help activities of the Undugu Society [Appendix 10.F; UNCHS-Habitat, 1988, p. 7].

5.3 Other suggestions

We consider the envisaged solutions to be important, but not enough to be really effective in improving the housing situation for the households in the lowest income deciles. The fact that these conventional approaches and resources cannot satisfy the demand is also recognized internationally by UNCHS-Habitat [1988, p. 7]. It seems as if the provision of housing has to be organized in another way if households are to provided with some form of 'decent' housing and infrastructure. It is stipulated that additional factors must be brought into play. The most obvious ones are the energy and other resources of the very poor people who need to be housed, who meanwhile have to maximize the small amount of capital they will eventually have available for housing construction. In other words, people should become involved far more actively in the organization and the provision of their housing and infrastructure. In this respect we propose to expand the role of self-help. From the cost calculations in par. 4.10 we have already seen that if self-help management and self-help construction were successful, it could push households 1-2 deciles up in affordability.

The (assisted) self-help building concept (e.g. applied to sites and services projects) is one of the solutions which is being officially supported, but this mainly concerns housing and infrastructure made of more durable materials. This option of self-help should also be supported for housing in less durable materials. In addition to this we have a hunch that improvement in the productivity of the self-help builder may lead to attractive cost reductions. We will come back to this in Part Two.

5.4 How to get started

The proposals discussed under 5.2(B) and 5.3 should be embedded in a good working climate. The first thing to be done, therefore is, above all, that the government should change its attitude and draft a realistic housing policy. This means recognizing that the majority of the people is faced with a problem. It should be prepared to scale down the housing policy and concentrate mainly on providing the basic provisions necessary for the low-income people. This would partly involve some measures at a certain cost but also measures at no cost at all, but just willingness (e.g. to prepare legislation).

The government should use its limited financial, organizational and personnel capacity available for housing, only for programming housing and infrastructure and not for actual project management and construction. It should rather be a 'creator of conditions', an 'enabler' rather than a 'doer' [see also UNCHS, 1990b, p.25] and undertake those activities which provide the other actors with the necessary tools (legislation, price control, etc.). One of its first tasks would be the development of a long-term master plan for housing. This plan should contain a programme for the immediate period ahead, providing shelter in terms of number and space (e.g. in less durable materials). This can be called a quantitative approach. For the more distant period the plan should provide for shelter in terms of higher quality (more durable housing). This can be called a qualitative approach. For our further research it is more realistic to look first into aspects of the quantitative approach. The qualitative approach is, though of interest, likely to become important far beyond the present decade, as the demand for better housing is closely related with improved income (see Chapter 2).

5.5 Conclusions and recommendations

Main conclusions

1. There is a discrepancy between the hard reality and what the government officially wants 'The government's long-term objective is to build, as rapidly as possible, a national stock of housing of a minimum standard with basic standards of privacy and security providing a healthy environment for all' [Ministry of Housing, 1973, p. 21-17]. We can agree with Makunda, who said that the government should stop saying that they provide housing for the people. They should be realistic on the provision of housing [Interviews 1988].

2. In reality the government's housing programme mainly serves the higher-income groups.

3. People will have to do increasingly more themselves about their housing situation in the near future.

4. Self-help building is one of the few ways to improve the conditions of the low-income population as this uses their own available resources.

Recommendations

1. It is recommended to intensify activities for population planning in order, among other things, to ensure improvement of the income situation.

2. The role of the NGOs should be recognized and strengthened in their support of the poor.

3. Ideas of self-help in the form of self-help management and self-help building have to be further investigated.

4. It is recommended that the aspect of productivity improvement in relation to self-help building is looked into.

Part Two

Productivity of self-help building method development

6 SELF-HELP BUILDING

6.0 Introduction and second research question

The nature and magnitude of the housing problem, in particular for Kenya, now and up to the year 2000, was reviewed in Part One. We concluded that one of the ways open to the lower-income groups as leading to significant cost reductions, would be to explore the self-help option further.

In Part Two the focus is on self-help theory and practice in promoting housing output by optimizing the limited resources of the self-help builder. The productivity aspects are examined hereby. We restrict to the actual building process needed to put up a housing unit with the resources labour, materials, equipment and tools.

The second research question that has to be answered is:
what is the role of self-help and of the production factors, what ways and means of optimizing these factors are available and what can be the role of productivity?

To answer this question,
- the many aspects of self-help, and the official policy in Kenya,
- the specific roles of the production factors labour, tools & equipment and materials,
- how their use/input can be optimized in terms of costs, and
- the role of productivity for the self-help builder with respect to optimization of the production factors,

will all have to be addressed. The answer to these questions will be sought in study of the literature and will include the author's own experiences as put down in publications and reports.
Chapter 6 deals with the pros and cons of self-help, the self-help situation in Kenya and the role of the production factors.

6.1 Main characteristics of self-help building

What self-help is
Self-help building is not new, in fact it is one of man's earliest activities extending back to the time of the cave dwellers [Ward, 1982, p. 7], see also Schneider [1976, p. 63]. As it is difficult to define the essence of what is meant

by self-help, different definitions, covering many aspects of self-help will be adduced. (1) According to Burgess [1985, p. 272]

> *'self-help building is distinguished from other systems of construction in that the family living in the house participates in the construction process by making different contributions (finance, labour power, administration etc.) be this in an autonomous form or as organized by an institution'.*

This definition is broad enough to incorporate all those building activities formally and informally. (2) Perlman [1986, p. 43] writes that self-help building allows people to build their own house in the way they like, at the speed they like and with the materials they like. Her definition is

> *'Self-help is described as a survival strategy based on the widest possible freedom of choice to allocate scarce time and resources. When opportunities expand and diminish, construction work can start and stop. Materials can be acquired piecemeal over months. When time is precious (e.g. because of a paid job) and when there is more cash available, part of the work can be done by subcontractors'.*

Self-help is therefore not necessarily self-built and participation is not necessarily physical. (3) Turner [1976, p. 171] writes that self-help is not necessarily self-building, but rather the user's control over the housing process from its inception, design, to management.

Other effects of self-help building

The meaning of self-help is not only that it results in the provision of cheaper shelter but also has an impact on the individual. It has a significant meaning to the individual as a personal achievement thanks to his own efforts. Self-help housing increases his self-esteem, he discovers his own talents, while at the same time he may acquire skills and knowledge he didn't possess before. Further, when a number of people or even a community are involved in the process, it can also improve improve social skills and sense of community. In addition, people who produced things themselves, are more eager to keep them in running order and also improve them [see also v.d. Linden, 1986, p. 23; Schneider, 1976, p. 32; Turner, 1976, p. 91]. The conventional view is that the builder and his family and neighbours organize the materials, the transport etc. and construct the housing unit. In particular, houses in traditional materials in a rural area and temporary housing in urban areas can indeed be put up in this way [see Spence, 1983, p. 307]. There are also examples of housing made of durable materials [Erkelens, 1981, pp. 15-19,28]

The ideas of Turner and the World Bank

One of the main representatives on self-help housing is John Turner [1972, p. 241] whose central idea is that the dweller controls main parts of the housing process. Some other ideas are that

- the concept of housing should be viewed as a 'verb' rather than as a 'noun'; in other words, housing is not just the material shelter, it is a process [idem, 1972, p. 148], so that
- housing is not to be considered as what it is, but as what it does. Not only physical characteristics are important but other aspects too [idem, 1976, p. 51],
- housing needs differ individually, hence large organizations can never cater for all of them. In other words, the main aspects of housing need to be left to the individual, which does not necessarily mean that the individual has to construct his own house [idem, 1976, p. 51],
- the task of government in housing is just to function as an enabler, without releasing it from the responsibility of organizing those things which cannot be expected of the individual, such as roads, power, water, etc. for the area [idem, 1976, p. 6], see also van der Linden [1986, pp. 19-21].

The World Bank, as a main initiator of (low-income) housing projects, has taken over some of the ideas of Turner, though they differ on a number of points. See also v.d. Linden [1986, pp. 28-30 and Vaessen, 1987, p. 5].

- Both agree that conventional solutions don't work, although the World Bank doesn't dismiss these conventional solutions.
- Both want to economize on the available resources; Turner by making more use of popular-sector resources, thus reducing the disadvantages of the larger scale, as those resources can cater for the individuals' needs. The World Bank shifts from public to private and community in order to bring down the expenditure, as the last two match supply and demand more efficiently.
- Housing provided by the World Bank is still in accordance with (lowered) ascertained standards, while Turner assumes individually set standards.
- The World Bank puts emphasis on the idea that what is assumed to be good for the government is good for the country.

Summarizing, it can be said that Turner and the World Bank do not contradict each other as both envisage the same solution for self-help building, but it is based on different visions; Turner assuming that self-help should be organized more individually, whereas the World Bank argues that self-help building should be organized more as a deliberate government strategy and assigns to government an important role as initiator [v.d. Linden, 1986, p. 28 and Vaessen, 1987, p. 5].

The role of the World Bank is not free of criticism as there are many examples, also in Kenya, where it failed to reach the intended beneficiaries, see Dandora site and services in Nairobi [UNCHS, 1987e, p. 80; Vaessen [1987, p. 7]. The present writer's opinion is that the role of government is that of an *'enabler'*, the individual self-help builder's is that of a *'doer'*, with the NGOs in between as vehicle, organizer, implementer, *mediator* 'in the belief that at least some organization, acceptable to both parties, should pull the car', at least in the beginning.

Advantages of self-help

Some specific advantages found in the literature on self-help are worth noting. According to TUE [1984, p. 4], the main advantage of self-help housing is that it can reach down to all but the poorest groups of the urban poor. It can also lead to a form of redistribution of resources according to Ramirez [1988a, pp. 2,16] who notes that, 'in state-assisted self-help projects the poor could use their bargaining power to enforce a transfer of resources towards them'. Self-help projects are also flexible, they permit a family to adjust expenditure on construction or improvements to a fluctuating income. And further, self-help housing projects tend not to be overdesigned; land use is generally more realistic than many public-agency designs. In this context it is also of interest to report on a positive correlation between self-help practices and low income: poorer households tended to rely more on self-help [Laquian, 1983, p. 217]. Bergh [1983, p. 10] found from research in Senegal that the dwelling so produced is considerably cheaper than contractor-built housing because of

- lower wage levels,
- no constant project costs (not so with contractors),
- members of the household participate in construction.

According to Soni [1981, p. 60] a form of self-help in which the individual works with building groups can have some specific advantages. The self-help builder can be provided with:

- assistance in finance,
- assistance in identifying an artisan,
- assistance in gathering information on building materials,
- assistance in seeking approval.

This view is supported by Laquian [1983, p. 46], who reports experiences in South America, where

- mutual aid is the social and organizational basis of community development efforts,
- it replaces a narrow attitude based on the family with a broader one based on the community,
- it is more efficient to work in groups of 20 than individually,

- families get to know each other in mutual-aid work and interact with each other even before they move into their houses,
- mutual aid replaces the initial down payment and facilitates access to home ownership by even the lowest income groups.

According to Perlman [1986, p. 44] it has been widely observed that 60 to 90 percent of the self-help built houses will have improved within five to fifteen years. When this happens, it improves the maintenance situation of the housing stock at the same time (see Chapter 5). However, specific problems are encountered, as will be seen below.

Theoretical critics

There is also criticism by Harms [in Ward, 1982, pp. 49,51] to the effect that

- governments have become interested in self-help housing as a policy to avoid distribution of surplus value, and further, that
- fewer resources need now be allocated to housing of low-income groups compared to when there is no self-help,
- governments appear to be liberal as they are not repressing self-initiatives but promoting them,
- self-help reduces the need for public subsidies to housing as it provides cheap housing,
- self-help increases the amount of unpaid labour in society,
- self-help devalues labour power and lowers pressure for wage increases by excluding housing costs from wages, and
- promotes petite bourgoisie mentality in owning and speculating with housing.

Burgess [in Ward, 1982, p. 57] and Ward [in Turner 1976, p. 6] criticise that self-help may lead to 'laisser faire' governments feeling less responsible for housing as the problem is solved anyway. However as abstracted from Kingham [1987, p. 7], we gather further from Burgess, that

- self-help has been practised for hundreds of years while the powerful elites go on building and consolidating their system of exploitation which makes self-help housing necessary in the first place;
- it furthermore, provides an inexpensive camp for the reserve army of the unemployed;
- the root of the housing problem is poverty. Self-help provides an excuse for authorities for not seeking a proper solution to the problem.

The last statement has already been discussed in Chapter 5 under (A) and the problem is addressed by increasing affordability. Moreover, the other criticisms are relevant but also inherent to self-help (see below) and to a capitalistic world [Ramirez, 1988b, p.10].

Productivity

Some authors give their opinion on whether self-help building is more productive than conventional housing. Turner [1972, p. 82] says about productivity, that 'In the longer run the productivity of centrally administered systems diminishes, as it consumes capital resources, while the productivity of locally self-governing systems increases as it generates capital through the investment of income'. This seems to be in contradiction with Burgess [1985, p. 286] who doubts whether a higher rate of productivity can be achieved. He (Burgess) writes, 'The state is aware that its finished housing programmes have higher levels of productivity than the artisan's forms'. But he admits that the state 'still fails to produce housing that is within the effective demand of the majority of the population'.

As will be seen in Chapter 7, which discusses productivity, weighting the statements of both authors is not easy without properly defining productivity. When expressed in terms of costs, the productivity of self-help can be higher than in contractor-built housing. Burgess [idem, p. 159] refers to Latin America where reduction of cost, due to the use of self-help labour, is around 30 per cent of the total cost of an industrially manufactured house. Bergh [1983, p. 21], shows from Dakar a reduction of 50% of the costs or, in other words, 2 times more floor area for a given amount of money. This is in line with Ramirez [1988b, p. 9] who, in a more balanced view on self-help building, states that figures on self-help are not so bad and therefore self-help should continue. We are in agreement with this viewpoint.

Practical points of self-help

1). Actual self-help construction occurs to a lesser extent than is thought. Spence [1983, p. 307] writes that actual self-help building is only found in traditional rural housing and temporary urban housing (with a low level of skills and building techniques). However, when it is a matter of more 'complex' housing, the self-help builder needs the assistance of hired labourers or craftsmen (Kishwahili: fundi). The self-help builder has also to deal with organization of the assistance, supervision, even contractual arrangements, payments, and so on. Sometimes the project organization provides for training in building and construction.

Soni [1981, pp. 58,63] found for the Dandora sites and services project, Nairobi that subcontracting is one of the feasible ways of constructing a house, because the required standards, building materials and finishes tend to demand greater construction skills than the allottee possesses [see also UNCHS, 1987b, p. 8]. This is also found in Lusaka [Laquian, 1983, p. 215] where about 90% of the households in site and services projects used hired labour for their houses. One of the reasons is that interviewees felt they did not have the skills needed to build a house of an acceptable standard.

Bamberger [Urban Edge, 1984, p. 4] experienced in Senegal that, contrary to the idea of a household using its own labour, it made better economic sense for them to be their own contractors and hire the labour. This subcontracting in self-help is also found on other continents. Van der Loop [1987, p. 23] reports that, in the Indian city of Vellore, the poor people engage an artisan for the construction of their huts, as special skills are required for earthen walls and thatched roofs. One may wonder whether simpler building techniques and materials might considerably reduce the need for subcontracting.

One is led to conclude that self-help more often means organizing the process than actually building. Tempelmans Plat [1986, p. 61] therefore distinguishes self-help management and self-help construction, in that self-help management covers the organizational aspects and self-help construction the actual building of the structure. This is a useful distinction and when both management and construction are meant, the term self-help building will be used in the present text.

2). Cost reduction is not always due to actual self-help construction.
Turner writes that the main cost saving is not the saving on labour costs through own labour input. The real savings come from organizing the construction process oneself and self-help management [Turner, 1976, p. 97]. This is also taken into account in the present study.

3). Governments are not always aware of the advantages of self-help.
As Koenigsberger puts it [1984, p. 51], few urban authorities have realized that, if they were prepared to guide and direct self-help activities, they could in fact, do so quite cheaply by provision of serviced plots in advance, instead of providing the services long after the houses have been built (and often in the wrong place at that).

Practical problems of implementation
a. There have been positive and negative experiences with building groups. From field interviews, but also from literature, it has been learnt that building groups do not always function well. They require proper financial control and preparation. That is often the reason given for refusal to join these groups [interviews 1988, Dandora].

b. The weakness of self-help is that the following things are often mistakenly assumed [Interview Syagga, 1990]
- the allottee has ample time,
- adequacy of management (e.g. purchases)
- adequacy of technical skills (e.g. to lay bricks),
- building standards are achievable, and
- housing is a priority of the allottee.

If these points are not satisfied, self-help fails.

Conclusions
The theoretical advantages, criticisms and practical points during implementation in self-help have been reviewed by the present writer. It was clearly indicated that the self-help approach is not without its problems. However, that should not prevent a basically sound concept from being put to use, with the observations, where applicable, being taken into account when readdressing some of these criticisms in formulating policy proposals (see Chapter 11). With this in mind, let us now look at the situation in Kenya.

6.2 Self-help building, the official view in Kenya

The government of Kenya wants to promote self-help building in housing construction in urban and rural areas. The Development Plan for 1984-1988 [Ministry of Finance, 1983, p. 165] states the intention *'to promote self-help housing construction both in urban and rural areas so as to increase housing stock at a reduced construction cost'*. The same plan makes mention of the Sites and Services Programme and the Settlement Upgrading in which the beneficiaries are encouraged to improve their housing structures and the environment through self-help efforts. The plan doesn't elaborate in detail. The new Development Plan 1989-1993 [Ministry of Planning, 1989] contains none of these ideas on self-help, but according to the interviews held in 1988, the government is still promoting this [Interview Maina, 1988] and many activities were noted during the field survey [Interviews 1988].

6.3 Actual modes of self-help building in Kenya

The organization of housing construction and infrastructure can be realized in different ways. Self-help occurs in many combinations and in many forms: individual self-help, with fundi, with subcontractors, with groups, through NGOs and cooperatives, etc. In Kenya we can distinguish the main modes of self-help [see also Soni, 1981, pp. 58-61 and Erkelens, 1981, pp. 41-43] for

new squatter construction, slum improvement/squatter upgrading, sites and services projects, as given below

i. completely self-help built, management and construction by the allottee and/or a building group (SHB),
ii. self-help management plus subcontracting an artisan/ contractor for the construction work(SHM), and the extreme case,
iii. self-help initiated but contractor-built, management and construction is by the contractor or fundi employed by the allottee or building group (CB).

Intermediate forms are, of course, possible, but these will not be further elaborated. This building process can be supervised/ guided by an NGO, government organization etc., or an organization specially set up for the project. The following paragraphs describe these modes in more detail.

(i). Self-help building by the allottee

The allottee can decide to manage and to construct his own house if he has proper knowledge of building materials and construction. In fact, this may be the cheapest kind of construction. He may get help in the form of third-party labour from others, and in return, help to pay for the construction of their houses with his own labour . Commitments to another job may prevent the allottee from constructing his house by self-help. Other options may provide better solutions. This option is often used in the case of constructing a temporary dwelling on the plot, after which the construction of a more permanent dwelling may start [see Sony 1981, pp. 58-61]. The allottee is in full control of the process, which is to a lesser extent the case when things are taken over by others.

Another form is self-help through a building group, which consists of a number of allottees who want to construct one or more rooms for each member with each others technical and financial assistance. The option of a building group has the advantage that allottees with a small amount of available money can share their finances. Financing can be done by paying a certain amount of money at regular intervals into a fund, from which the construction can be financed. Besides the managerial and financial organization by the building group, there is the construction, which can be done by sharing specialisms of members of the group. When a member has certain skills, he has the advantage over others and may need less assistance himself.

(ii). Self-help management and subcontracted construction

The allottee may have a paid job which offers more money and a continuous flow of income than he would if he were to construct his house himself. For the construction work he may employ a fundi. When he has spare time he

may assist the fundis, and thus reduce labour costs. Most of the technical decisions are made by the fundis, such as the building materials required, the right time for purchasing these materials, etc. This option of self-help is often taken in those cases in which a dwelling is built of more durable materials. Again, should the allottee be a member of a building group which does not have sufficient members to carry out the work (for which they are paid), the decision can be taken to subcontract the work.

(iii). Self-help initiated
In the case of management and construction by a fundi or contractor, a contract will be drawn up for the work to be carried out in a certain period of time. Sometimes agreement is based on a priced bill of quantities. The construction of the house is now taken over by the fundi/contractor. The costs of this mode of construction are higher than in the previous options but, on the other hand, the allottee is free for other jobs and is (most likely) assured of the timely completion of his house. This contract can also be made between a building group and a fundi/contractor. In the event that the allottee participates in a big project, it may be that a contractor is employed by the project administration.

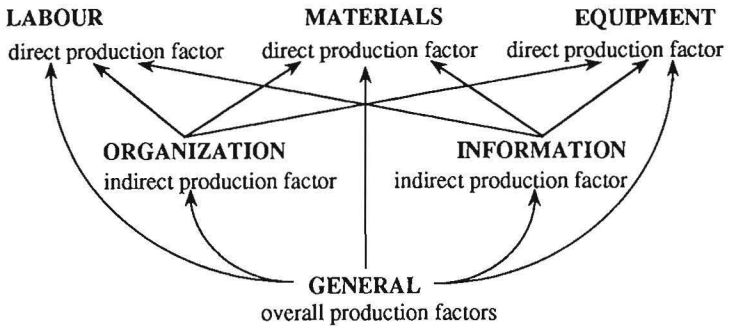
For big projects (like the Dandora sites and services project, etc.), all the organizational work may be taken over by the project administration which invites tenders and awards the construction work accordingly. The advantage to the allottee is that the administration is done by the project office. Furthermore, bigger contracts are generally cheaper than smaller ones (for instance, a single house) because overheads are lower, transport costs of building materials can be reduced because materials for a number of units can be transported at a time.

6.4 Role of production factors in self-help building

The production factors (=input) as seen from the technical building point of view will be discussed in this paragraph.
- At the level of the self-help builder we can distinguish labour ('work', skills, knowledge), tools and equipment and building materials. We consider them as **'direct' production factors** which are to a certain extent substitutable and directly needed for the production of building (Fig. 6.1), see also Sikkel [1987, p. I-2] and Poortman [1990, pp. 24,25].
- Organization and information can be considered as production factors as well, but at the level of the self-help builder they are **indirect production factors.** They are needed for the process of building and in that sense they influence labour, materials, tools and equipment.

- Last of all, a category of **overall production factors** is considered needed for both the process and the physical production of the house.
When this is arranged in a hierarchical structure, the following order of categories of production factors is arrived at (Fig. 6.1).

Fig. 6.1 Hierarchy of direct and more indirect production factors



From the three categories the direct production factors (found from study of literature and practical experience to be the most relevant) will be selected. The costs of the indirect and overall factors will be included in the factors labour, materials and equipment. For example, the cost of obtaining information or of organizing may be expressed in the labour costs. The three direct production factors will now be reviewed in the light of the three forms of self-help distinguished (i,ii,iii, see par. 6.3). When costs, urgency of need and availability are considered, specific differences between these production factors are shown in Fig. 6.2.

Production factor labour (work, skills, knowledge)
The self-help builder can invest his own labour. He may lack the knowledge in certain respects and he may need more skills combined in one person. Where a building group is concerned, this could be supplied by another member: the management, too can be done by those who are experienced. In a bigger project (sites and services) he can use the management facilities offered by the project office on the site. A project supervisor may be available to assist in surveying, levelling of the foundations, floors, etc. (for instance, he may indicate the required depth of the foundation). The contractor is likely to have personnel for specialist jobs. The self-help builder needing external advice, perhaps from a fundi, would have to pay for it; not so the contractor, who has this knowledge available in his organization. In subcontracting or as member of a building group, the allottee can contribute his own labour.

Fig. 6.2 Differences in urgency of need, availability and costs of production factors for the three self-help modes

	SELF-HELP MANAGEMENT AND CONSTRUCTION	SELF-HELP MANAGEMENT BUT SUBCONTRACTING	SELF-HELP INITIATED BUT CONTRACTOR-BUILT
MANAGEMENT	SELF-HELP	SELF-HELP	CONTRACTOR
LABOUR			
experience & knowledge	experience usually not available only for a simple house	experience usually not available only for a simple house	experience obtained through other projects
cost	no additional costs as using own labour for management	no additional costs as using own labour for management	additional costs for contractor's organization (overheads)
CONSTRUCTION	SELF-HELP	CONTRACTOR	CONTRACTOR
LABOUR			
skills	needs more skills in 1 person either he may receive an intensive training or he can employ a fundi	contractor has his own specialists for certain skills	contractor has his own specialists for certain skills
advice	sometimes advice needed which may be available from project administration	contractor has his own specialists for advice	contractor has his own specialists for advice
costs	no additional costs as he provides his own labour	higher costs because of profit, costs of labour & overheads	higher costs because of profit, costs of labour & overheads
BUILDING MATERIALS			
materials	is dependent on what is available nearby	can get higher discount because of work-relations with suppliers of materials	can get higher discount because of work-relations with suppliers of materials
other materials	is limited in possibilities of using other materials	can apply other materials can even make new products	can apply other materials can even make new products
construction techniques	limited number of techniques but also appropriate techniques can be applied	sophisticated techniques can be applied	sophisticated techniques can be applied
TOOLS & EQUIPMENT			
tools	uses often simple locally made tools available in household	can avail better tools for example imported ones	can avail better tools for example imported ones
equipment	equipment limited/not available possibly from projects administration transport needs to be	can avail of more sophisticated equipment	can avail of more sophisticated equipment
transport	organized or materials to be carried by himself	transport is usually available	transport is usually available

sources: UNCHS 1983b, p. 22; Erkelens, 1981, pp. 41-43

Production factor materials

Although the same design may be used, the building materials and techniques applied can differ as between the self-help builder and the contractor. The contractor has the advantage that he has more equipment available, can use other materials as he has other building techniques at his disposal (e.g. for laying concrete floors, etc.). The self-help builder can only use a limited number of materials in accordance with his skills, experience, available tools, transport, etc.

Materials collected from the street are free, but otherwise they have to be bought either new or secondhand. These last are from the informal sector, where people collect and sell materials like carton, sheet metal, etc. obtained

from refuse dumps. There may be transport involved (sometimes at some cost), which may be easier for a contractor than for the self-help builder. The contractor has the advantage that he can get a discount for quantity and better transport possibilities, he may have better access to the 'market' and he has his business associates.

Some of the above advantages, such as discount and transport can also be available to the self-help builder if he is a member of a building group or when the housing construction is on the larger scale of a project organization. A site office may offer assistance and there can be a yard to which building materials can be delivered. This facility is paid for by the self-help builder as a percentage of the total project costs (as was the case in the Dandora sites and services project). There are several examples of projects in which NGOs provided assistance to self-help groups for joint purchase and transport of materials [Undugu, 1986, p. 3].

Production factor tools and equipment
Depending on design, low-cost housing can be constructed with simple tools. A crane and scaffolding are generally not required. Tools may be available in the household or from relatives, a building group may possess a number of tools which can be shared. Equipment is usually not available, but 'the project organization' can make this equipment available to the individual self-help builder. For example, through the project office of a sites and services project. A self-help builder is then dependent on what is made available and whether it is being used by others. A building group may be in the position to hire the equipment externally for a longer period. The contractor can have better tools and some equipment, so that he is in a position to produce his own blocks, for example, while saving on transport cost and on the cost of the blocks. On the other hand, the self-help builder may be able to use appropriate technologies.

We conclude from the above that quantities and types of required labour, materials, equipment and tools can differ per type of construction and how the construction is organized (see Figure 6.2).

6.5 Price of production factors

Paragraph 6.4 reviewed the direct production factors in the case of self-help and contractor-built housing. For the first-named, the production factors can be available free of charge or at a (certain) price. From the point of view of the (poor) allottee we consider his possibilities of contributing to the direct production factors.

Labour, one of the allottee's human resources, can be split up into

- work or work capacity,
- knowledge (theoretical or practical),
- skills [defined as expertness, practised ability, Oxford Dictionary, 1971, p. 2847].

In general, these three are his only available free inputs when he has no paid job. However, when he is managing/constructing his house, while he could do a paid job at the same time, his human resources are available only at opportunity costs (defined as the maximum amount of money which could be earned when he is not engaged in building the house [UNCHS, 1986a, p. 49]).

Building materials may sometimes be freely available when these can be collected from somewhere.

Tools maybe freely available (as part of the household), which is seldom the case with equipment.

The price of the production factors is, furthermore, dependent on whether the allottee can borrow labour in exchange of his own labour at a later date. Sometimes tools and equipment can be borrowed or obtained at a 'friend's' price or just at market prices. Of course, all this is speculative and is really dependent on personal circumstances, traditions, location, etc. In the present study such imponderables will not be taken into account but will conform to the general tendency.

Total costs. When the production factors are expressed in terms of quantities and costs, the building costs can be estimated. They comprise:

Labour	: L_1	quantity of own labour + tools	unit cost l_1
	L_2	quantity hired labour + tools	unit cost l_2
Materials	: M_1	quantity of own materials	unit cost m_1
	M_2	quantity of purchased materials	unit cost m_2
Equipment	: E_1	quantity of own equipment	unit cost e_1
	E_2	quantity of hired equipment	unit cost e_2

Multiplying the quantities of production factors by their unit cost gives total building costs (K)

$$(K) = L_1 \times l_1 + L_2 \times l_2 + M_1 \times m_1 + M_2 \times m_2 + E_1 \times e_1 + E_2 \times e_2$$

These costs depend on the type of housing option and infrastructure, the chosen self-help mode, free availability of production factors and eventual opportunity costs, etc. In the case of Kenya, the following costs (assuming there were no opportunity costs, thus $l_1 = 0$, no own materials and equipment

and a minimum of hired labour for special jobs in case of SHB) were found from research (see par. 4.10) for the three modes

(CB) self-help initiated but contractor-built

quantities L_2; M_2; E_2

cost $K(iii) = L_2 \times l_2 + M_2 \times m_2 + E_2 \times e_2$

(SHM) self-help management + subcontracting
(15% reduction due to overheads, 10% due to profit)

quantities L_1 ; L_2; M_2; E_2

cost $K(ii) = L_2 \times l_2 + M_2 \times m_2 + E_2 \times e_2$

cost $K(ii) = 0.79 \times K(iii)$

(SHB) self-help management and construction
(21% reduction due to own labour for housing)

quantities L_1 ; L_2 ; M_2 ; E_2

cost $K(i) = L_2 \times l_2 + M_2 \times m_2 + E_2 \times e_2$

cost $K(i) = 0.625 \times K(iii)$

6.6 Conclusions

1. In this chapter we reviewed the input factors labour, tools, equipment and materials for the self-help builder required for the production of a certain housing output. Needs are dependent on the way self-help is organized.
2. Some of the input factors can be 'free' of charge or are available at a certain price to the self-help builder. This last also applies to own labour (in terms of 'work', skills and knowledge) where there are opportunity costs.
3. Most of the input factors are available within limits. Moreover, some of the inputs required for realization of the output are lacking. These inputs have to be sacrificed when they are not only available to a limited extent, but also needed for other purposes, for which reason it would be as well to limit the use of these inputs.
4. It is therefore advisable to consider methods of optimizing the input. This depends on the output as well, so we are once more faced with the problem of productivity.
5. The results of literature research on productivity will be reviewed in the Chapter 7.

7 SELF-HELP PRODUCTIVITY AND PRODUCTIVITY FACTORS

7.0 Introduction

This chapter first reviews some general thoughts on productivity in relation to self-help and the problems which put obstacles in the way of defining productivity. The productivity factors, the third basic research question and a setup for further research will be introduced. There is much confusion as to the meaning of the term productivity. It is often wrongly used and misinterpreted. More insight into productivity is not only the expressed wish of the building and construction industry, it is also an area of interest to most branches of the trade, in particular to those which are labour-intensive. We refer here, for example to the CIB, IABSE conferences and to articles published in the last few decades. This problem can be illustrated by the following observations.

The definition of productivity is not the same inside and outside the building industry, which makes comparison difficult. When building productivity is under consideration, the quality of the end product (= output) changes in the course of a period of time, the house of 1950 is not the same as in 1970, etc. Thus it is also difficult to compare productivity over a period of time [Revay, 1984, p. 3]. This is the aspect of two incomparable units. At micro level, that is on the building site , a great deal of research has been done during the last 20 years in western countries. These research activities deal in particular, with measuring productive and unproductive time spent on specific tasks in a job [Sikkel, 1983, p. 39].

It can be said in general that productivity is an ambiguous term. Everyone uses a different definition. It is not the present writer's ambition to solve this problem or find a definition generally applicable to all levels in the building and construction industry, but only one applicable to self-help building. Productivity in self-help building has not hitherto been a topic of detailed research, so that the study of other literature on the subject is imperative.

7.1 Opinions on productivity, labour, money, time

1. According to Wassink [1971, p. 12] productivity measurements done at regular time intervals will show trends; this is also the case when the changes and the effects of certain measurements are studied and compared over periods of time. The type of productivity information required may differ for the various levels and organizations.
-At **national level**, a ministry, for instance may be interested in raising productivity, with the aim of reducing housing costs.
-At **branch level**, better insight into productivity may improve the competitive position vis-a-vis other branches.
-At **building company level**, the interest may be in increasing productivity in order to raise the profit margin within the actual contract sum.
-At **project level**, as on the building site, measurements can give indications for estimates of future projects, and also for checking up ongoing projects [see also Erkelens, 1984, p. 2].

2. The World Bank [Horton, 1981, p. 6] has its doubts as to the usefulness of such productivity measurements. Comparing the same goods produced by different people, factories or countries may not be easy owing to quality differences. There are many productivity studies that focus on a single product or work activity, but the general conclusions that can be drawn from these are thought by the World Bank to be extremely limited. Eilon [1976, p. 7] also have a number of observations on measuring overall productivity as regards
- the measurement of heterogeneous inputs which are often subject to change in composition in the course of time,
- how qualitative changes in outputs can be measured, especially during the phases of change in a period of time,
- how to determine the relevance of particular input,
- output comparisons in evaluating performance in various operations, and
- how to interpret the findings, as regards the need to differentiate between the influence of internally controllable and externally imposed factors.

3. Dogramaci [1981, p. 5] concluded from his survey that many authors think that a productivity increase can lead to a higher standard of living, less inflation, better trade balances, further growth in productivity, more leisure time, more money for ageing populations and even for environmental improvements. He notes, too that these relationships are not universally accepted.

4. There is often resistance to improving productivity on grounds of causing unemployment. This concurs with the views of Strassmann [1982, p. 32] who writes that, when labour is made more productive through education, the result need not be higher unemployment, but that, thanks to increased labour productivity, production can be cheaper and construction greater (assuming that increased labour productivity compensates the other increased inputs needed to obtain such increased productivity).

5. Labour productivity is often put forward as representing total productivity [Hooren, 1979, p. 61]. This may lead to misinterpretations, as the inputs of other factors are not reflected, and even be the cause of a higher or a lower productivity figure, so that other actions/measures may be required than those based on labour-productivity figures.

6. When labour productivity is used, it is often done in the wrong way. Hendriks [1982, p. 2] writes that it is incorrect to use the development of the gross production by labour as a yardstick for the development of the labour productivity on site. This productivity figure doesn't make a distinction between the activities in the preceding phase and those on the building site, for instance, when a prefabricated unit, obtained, of course, from elsewhere, just has to be fixed on the building site with one screw, and raises labour productivity on site (as gross production per man-hour) to a high level, although the labourer on site is just doing a little bit.

7. Bottoms [in Tangeraas, 1980, p. 101] writes that time could be one of the best units for expressing productivity: it is inflation-proof and is an international standard, whereas financial units are affected by inflation, currency fluctuations and are sometimes difficult to explain and understand. The problem remaining of how to aggregate and/or compare, to take but one example, man-hours of a mason or a manager with machine hours. Some form of conversion is still required, for which the money dimension can be of assistance.

7.2 Definitions found, pros and cons

The results of a search for definitions and relevant aspects in relation to self-help productivity are presented in this paragraph. Fig. 7.1 (page 96) gives an extensive review of definitions found for productivity which are grouped in the categories (I) general, (II) total, (III) labour, (IV) capital, (V) material and (VI) miscellaneous. Other research into productivity definitions was previously published [see Sikkel & Erkelens, 1984, and Erkelens, 1984, pp. 6-7]. Only the main results are referred to here.

Study of the literature reveals *a great variety of definitions for productivity*. The International Labour Organization [ILO, 1979, p. 4] defines productivity as the **ratio of output to input** or, more specifically as the arithmetic ratio of the amount produced to the amount of means used during such production. This definition was adapted for building and construction by Sikkel & Erkelens [1984, p. 48] as the ratio of what is produced (= the production, or the output) to what was required in order to realize this production (=input). Tangeraas [1980, p. 195] applies a broader definition, that is the ratio of the business result to the input of resources (see Fig. 7.1 sub I). The different ratios from the ILO, Sikkel and Tangeraas already indicate the problem; the first one hints at the dimension of quantities but remains vague as to which quantities, there is a vague dimension in the second, while the third one uses the money dimension. These definitions illustrate the confusion earlier reported. Possibilities for aggregation in the input as well as in the output remain unclear, particularly in the case of the ILO definition. It can be concluded that these definitions are 'in the right direction' but not detailed enough for the self-help builder.

Single-factor productivity (SFP)
The above definitions can cover all production factors, whether aggregated or just a single one. The literature distinguishes single-factor productivity (SFP), if one input factor is considered (such as labour, capital and material) and, the total-factor productivity (TFP) for all the factors taken together, see below. From literature studies a number of definitions was obtained on SFP and they are shown in Fig. 7.1. under (III,IV,V). This review of single-factor productivity definitions does not, however give a directly usable definition. During the literature study possible defects in judging were encountered when working with SFP exclusively. It was also found that productivities have to be related; considering just one type of productivity need not lead to correct conclusions. It may be found that the productivity of one single factor may be on the increase while another SFP is doing the opposite. The use of TFP thus gives the best impression (Horton, 1981, p. 4). The use of SFP is thus discouraged here unless it is specifically required. More is expected from a review of the definitions of total-factor productivity.

Total-factor productivity (TFP)
Where a number of input factors are involved we have multiple or total factor productivity. Revay [1984, p. 3,4] suggests the
following expression for

$$\textbf{total factor productivity (TFP)} = \frac{Q}{a.L + b.K + c.E + \text{etc.}}$$

where Q= the quantity of output
L= the quantity of labour
K= the value of invested assets
E= the use of construction equipment
a,b,c are weighting factors to be established later.

These weighting factors are needed as quantities and/ or values and can usually not simply be aggregated. This definition of Revay is admittedly open to some criticism, although theoretically sound. It is a good theoretical formula but its usefulness depends on the weighting factors determined. It is also unclear why K and E have been distinguished and what the dimensions of the denominator are.

Yousif [1990, p. 15] suggest a similarly structured definition, but formulated for the company level with money as the dimension, so that the TFP =

$$\frac{\textbf{total output}}{\textbf{labour + capital + raw materials + other miscellaneous goods}}$$

A similar definition is used by Dogramaci [1981, p. 7], that is
TFP = the ratio of the quantity of produced output and a weighted combination of quantities of different input factors used.
Hendriks [1982, p. 5] defines the TFP (of a building project) as

$$\frac{\textbf{production foregoing phase + site production phase}}{\textbf{total of used production factors in both phases}}$$

Both authors don't address the problem of a definition for aggregated factors but leave it at a mere description.

4. *Uniformity of output/input*
When the **output is homogeneous** over a certain period of time, outputs from this period can be compared with each other. When differences occur in quality, design, etc., we do not compare the same outputs. In that case there is a problem which needs special attention and possibly rectification or adjustment (by weighting factors) to make them comparable. We will come back to this if it is a problem in the present research. The same applies to the **uniformity of the inputs**. The various inputs may not be uniform over the period of time, and is thought to be a different problem compared with the output. The output is the result of a complex of production inputs, whereas the input, is by definition, a 'lower' level of aggregation. Differences in labour, capital and material will be reflected in both quantities and prices which guarantee comparability to a certain degree.

Fig.7.1 Review of productivity definitions found from literature

I. GENERAL PRODUCTIVITY DEFINITIONS

* ratio of output and input: (arithmetical ratio of amount produced and amount of used means during that production) [ILO, 1979, p.4; Shaddad, 1981, p. D. 1.96]
* ratio of what is produced and required to realize this production [Sikkel, Erkelens, 1984, p. 48]
* ratio of amount of production to amount of productivity factors [Pen, 1958, p. 297]
* measure of effectivity [Wassink, 1971, p. 30]
* output per unit of time [Shaddad, 1981, p. D. 1.96; Fazio,1984, p. 65,]
* form of efficiency. [Shaddad, 1981, p. D.1.96]
* rate of return [Shaddad, 1981, p. D.1.96]
* optimum of resources to obtain an acceptable goal [Shaddad. 1981, p. D.1.96]
* real productivity= norm productivity x efficiency x effectivity (Pr = Pnorm x effectivity x efficiency) [In 't Veld, 1972,p.8]

II TOTAL FACTOR-PRODUCTIVITY

a). $\frac{Q}{(a.L + b.K + c.E + etc.)}$ (Q:output, L: labour, K:invested assets, E use of equipment, a,b,c, weighting factors) [Revay, 1984, pp. 3,4]

b). $\frac{\text{(total output)}}{\text{(labour + capital + raw materials + other miscellaneous goods)}}$ [Yousif, 1990, p. 15]

c).ratio of the quantity of produced output to a weighted combination of quantity of different input factors [Dogramaci, 1981, p. 7]

d). $\frac{\text{production foregoing phase + site production}}{\text{(total of used production factors in both phases)}}$ [Hendriks, 1982, p. 5]

III LABOUR PRODUCTIVITY

* ratio of the national product to the amount of labour (or number of pairs of working hands) [Pen, 1958, p. 42]
* output by/per manhour [ILO, 1969, pp. 22,23; Dogramaci 1981,pp. 5,6; Gold in Dogramaci, p. 102]
* output per unit of labour input [Fazio, 1984, p. 65]
* amount of output produced per man-hour -week -month -year [Rakhra, 1984, p. 53]
* average monthly output by 'employed' worker [Dunlop, 1964, p. 38]
* disposed volume per productive manhour [MVRO, 1981, pp. 28,29]
* productivity by job [in't Veld, 1972, p. 10]

$\frac{\text{result (value added in one year)}}{\text{average number of workers (in that year)}}$

* $\frac{\text{value of produced and sold products}}{\text{a labourer}}$ [Malotaux, 1983, p. 18]
* ratio of result to therefore required input of labour capacity units [in 't Veld, 1972, p. 9]

ON THE BUILDING SITE

* average labour productivity = $\frac{\text{building production}}{\text{number of labourers on site}}$ [Roest 1973, p. 50]
* $\frac{\text{value added of the production of building}}{\text{the number of labourers on site}}$ [idem]
* nett labour productivity = $\frac{\text{site production}}{\text{manhours on site}}$ [Hendriks, 1982, p.5]

gross labour productivity (on site) = gross production per man:

* $\frac{\text{production fore-going phase + site production}}{\text{manhours on site}}$ [Hendriks, 1982, p. 5]

total labour productivity:

* $\frac{\text{production fore-going phase + site production}}{\text{total labour in foregoing phase and site (incl. transport)}}$ [Hendriks, 1982, p. 5]
* the amount of manhours per m2 floor area [Woodhead, 1977,p.7]

IV CAPITAL PRODUCTIVITY DEFINITIONS

* ratio of result to therefore required capital [In 't Veld,1972, p. 10]
* ratio of value added to the capital used during that year [in'tVeld, 1972, p. 10]
* ratio of output to assets [Revay, 1984, p. 3]
* ratio of productive to nett fixed capacity [Gold in: Dogramaci, 1981, p. 100]
* machine productivity: the ratio of the amount produced to the amount of resources used [ILO, 1979, p. 5]

V MATERIAL PRODUCTIVITY DEFINITIONS

* ratio between the amount produced to the amount of any material resources [ILO, 1979, p. 5]
* ratio of output to materials volume [Dogramaci, Gold, 1981,p.100]

VI MISCELLANEOUS PRODUCTIVITY DEFINITIONS

* return = $\frac{\text{profit}}{\text{capital}} \times 100\% = \frac{\text{output minus input}}{\text{capital}} \times 100\%$ [Wassink, 1971, p. 34]
* value added ratio as overall measure of productivity [Weinel, 1981, p. B1.22]
* intellectual productivity (of a team of persons): ratio of improvement of information and size of team. [Zipse in Sprague, 1974, p. 111]
* economic productivity: ratio of sales, revenues to cost of labour, capital, materials, services [Tangeraas, 1980, p.195]
* ratio of the business result to the input of resources [Tangeraas, 1980, p. 191]
* ratio of benefits obtained to the amount of money and effort put into a task [Shaddad, 1981, p.D.1.96]
* fertility [Malotaux, 1983, p. 18]
* productivity: comparison between the calculated and the real production cost [Kanawaty, 1981, p. 93]
* ratio of quality to cost multiplied with a factor: $P = f \times \frac{\text{quality}}{\text{cost}}$ [Sikkel, 1983, Vol. A, p. 10]
* technical return: output/input x100% [in'tVeld, 1972, p. 8]
* economic return: ratio of nett profit (= capital increase) to invested capital x 100% [idem]
* material labour productivity: number of products per number of hours [Malotaux, 1983, p. 19]
* manhours per product unit [Shaddad, 1981, p. D1.96]

5. *Dimension of output/input*
It can be seen from the definitions in Fig. 7.1 that all sorts of different dimensions are used. In the case of single-factor productivity, the use of units can be more diverse. However, in either multiple-factor productivity or total-factor productivity more use is encountered of a few units, that is time units or money units. This can be explained by the need for aggregation of the various input factors or outputs.

6. *Aggregation of output, input*
None of the above authors referred to, indicates how to aggregate output when different items are involved. This will be left for discussion in par. 7.3. For the aggregation of input factors, use can be made of conversion factors (see also Revay, idem). The most common conversion factors convert inputs into time units or **money units**. The money unit suffers from the disadvantage that its value can differ over the years due to inflation, but can be corrected for that. The use of **time units** (e.g. man-hours) is, at best, feasible for single-factor productivity. When the input of other production factors, such as machines have to be aggregated with labour, for instance they can not simply be aggregated in the form of man-hours + machine hours, to take another example. The latter can be converted into man-hour equivalents, but often by way of first converting them into money units. Aggregation is even more complicated in the case of materials input. Time units wouldn't work, or might be meaningless. From the above it can be concluded that, for aggregation purposes, money units are more workable.

7.3 Definition for self-help productivity

From the previous paragraph it can be seen that there is a variety of definitions, many of them only applicable to a certain sector. In selecting a definition for self-help building, the definitions in Fig. 7.1 must first be checked against the criteria developed in par. 7.2, points 1 to 6.

a. Categories of definitions sub (III), (IV) and (V) don't satisfy requirements as they concern SFP, use of which was discouraged in favour of a total productivity definition.
b. The general productivity definitions under (I) can also be used as total factor productivity but they are not sufficiently detailed. The aim is to make the input factors visible in order to optimize their use. This means that a definition like 'form of efficiency' is not a satisfactory definition either, as it concerns all the input factors taken together.
c. Categories under (VI) 'Miscellaneous', don't meet requirements, as a definition dealing with the process of house building is what is being looked for.

d. We are therefore left with definitions of total-factor productivity (TFP) under (II), which are in a way similar and not applicable in unadapted form, though their structures can be used. As no definition has been found suitable for the self-help-builder case, one will be developed on the basis of the above observations. A general productivity definition could be the ratio

$$\frac{\textbf{output}}{\textbf{total of (weighted) inputs}} \qquad \text{....(1)}$$

and more specifically,

$$\frac{\textbf{output of a housing unit}}{\textbf{labour input + material input + capital input + other inputs *)}} \qquad \text{....(2)}$$

*) By capital is meant plant, equipment and tools

The following (basic) remarks can be made for both input and output.

Input
In Chapter 6 it is shown that the "quantity" of the productivity factors or input factors has to be optimized, as it is limited in availability. This doesn't necessarily mean a minimization of inputs, what counts is the maximum of the ratio. It has been already noted that the inputs can be aggregated by the use of weighting factors. For all practical purposes, the factors will be converted into the money 'dimension'. The height of the prices expresses the scarcity and is a means of weighting the various factors.

Output
In Chapter 2.4 it is maintained that, as the GDP/capita will hardly be subject to change over the period 1989-2000, there will be no dramatic changes in the housing indicators, such as the availability of water, electricity, number of rooms per house and number of persons per room. Consequently the type of housing output is unlikely to change much either. There may, of course, be a change in the annual production quantities. But consideration of squatter units, slums, sites and services units indicates that there are no reasons for assuming that these forms of output will change in character, especially when it is the individual self-help builder, constructing one unit in his lifetime, usually following old, non-innovative ways, who is being considered. It is therefore concluded that, up to the year 2000, the type of output will remain homogeneous. In other words, the numerator in the productivity definition no. (2) for the self-help builder remains 'constant'; which is a reason for looking only at the denominator.

Definition
We now define the productivity of the self-help builder or **self-help productivity as**

$$\frac{\textbf{output of a housing unit}}{\textbf{total expenditures on labour + materials + equipment}} \quad \text{....(3)}$$

The denominator of this productivity ratio includes possible expenditures on labour (force, knowledge, management, skills), materials (inclusive of transport) and equipment. The tools are integrated cost-wise in labour (see also par. 6.6). What we now have is (i) a simple and workable definition of self-help productivity and (ii) the input can be made homogeneous with the denominator converted into money units. The general definition for self-help productivity is now

$$\frac{\textbf{output of a housing unit}}{l_1 \times L_1 + l_2 \times L_2 + m_1 \times M_1 + m_2 \times M_2 + e_1 \times E_1 + e_2 \times E_2} \quad \text{....(4)}$$

Productivity increase
Self-help productivity can be increased in a number of ways, by increasing /decreasing of input/output and/or in combination [Erkelens, 1985e, p. 146]. But if the output remains constant, all that can be done is to try to reduce the size of the denominator. Or, in other words, reduce expenditure on labour, materials and equipment. In order to achieve reduction in expenditure on these inputs or production factors, these inputs have to be influenced. By definition, this is done by the already briefly mentioned productivity factors. What comes to mind now, is to reduce the quantities needed, by substituting the production factors by other 'cheaper' ones and/or reducing the cost of the respective production factors.

7.4 Productivity factors

Productivity improvements and maximization of the self-help productivity ratio can be achieved by influencing the input, the output or both. The factors which influence the input, output or both are called (by definition) productivity factors [Sikkel, 1983, p. 10]. A variety of different factors can be distinguished.

Single and multiple-factor productivity factors
According to the discussion in 7.3 it is assumed that the output remains homogeneous. Therefore a productivity factor will only influence the input. A distinction is made between the two types of factors (a) and (b) about to be discussed below.

(a) *Single-productivity factor or SFP factor.* This is a productivity factor which mainly influences one of the input factors labour, materials or equipment, more directly, influencing in turn the SFP ratio and consequently the TFP. (An example of SFP factor is the use of 'second-hand materials' which only influences materials productivity, as it requires the same labour and equipment).

(b) *Multiple-productivity factor or MFP factor.* This is a factor, which influences more than one of the input factors (labour, materials, equipment) directly, or indirectly via the indirect or overall production factors. This factor therefore influences more SFPs and (eventually) the TFP. (Eventually, as one SFP may increase and another SFP is doing the opposite, the TFP remaining unchanged). Examples of MFP factors are: (i) 'topography of plot' which influences more than one of the direct production factors and (ii) available project time, which influences the indirect production factor, organization, (and through it labour, equipment, and materials).

Impairing and enhancing productivity factors
The above SFP and MFP factors can be impairing, enhancing (positive) or neutral. We now define an 'impairing' productivity factor (abbreviated: IPF) as one which causes a decrease in productivity (e.g. a low level of skills). In the same way, we define a 'positive' productivity factor as one which enhances productivity (e.g. a high level of skills). A 'neutral' productivity factor is a factor which doesn't bring about any change in productivity (e.g. the level of skills) but plays a role if given an impairing or enhancing direction.

7.5 Third research question

Maximization of self-help productivity demands optimization of the input. Therefore what has to be known are the productivity factors that impair or enhance the productivity of the self-help builder and what measures could be taken. Moreover, it is important to know what actors can have an impact on these productivity factors. As the research findings can be of importance in a number of countries, it is of interest to develop a general method. The **third research question** is therefore formulated as follows. *Is it possible to develop a generally applicable method for identification of productivity factors and measures to improve the productivity of the low-cost housing self-help builder?*

The method has to deal with the five following areas.

1. It indicates the productivity factors affecting self-help productivity and the measures involved (Chapter 8).
2. For a given country (in this study Kenya, urban areas) it identifies these factors and (eventually) new ones, and indicates the (most) important (impairing) productivity factors (Chapter 9).
3. It identifies enhancing (or so-called positive) productivity factors and expresses opinions on measures (Chapters 9 and 10).
4. It indicates measures that have therefore to be taken, in order to influence the (most important) factors (Chapter 11).
5. Evaluation of the method so developed (Chapter 11).

7.6 Set-up of the research

This paragraph discusses the various methods of data collection and briefly touches on the method of sampling and analyzing the collected data.

Data collection
A combination of different methods of data collection served to compensate to some extent for the shortcomings of each of them. Two primary methods of data collection, a (general & local) literature survey and (local) interviews were used. The idea of active participation in building low-cost housing in different categories in several countries was soon rejected as unfeasible. Moreover, for our purposes and in view of (1) communication problems, (2) the level of comprehension on the part of respondents, (3) the extent of their understanding of foreigners and (4) the limited time available this does not seem to be feasible.

The literature survey will be mainly used for answering question 1. The factors and measures found will be structured, so that the factors are presented in an overall framework and described individually in so-called productivity factor analysis sheets, together with the envisaged measures (see Chapter 8). As it is not known whether all the factors are covered by the general literature study, local research will have to be carried out in a country, in this case in Kenya. This will include reading local publications, project documents, files, memoranda and statistics required in order to get up-to-date information.

Literature and local project documents and reports could also be used to answer questions 2, 3 and 4. This will certainly contribute to our knowledge but it is very unlikely that all the (impairing and enhancing) factors will be found. Certainly not from the main target group, whose experience is never

put down in writing. Therefore the other primary method of data collection is visiting and interviewing respondents instead of using telephone or mail.

- telephone: Not all the respondents have one and when they do, it is likely to be out of order. Moreover, the questions are too numerous.
- mail: The likelihood that the respondent is illiterate should not be overlooked and many don't have a letter box.

A semi-structured checklist was drawn up for the interviews, see further Chapter 9.

'Free' interviews and site observations are used as secondary methods of data collection and for cross checking collected data.

-The 'free' interview with authorities and others is useful for obtaining additional information not found previously and for cross checking certain data or responses.

- Visits to low-cost housing sites where self-help builders and NGOs are actively engaged can yield additional information. Actual viewing and 'getting the feel' of the project areas during the work process give a clearer impression of the problem, which can never be adequately described in literature. Pictures which underline certain circumstances in the area can be helpful in analysing research results. Such observations can round off an impression and have to be considered as subjective support of this research.

Population, research unit, sampling

Apart from the self-help builders, other actors, such as those described in Chapter 3, to wit, government and semi-official bodies, the NGOs, the consultants, small, medium, and big contractors and artisans are included in our interviews. For more details of that and of sample sizes see Chapter 9.

Data analysis

A descriptive statistical analysis will be carried out, in which the average scores are counted from the structural part of the interview and the nature of the answers to the open questions is analysed. From this the most important productivity factors for Kenya (Chapter 10) and related measures (Chapter 11) can be found. Moreover, efforts are made to establish whether there is any relation between a respondent group and the answers/scores on productivity factors, though much more than a general impression is not expected.

8 PRODUCTIVITY FACTORS, FRAMEWORK, ANALYSIS SHEETS

8.0 Introduction

This chapter deals with the literature survey on productivity factors, their presentation in a framework and the productivity factor analysis sheets as part of the method under development.

8.1 Literature study productivity factors

As we only found limited literature on the definition of self-help productivity, we did not expect to find much on self-help productivity factors either. We therefore report on factors obtained from other sources, such as the building and construction industries in particular.

(i) *Literature from contractors and research institutes*, mostly from industrialized countries, gives information on (productivity)factors, on labour productivity, capital productivity, etc. Apart from a number of general publications on this theme, we drew information from research on productivity and productivity factors from

- The Netherlands
  Sikkel and van der Heijden [1983] whose survey covered all participants in the building and construction industry.
- Canada
  Fazio [1984, pp. 65-70] carried out a survey in 1982/83 among owners, general- and trade contractors to obtain an idea of the main factors impairing construction productivity.
- U.S.A.
  Chromokos [1981, p. D.1.50] reports on a survey of 400 firms in 1979 and made an inventory of areas for potential improvements in productivity.
- U.K.
  The same sort of research was reported by Shaddad [1984, p. 619].

(ii) *Literature from developing countries*
Apart from some general publications on productivity, for example from the ILO [1979] and Horton [1981] we found information in Turner [1976],

Fig.8.1 Framework of productivity factors for the self-help builder

	B. LABOUR	C. EQUIPMENT	D. MATERIALS	E. ORGANIZATION	F. INFORMATION	A. GENERAL	
NATIONAL	labour conditions availability skilled labour availability artisans avail. trained inspector/superv. organization of labour market influence of unions		quality of materials availability local materials availability import materials price of materials price changes of matedrials suitability of materials number of different materials offered location materials shops	structure of building process	influence of national procedures influence of regulations influence of codes/bylaws speed of approvals/permits availability of good bldg manuals available standard specifications influence council procedures information new techniques know how relation design execution	political stability availability infrastructure competition variability of weather degree of technological progress support for R & D interest rates credit policies encouragement of savings degree of inflation attractiveness of plot value	NATIONAL
HOUSEHOLD	committments to regular job responsibilities to family size of family input of family members available time for building levels of skills available time for supervising quality of supervision available time for organizing health conditions literacy rate traditions of workers length of working hours		knowledge of materials knowledge of materials prices knowledge of quantities needed	organizing ability of things identifying good subcontractors organization of households cooperation between members relation with other SH builders familiarity with project coord. available project time building phases ready in time stability of production project preparation project organization use of planning degree of work organization participation in decisions accidents safety	knowledge of procedure informal contracts availability support for approvals decisiveness speed of households documentation of past projects knowledge of the project knowledge building techniques knowledge survey techniques knowl. criteria mats. loan knowledge on fits & tolerances form of contract	stresses to regular income income level financial resources	HOUSEHOLD
PROJECT	relations between workers quality of hired labour	maintenance of equipment availability spare parts wear and tear of equipm/tools use of right tools	quantity of materials used use of 2nd hand materials quality of blocks made quality of mixed concrete transportation on foot/cart soil conditions soil survey carried out materials quantity in designs correctness quality standards degree of prefabrication standardization degree of materials waste storage methods reliability of supplies quantity discount	degree of quality control cooperation between crafts number of subcontractors ability for cost control cost changes location of temporary unit plot topography plot remoteness size of project complexity of project degree of community participation degree of formation house bldg groups number of participants type of construction method of construction	security of plot legalization complexity of design consistency of product specif. quality of drawings availability of detailed drawings standards for mats. vs. skills standards of finishes vs. skills. standards of construction vs. skills. allowed versus applied standards training programmes skilled labour adequate labour instructions availability general project info.	philosophy project organizer	PROJECT

Soni [1981], Bergh [1983] and Duchart [1986], to mention only a few, and more in particular from Moavenzadeh [1978] but then only on the theme of labour productivity factors.

(iii) *Own publications and experiences* [Erkelens, 1978 up to 1987].

Productivity factors
Many of the authors present the factors in lists with not very much background information. In a number of cases no reference has even been made to a definition of the productivity to which these factors apply. In all cases we have to judge or ourselves, whether factors can be identified as a productivity factor for the self-help builder or not. In order to be sure that this was done correctly, we sought the assistance of the HRDU. Examples of rejected factors are 'toolbox meetings' and 'size of office staff'.

Some of the factors found can be directly recognized as an (impairing) productivity factor. But there are also productivity factors which are hidden in a formulation, for example when the author discusses areas for potential improvement of productivity (e.g. decrease of the burden posed by some health regulations). The productivity factor 'health regulations' and impairing productivity factor 'burdensome health regulations' could be abstracted from this example. We further note that a number of the identified factors also play a role in the 'fore phase' where they can also be considered as conditioning factors prior to the actual start of construction activities (see Chapter 11). From the literature studies we identified 129 productivity factors, see Fig. 8.1.

8.2 Development of framework

General
We structure the factors in a framework for a clear presentation of the factors found, for the field survey and for further analysis. From the literature we found some suggestions for this structuring.

- Fazio [1984] grouped factors under 7 categories: project conditions, market conditions, design and procurement, management of construction phase, labour, government policy and regulations, education and training;
- The ILO [Horton, 1981, p. 13] distinguished three categories: general factors, organization & technical factors and human factors;
- Shaddad [1984, p. 619] used a classification of: external forces, utilization of resources, application of scientific techniques, information factors, structural factors, training and selection factors and motivational factors;

- Sikkel et al. [1983] categorized factors under 5 headings: society, quality, building process, technology and innovation and organization;
- Finally we refer to Moavenzadeh [1978, pp. 203-etc.] who used the five categories: natural conditions, the nature and quality of management & organization, the nature and quality of labour, the availability of capital and the level of technology.

The order is one-dimensional in all cases, but we want to distinguish a (two-dimensional) grid, which shows relationships to both production factors and 'levels of influence (see below and Fig. 8.1).

Grouping of productivity factors in columns
We selected 6 categories of factors (A up to F)
1. Productivity factors more or less directly influencing the production factors will be grouped under: **(B) Labour, (C) Equipment and (D) Materials.** The factors grouped under (B), (C) and (D) are therefore more the SFP factors.
2. Productivity factors affecting the 3 production factors more indirectly. These will be grouped under **(E) Organization and (F) Information.**
3. Productivity factors which are more general or which cannot be grouped under (B) to (F) inclusive, will be grouped under **(A) General.**
Factors under (A), (E) and (F) are more the MFP factors. Wrong location of factors in the framework, doesn't affect any result or interpretation as the factors are analysed individually.

Grouping of productivity factors in rows
Three vertical levels are distinguished for interviewing the various groups of respondents, National (inclusive the building industry), the Household of the self-help builder and the building Project see also Fig. 8.1.
- **level (1) National,** factors which are specific to the nation and environment and independent of the project and household (e.g. interest rate). Different self-help builders' households and different projects may be affected by the same national/environmental factors, e.g. city regulations, availability of materials.
- **level (2) Household,** this covers factors which are specific to the self-help household (for example his personal circumstances: income situation etc.).
- **level (3) Project,** involving factors specific to the project (e.g. topography of the site).

A factor is placed at level (3) if it is typical of a project and it is placed at the household level (2) if it is thought to be typical of a household. When a factor applies to several levels, it is placed at the highest applicable one.

Code numbers
The factors are given a code number for processing purposes and for easier reference to the location in the framework (see Appendix 8.A).

Productivity factors in the framework
The 129 productivity factors referred to above, which are potentially effective in the self-help productivity, are now placed in the framework shown in Figure 8.1, in which the factors are described as 'neutral'.

8.3 Productivity factor analysis sheets

Apart from the names of the productivity factors, we also collected background information on these factors. For structuring them and other relevant information, and easier future use, we developed a standard form of presentation for each of the factors in what is known as a '**productivity factor analysis sheet**'. Here we also indicate what is provided by the literature and our own experiences (and later on the field survey, see Chapter 10) as a measure for influencing that factor. We restrict ourselves to those measures which, according to literature, surveys and own insight have the most impact. We distinguish hereby (i) short-term and (ii) long-term measures. (i) Short-term measures mostly have a direct effect on the building process, leading either to a real solution or to a temporary one, by avoiding the problem. These measures can be taken within a relatively short period (e.g. a year or so) and, in fact, before each start of a new building project. (ii) Long-term measures have mainly to come from external changes leading to solutions of problems not directly related to the project. Organizing may need more time and is effective in the longer term. We also indicate effects on the productivity factor itself and other effects, too. The layout of the developed analysis sheets is given in Fig. 8.2. More details and a selected number of completed sheets is found in Appendix 10.E.

Fig. 8.2 Set-up of productivity factor analysis sheet

Code number and name of the productivity factor	
Description :	brief description of the productivity factor (with literature references)
Impact:	possible impact on housing construction
Measures	
Short-term:	measures on how to influence the construction proces
Long-term:	measures on how to improve the circumstances by external action
Effect:	possible effect of measures on the productivity factor and other issues

9 DEVELOPMENT & TEST OF INSTRUMENT, FIELD SURVEY

9.0 Introduction

In this chapter we will work out the instrument for the interviews and review the field survey in Kenya.

9.1 Form of instrument, interview, checklist

The instrument will consist of a semi-structured interview, which is motivated below, and has three sections
- Section 1. General information sheet,
- Section 2. The structured checklist,
- Section 3. Open questions.

This will be used for the Kenyan situation.

Section 1 General information sheet
For other general background information on the respondents there are different types of questions, depending on the category of respondent. Apart from the self-help builders, we include other actors as described in Chapter 3, such as the government, semi-government, the NGOs, the consultants, small, medium and big contractors and the artisans (see also Appendix 9.B).
1. The respondents from government, semi-government and NGO are asked to give the name of the organization, office, address, town, the name of the responding officer and his function.
2. The respondents from medium-size and large firms of contractors and consultants are asked the same as above, plus their experience in relation to self-help building.
3. As for the self-help builder, we are interested in name, address, tribe, household size, female/male as head, number of households in the plot, income, income spent on housing. He/she is also asked what he/she builds and what the fundi does: foundation, floor, walls, doors, windows, roof, waterlines, taps, sanitation, electricity, and others.
4. From the fundi and small contractor we want to know the same as under 1. and his specialism: mason, carpenter, plumber, painter, welder, electrician, his work experience in sites and services, squatter upgrading and slum

improvement. He, too, is asked what he builds and what is done by the self-help builder.

Section 2 The structured checklist
For questions on the productivity factors we opted for a structured checklist (see also Appendix 9.A). With such a preprinted list their is less chance of overlooking factors. The 129 factors were taken from the framework in Fig. 8.1 and we did not omit a single factor.
* Formulation of the questions in the structured checklist. In order to detect whether a productivity factor plays a role we described a problem in which the factor is negatively formulated (as an impairing productivity factor or IPF). We tried to construct the question in such a way as to indicate what we really want to know. Each factor in the framework was therefore reformulated as a negatively formulated factor. For example, a 'neutral' factor 'degree of inflation' was given as 'high inflation', and a 'positive' factor 'good infrastructure' as 'lack of infrastructure'.
* For each negatively formulated factor of the list the respondent has to answer the question: 'Is the following negatively formulated productivity factor a problem ?' 'yes', 'no' or 'unknown'. A more detailed rating of the answers didn't work in a trial run in which university staff members (as test subjects) were asked to rate the answers according to a scale 'important', 'less important', 'neutral', 'not important' and 'unknown'. This took too much time and was irritating because of the many factors.
* During the preparation of the checklist we discovered that categorizing factors under labour, equipment, etc. is only useful for analysis reasons, but that grouping of the factors at 3 levels 'National, Household and Project' was thought useful as respondents may be familiar with one of the levels because of the organization or individual represented.
* A category 'others' is intended for 'new' productivity factors that may be detected during the survey. This category is placed at the bottom of the list.

Section 3 Open questions 1, 2 and 3
- Question 1, the respondent is asked to mention five of the main IPFs for a quick indication. He is now forced to reflect on the preceding checklist of Section 2. The number five was taken as it was thought that people could not remember a bigger number. His answers can be checked against those from Section 2 and is a control question.
- Question 2 is an open question asking for the positive productivity factors. We do not expect many, but there may be specific factors.
- Question 3 is an open question on the vision/opinion of the respondent as to how to solve the housing problem.

Instructions for the interviewer
For the interviews we made a set of documents containing an explanation of the purpose of the interviews, and background information of the present research. There is also an instruction on how to deal with illiterate respondents (see also Appendix 9.A).

9.2 Pretest of instrument

For pretesting we went through the following steps.
1. Text screening of the interview documents by four people who were professionals and therefore able to comment; they were a social planner, a building economist, a socio-economist and a building engineer, all with experience in developing countries. There was also a screening by the Housing Research & Development Unit, Nairobi. This resulted in:
- improvement of the layout of the tables to be completed,
- more clarification on some questions in Section 2,
- improving the interview instructions for illiterate respondents.

2. A pretest of the interview with the HRDU staff and with Eindhoven University staff led to improvements in rewording some questions ('incentives for savings' became 'private savings are not encouraged' and 'credit policies' was reworded into 'difficult to borrow money').
3. In order to reduce the amount of paperwork and interview time, the HRDU screened Section 2 for questions on factors absolutely irrelevant to Kenya. This resulted in deleting questions, such as those on labour unions.

9.3 Actors and research unit

Actors
The following actors in the building process described in Chapter 3 are distinguished as respondents
- the self-help builders of low-cost housing, considered as main target group. For Kenya we distinguish between new squatter units, slum improvement/squatter upgrading and sites and services projects,
- artisans and small contractors assisting the self-help builders,
- medium-size and large contractors, because of their contribution to construction of infrastructure and core units,
- consultants: architects, engineers, quantity surveyors as specialists,
- semi-governmental organizations, such as research institutes and housing corporations, as researchers and implementers of policy,
- ministries concerned with housing affairs, as policy makers,
- Non-Governmental Organizations (see also Appendix 9.B).

The information coming from the above actors is not likely to be all of the same type. The self-help builders and the fundis, and sometimes NGOs, are located in the area where the construction activities take place, while the other actors operate at a greater distance. Therefore self-help builders and fundis are assumed to have direct and detailed information on 'their' project and we assume that the fundi may also quote from his previous experiences. From the government, the semi-governmental bodies, the NGOs, contractors and consultants, we expect a more general view on the problems of the self-help builders.

Estimate of the sample size
We had considered carrying out a statistically justified number of interviews with self-help builders, fundis, contractors, and consultants based on random sampling all over the country. In the case of the self-help builders of the different housing types, a total of 380 interviews would be required for a 10 percent width (='d') of the 95% confidence interval, which is not acceptable from a research financial point of view and an increase of 'd' to 20 % would mean a total sample size of 96, but the answers would no longer be useful.

Whether so many respondents need to be interviewed is open to doubt. Apart from the financial constraints, there is also the practical point that these self-help builders are mostly illiterate and not used to interviews, etc. But even the assumption that a random sample can be drawn is something one cannot be sure of in slum, squatter areas. We could apply the method of area sampling but this requires mapping of the areas before sampling. For sites and services projects this would be less difficult as the applicants are known to the project office, which could make a random selection possible. We therefor prefer using key informants from the project areas and do the same in selecting the respondents from among the other actors. The statistical significance is negligible in our case, but we consider the answers as an indication in a piece of explorative research. The reader is referred to Appendix 9.B for more information.

9.4 Reliability, processing, acceptance of factors

Reliability
The reliability of the interview answers will be checked as follows
- Question 1 of Section 3 also serves as a control question. If a respondent gives answers contradicting the IPFs indicated on the preceding checklist in Section 2, that is a reason for clarifying this further with the respondent concerned.

- Question 2 in Section 3 on positive productivity factors is another check which could not have been indicated as an impairing productivity factor in Section 2.
- In some cases -where possible- a greater number of respondents in the same organization can be interviewed. Comparison of their answers can establish the degree of uniformity.
- The reliability can also be roughly checked by comparing the total of answers, after 50% of the interviews and again at the end of the series.
- The test-retest method that is the same interview with the same respondent, but at different time intervals.

Processing of answers
The answers can be collected and newly detected productivity factors (from Sections 2 and 3) will be given a code number. During processing of the answers each 'yes' answer is rated '1' . The results are first combined per (sub)group, then per group of respondents and aggregated/counted. In this process the same weight is given to all the individual respondents, the aggregated total for a subgroup being '1' when, for instance all 4 respondents of that group answer 'yes' on an IPF, and the final rating is 0.75 when 3 out of 4 respondents answer 'yes' (indicating that 75% of the respondents consider this as an IPF). The subgroups are equally weighted for aggregation to groups.

Acceptance of productivity factors
For the acceptance of the productivity factors in Sections 2 and 3 we apply the following criteria. The answer of the key person is considered as sufficient by the NGO, semi-government and government bodies. The other groups of respondents have to meet the acceptance criterion that at least three scores in a whole group or subgroup are needed before a listed or newly detected IPF can be accepted as such, since acceptance of a lower scoring could mean the inclusion of atypical cases.

9.5 Field survey in Kenya

The field research was carried out in the period between August 1988- July 1989. Appendix 9.B gives some information and the results are evaluated in Chapter 10. For detailed information, the interested reader is referred to a separate field research report available on request from the author.

10 ANALYSIS OF FIELD SURVEY

10.0 Introduction

In this chapter the field research results in Kenya are analysed quantitatively and qualitatively. In the quantitative part the answers are sorted, scores counted and the newly detected productivity factors given a code number. The reliability of scores is discussed in par. 10.1 and par. 10.2 presents background information from interviewees. The acceptance criteria are applied to the IPFs and scoring patterns reported on in par. 10.3. In the course of the work we also checked on how far the IPF scores on the interview in Section 2 were in line with those in Section 3. The most important IPFs are given in par. 10.4.

The qualitative analysis is based on the most important IPFs (par. 10.5), opinions (par. 10.6) and the enhancing productivity factors (par 10.7). Information obtained from the survey is further used for updating the framework of productivity factors and the respective productivity factor analysis sheets (see par. 10.8). The figure between brackets refers to the IPF code number (see Appendix 8.A).

10.1 Results of reliability check

In a few cases a larger number of respondents in the same organization were interviewed. Comparison of their answers showed the degree of uniformity between them. We also used the test-retest method, which brought out minor differences. For another (rough) check on reliability we compared the 30 top-scoring IPFs at different time intervals. They largely remained the same, except for minor differences. We therefore consider the degree of reliability as acceptable.

10.2 Background information on 'interviewees'

From the interview (Section 1) the following background information on respondents is abstracted.

Self-help builders, the main target group

* **the number of households on the plot** varied between 1 and 10, generally numbering some 27 persons. There were, on average, 5.2 households, of which 3.3 were headed by males and 1.9 by females; the average household size was 5.35 persons.

* **income**. Not all the respondents were able to state their monthly income but, based on the collected data, we found households on the sites and services and squatter upgrading/slum improvement projects with an income between KShs 1000/- and 3000/- (the mean income was KShs. 1733/-), of which the percentage spent on housing was between 7-50% (mean 29.2%). For those in the squatter units the monthly income was between KShs 500/- and 1500/- (average KShs. 920/-), with the percentage spent on housing between 15-30% (mean 21.4 %). The group interviewed was thus the main target group indicated in Chapter 5.0.

* **degree of self-help building**. From the interviews we derived that most of the self-help builders in squatter upgrading/slum improvement and in sites and services areas were not involved in construction. Sometimes they assisted the fundis in minor building activities. Most of them were engaged in organizing building materials and fundis. This supports the general opinion that, in these categories of housing, self-help means self-management and not self-construction. In new squatter units, however, there was active construction by the owner occupants, who constructed foundation, floor and walls, while the doors, windows and roofs were placed in position by fundis. We further found that women don't actually build a squatter unit; they employ fundis to build the mud-and- wattle structure.

Fundi/ small contractors

* **experience and skill**. Most of the fundis also had experience of work in types of projects other than those they were engaged on at the time of the interview, which justifies the aggregation of their answers to the effect that 3 out of the 22 fundis had more skills than basically those of carpentry or masonry. The 3 small contractors interviewed were originally masons, the usual career line for them.

* **building activities**. The 9 masons made the foundations, floors, walls, doors/windows and roofs; some of them also placed the waterlines and did sanitation work, in spite of not being plumbers. The carpenters made the doors and windows, but some of them were doing other jobs as well. The welders / blacksmiths were mainly engaged in manufacturing metal doors, window frames and grilles. We conclude that the activities of the various participants bear out the views expressed.

10.3 Quantitative analysis impairing productivity factors (IPFs)

Crude data
a. Listed IPFs (Section 2). The 129 listed IPFs scored between 0 and 59 times and 3151 times in all, on average, 24 IPFs per respondent. The government and the NGOs scored the lowest number (16), while the consultants scored highest (62).
b. Newly detected IPFs (Section 2, category sundry). The 63 newly detected IPFs scored 155 times, the 77 respondents raising, on average, 2 new IPFs. The NGOs, semi-government and government brought in most of the new IPFs. 16% of the new IPFs were mentioned by more than one group of respondents. For rough data see Appendices 10.A and 10.B.
c. Main IPFs (Section 3, question 1). The respondents presented 78 different main IPFs, in total 219 times, or about 3 IPFs per respondent. 14 IPFs were mentioned by more than one group of respondents, see Appendix 10.C.

Acceptance of IPFs interview Section 2, scoring patterns
From Section 2, 127 out of the listed 129 IPFs, and 48 newly detected ones out of 63 IPFs, remain after applying the acceptance criteria given in par. 9.4. The rejected factors are indicated by an * in Appendices 10.A and 10.B. The following scoring patterns are of interest.

Respondents versus IPF categories A-F of framework
In the categories sites and services, slum improvement/squatter upgrading and new squatter units, the self-help builders were found to encounter a growing number of IPFs. This can be explained by the type of house under construction, where the self-help builder is doing increasingly more himself. The opposite occurred in the case of the fundis, as they scored more IPFs in sites and services than in slum improvement/squatter upgrading. The explanation can be that the fundis are more involved in S&S housing than in the other types of projects.

Respondents versus listed IPFs levels National, Household, Project
Let us now consider only those listed IPFs which are scored by the majority in a group of respondents. Most of the IPFs are scored by the self-help builders at household level. This is also true of semi-government (maybe since they are working more closely with the self-help builders). Government score highest at national level, which could mean that they experience the IPFs of the self-help builder at the policy-formulating level. Furthermore, the NGOs and consultants score highest at project level maybe because of their professional occupation at that level.

Acceptance of main IPFs and scoring patterns (Section 3, question 1)
From interview Section 3, question 1, 37 out of 78 IPFs passed the acceptance criteria. 14 of these factors are felt to be important by more than one group of respondents, but we did not find specific scoring patterns. The 41 rejected factors are indicated by an * in Appendix 10.C.

Comparison of IPF scores in Sections 2 and 3
In Section 3, 7 of the 28 main IPFs raised were new (thus not printed on the structured checklist in Section 2). Most of the other 21 factors were also scoring high in Section 2 (9 factors were indicated by more than 50%, 6 by between 30-50% of the respondents). We find a high degree of consistency in responses in Sections 2 and 3 and the respective results can be combined for further analysis.

10.4 Most important impairing productivity factors (IPFs)

The most important IPFs are selected in two steps. First establish the main IPFs (i) then the most important IPFs (ii).
(i) The main IPFs are found by combining the 28 main IPFs from Section 3 and those 26 IPFs from Section 2 that are identified by the majority (50% or more). The resulting 33 IPFs are clustered in categories A-F of the framework and presented in Appendix 10.D, which also shows the ranking of the IPFs according to the scores.
(ii) For establishment of the most important 10 to 15 IPFs we took only those factors from (i) above which were at least indicated by the main target group, which yielded 13 IPFs. Figure 10.1 presents these 13 IPFs in the left-hand column in decreasing order of scores, and in the right-hand column the same factors, but this time neutrally formulated according to the hierarchy in the framework. 7 out of these 13 IPFs are also considered of importance as preconditioning factors (see Chapter 11).

10.5 Comments and opinions on the 13 most important IPFs

This paragraph presents the respondents' comments on the 13 most important IPFs and gives, where available and relevant, opinions on how to do something about these IPFs. The review follows the ordering of Figure 10.1, right-hand column, as this facilitates the discussion of more or less related factors.

Fig. 10.1 Review of the 13 most important impairing productivity factors for Kenya

factors in decreasing order of importance	factors neutrally formulated ordered in framework
- difficult to borrow money 2)	A[1)] availability of infrastructure
- unavailability of infrastructure 2)	A variability of weather
- high cost of building materials	A borrowing of money
- low income level 2)	A resources of prefinancing
- local materials not available	A income level
- disappearance of equipment/materials	B availability of skilled labour
- frequent price changes materials	C/D disappearance of equipment/materials
- crowded, small plots 2)	D availability of local materials
- lack of skilled labour	D cost of building materials
- variability of weather	D price changes of materials
- insecurity of land legalization 2)	E sizes/layouts of plots
- ltd. resources for prefinancing 2)	F building codes
- burdensome building codes 2)	F land security

1) A-F are categories of the framework, see Chapter 8
2) Also found important as a preconditioning factor

(A) General

On the **unavailability of infrastructure** (11) points were raised, such as
- lack of water or not having water at hand during construction is often a bottleneck in the preparation of concrete, etc., causes delays, and is also needed for fire fighting,
- lack of electricity and slow repairs,
- no telephone lines, problems with communications,
- bad roads or no roads at all for the transport of materials,
- lack of shops, but this was found to depend on plot location.

All respondent groups mentioned the **variability of weather** (65) as an important IPF; heavy rain slows work down, thus lowering the quality of work already done if no proper counter measures can be taken.

The self-help builders gave as their main IPF that it was **difficult to borrow money** (203). Banks require a security, for instance a title deed to the land: however, in a number of cases such title is withheld until the plot has been developed to a certain stage. Both consultants and semi-government conclude that there is a lack of adequate formal financing under favourable terms. There is a **lack of local funds** (207). Commercial banks are only prepared to lend money for short periods (5 yrs). Some institutions (see also Fig. 3.10) only lend money for longer periods but they operate on limited budgets, which is why it is difficult to find proper financing for projects. According to consultants, banks are in fact not prepared to finance low-cost housing, thus

making it possible for speculators to come on the scene. Some self-help builders complain that they were not given their loans for the sites and services project although they were entitled to them. Some were able to get help from friends, but that means that building takes longer than necessary. When loans are provided, they are not always enough for building, which explains why the poor, even when given the money, still decide to sell their plot to richer people. It was suggested (i) to make the loan enough to ensure completion of one or more rooms, and (ii) that poor people, even without security, should be given access to loans. (iii) This loan should be made adjustable to circumstances like inflation, foundation problems due to subsoil, etc. (iv). Supervision is under consideration as a means of ensuring that the money is indeed used for construction. (v) This money should be given on completion of each stage of house construction.

A **low income level** (222) scored as a main IPF. People have to work very hard for very little money. Even the fundis complain about this. NGOs state that when income generation is not considered as an integral aspect of a housing project, the low-income people end up by having to sell their plot. Some allottees had a job at time of application for a house, but became jobless during the actual construction, which led to abandonment of the house. According to consultants, housing must be based on a surplus, therefore the employment problem should be dealt with first of all. As one respondent said: *'The housing problem will only have been solved when the term 'low income' disappears from the vocabulary'.*

(B) Labour

Although labour is abundantly available, there are complaints about the **quality of skilled labour** (111), which is neither well trained nor very skilled. According to a fundi, 'It was sometimes difficult to secure suitably qualified workers.' Some self-help builders, on their own part, also refer to dismissal of hired fundis for that same reason.

(C) Equipment and (D) Materials

Lack of local materials (312). Both the self-help builders and fundis/contractors complain of insufficiency of local building materials. The unavailability of locally made cement, and even nails, is reported as an IPF. Even worse, in some areas (low-cost) materials are simply not to be had. For example, thatch is getting scarce as people tend to grow food crops instead of grass for thatching. Sometimes the shortages are artificial; shopkeepers don't sell in order to demand higher prices later (e.g. nails). In big projects, the experience of contractors is that the supply of large quantities of materials at short notice can be a problem, e.g. quarry stones and doors, and this inevitably leads to the use of different qualities. It was further reported that, contrary to the official support for the use of low-cost materials, the actual

lack of support by the government (City commission) creates unnecessary investments in other materials and unnecessarily increases efforts by self-help people and willing donors to get things organized. Foreign donors are also 'suspected' of dictating the use of more durable building materials.

The **prices of materials are (too) high** (314), cement being mentioned particularly, so that costs keep rising. The government attributes rising prices to inflation, importation of some of the raw materials and high transport costs. Basically cheap materials, like sand, are also affected by the high cost of transport. As the low-income people simply cannot afford conventional building materials, they feel that low-cost materials should be developed and made available locally, see further IPF (653) below. Another idea is the development of a 'building materials bank' for the benefit of the self-help builder. The prices of key materials have not been controlled since 1988 and **prices keep changing** (315). Early purchasing of materials is in this context sometimes thought to be a good way out, but this requires availability of funds. Some respondents think that the prices of materials should be regulated again.

In the light of the above it is not surprising that **theft of materials and equipment** is a current phenomenon (349). This occurs, not only on the building site, but also in transit between the yard and the site. According to the government, even fixed items, such as street lighting are stolen. Poor storage of materials is another cause, sand unloaded and not protected at the site is simply blown away.

(E) Organization
Some self-help builders feel that **the smallness of plots** is an IPF (70). As a limit is set for construction height, there is need for more horizontal space. But a small plot is a serious obstacle to putting up bigger (more economical) structures and sometimes leads to the creation of mere 'slums' around the house itself.

(F) Information
The **building codes and bylaws are felt to be burdensome** (503) by many of the respondents. It is in fact the highest scoring IPF. It has been said that materials, technology, costs and affordability are all gravely affected. According to some local researchers, the building standards advocated are incompatible with the people's income. When bylaws are in fact relaxed, it is done unwillingly, and cases of obstruction by the authorities have been observed. For example, in the Kayole project Urban II in Mombasa.

Revision of the building codes and bylaws (503) is needed in order to promote cheaper and newly developed materials and acceptance of other

standards for infrastructure (murram streets, etc.). Another opinion was just to let people put up their housing according to affordable minimum standards (but provided they are fire-safe). One respondent explained the wish for high standards by the fact that politicians promise high standards (as the rich people and the former colonial power also have them). It is a matter of value. Commercial institutions would also have us believe that a high standard is a must *'Selling of lower standards to people is difficult'*. However, people are gradually realizing that there is no alternative: lowering of standards is a must; a minimum standard is what must be aimed at.

Problems arising from **insecurity of plot legalization** (541) were reported by the new squatters. Insecurity of land use and the destruction of buildings and materials by city askaris (watchmen) have given rise to many problems in the past.

10.6 Review of other opinions

This paragraph deals with interesting views/opinions on solving the low-income housing problems (Section 3, question 3). The 51 categorized opinions scored 141 times, 16 of them being touched on by more than one respondent. The majority of the opinions concerned one or other of the 33 main IPFs. The following categories of suggestions were invoked: 30% of the respondents noted that something should be done about the problems involved in borrowing money. Another 14% suggested improving the availability of land and 13% that something be done about building codes and bylaws. 28% expect action by the government, half of them ask for the development of a long-term policy. 11% of the respondents (fundi) wanted training programmes for craftsmen.

The shortage of low-cost housing is not regarded as the main problem. Other problems, too, require solution, for instance education, food, etc., in an all-round and comprehensive programme. In the field of housing, a comprehensive policy is required to ensure the provision of housing for all income groups. *'What is needed here is the right mix of developments, such as differences in the types of housing'*. Some different opinions are given below. A very pessimistic one was that 'the housing problem will never be solved. Look at the USSR where it is the government alone that has to provide for housing. Many people are badly housed'. And another respondent, 'There will always be shanties because of long-term shortage of housing for all classes. The high-income class occupies middle-class accommodation; the middle-income group, in turn, occupies low-income class housing'. Another of the respondents said, *'There is no housing problem, there is a planning problem'* and, according to a consultant, 'Solutions to the housing problem can only be

found by trial and error'. An idea, which is not regarded as promising, is the development of a policy for migration to the towns, based on the availability of jobs, infrastructure, etc.

The government should do something about the **availability of land** (10). If it doesn't provide land on leasehold, there cannot be low-cost housing projects. It is suggested that the state should acquire land, on which the squatters are now settled, for distribution to these people. The next phase should be the upgrading of the area: first of all water taps, to be followed by sewerage, roads, etc. People can start by improving their housing. Rwanda was mentioned in this connection as an example where people were given free plots, with the result that there is now much building activity.

Lowering the fees and administration costs may also reduce the total housing costs. Architects should be trained in the field of low-cost housing as regards affordability and appropriateness. 'Beauty of housing designs' can be introduced if it involves no extra costs. This is better than arriving at the affordable cost by 'stripping' a design.

Policies (7). Policy makers should identify what the people want as regards housing. *'One should listen more to the local people in order to identify what they want'.* Most of the resettlement schemes are designed and constructed without consulting the beneficiaries. People may only need a shelter and not a sophisticated house; house plans don't always meet actual needs. According to another respondent, *'there is a wide gap between housing realities and expectations'.* The objectives and priorities of the beneficiaries need to be in line with the project concept. The **philosophy of the project organizer** (12) was held to be an important aspect. The NGO Undugu society considered their philosophy as a possible contribution to the solution as they include in their projects

-creation of jobs and thus income,
-building two-roomed housing units, by oneself or in groups, on small plots and renting one room out.

People feel more comfortable when things are done through NGOs (14) than through government. People have **to know about the project** they take part in (421). Therefore they must organize communities to know more about their own capacities and help them with construction skills that can make the best of low-cost materials. Community leaders should make plans with the local people and let them choose their own local leaders without interference from big organizations.

10.7 Enhancing or positive productivity factors

The request for positive productivity factors (Section 3, question 2) resulted, as expected, in a weak response. Two categories of factors (i) and (ii) can be distinguished

(i) Housing situation
- people appreciate that they now have a shelter,
- housing development keeps the rents low in these areas,
- shelter is seen as some form of investment,
- by subletting, people will earn some income or some additional income as there are enough people who will rent the rooms.

These items influence production rather than productivity.

(ii) Specific to self-help building
The following factors influence the productivity of self-help.
- The influence of NGOs is thought to be positive.
- Women are mentioned as the best self-help building group. [see also Dijkgraaf, 1987, p. 7]
- Fundis considered self-help building as an opportunity to improve their skills.
- Lack of standardization allows for variation in design.
- Community participation in the form of house-building groups, results in:
    1. cutting down the costs of purchasing materials,
    2. joint employment of fundis for the difficult construction work, cheap labour through cooperation.

10.8 Updating framework and analysis sheets

The framework needs to be updated with the newly detected impairing productivity factors and the positive factors found from the survey, both neutrally expressed, such as the role of women, role of NGOs. The updated framework is given in Fig. 11.3. Some of the factors turned out to apply at another location in the framework. We didn't have time to make a complete revision of the code numbering; furthermore, it was not essential to the research and analysis as such. In a follow-up to the thesis this omission will be rectified.

Productivity factor analysis sheets were also prepared for the newly detected productivity factors. The data from the other sheets were updated with new information from the survey (see Appendix 10.E).

10.9 Result-bound conclusions on field survey

General

1. From the field research it can be concluded that far more (impairing) productivity factors are involved in self-help building than are derived from literature. Observations during visits to building sites contributed to this opinion.
2. From the survey, the opinions of the respondents are not found to contradict but rather to corroborate each other. Some of their comments also concern the prebuilding phase.
3. From our site visits but also from interviews, we gained the general impression that the majority of the people has no clear vision on how to solve the housing problem. They seem to lack proper orientation. Consultants are less vague although they speak of trial and error. In practice, too we found no planned development but just mushrooming housing developments without any sign of proper planning, etc.
4. When we expect the authorities to come with a clear-cut solution to the problems, we found that the main policy maker, in this case the Ministry for Planning and Housing, had only some points for immediate action but no comprehensive view, which confirms what was already clear from the documents, that is, that *'there is no realistic or active housing policy'*. In contrary, the NGOs were felt to have more comprehensive opinions and ideas, some of which were already being executed.
5. The survey confirmed the impression that the self-help builders in Kenya did more organizing than building. This, in particular, was the case with the squatter upgrading/slum improvement and sites and services projects. At the squatter-housing sites we found self-help construction. According to some respondents, 'only the really poor do self-help building'.
6. The positive factors emerging from the field survey were the role of women, the importance of community development and that of NGOs.

Specific factors per actor

Self-help builders. Borrowing money is felt to be a main IPF, even after the start of construction, which also applies to the high cost of building materials. New squatters, in particular, refer to insecurity of the plots, crowding on small plots and theft of building materials. Another point was the lack of infrastructure, such as roads, water and electricity, but also (materials)shops.

Fundis / Contractors. The low-income level of the self-help builder was felt to be the main factor preventing him from meeting his obligations. Other IPFs were the unavailability of local building materials, frequent price changes and the vagaries (variability) of the weather. These IPFs mainly concern the realization of construction work. Apart from ideas on improving their own working conditions (workshops and training facilities), the fundis suggested simplified loan requirements and the development of cheaper building materials.

Consultants. The lack of understanding by third parties of the requirements of low-income people regarding housing and other basic needs is felt to be a main IPF. Another is the disparity between the official and actual standards. The consultants don't foresee an immediate solution to the problems but expect a solution through trial and error.

NGOs. The NGOs describe the main IPFs of the self-help builder as the low-income level and the overcrowding of small plots. Further, they mention the corrupt practices, the lengthy land acquisition procedures and problems with leadership of communities when building activities have to be organized. The NGOs agree about the impairing productivity factors of the self-help builder, but point out that they, through their own approach as NGOs, have addressed most of these IPFs (reference is made to the Kynyago project see Appendices 10.F and 11.B). They promote their own ideas as a solution for the future: self-creation of jobs, income and housing.

Semi-government. The IPFs are the problems involving the borrowing of money, the high building costs, the low income level, the limited financial resources of the self-help builder and the insecurity of the title to the plot. Further points are the lack of skilled labour and good materials. Their general opinion is that the impairing productivity factors should be influenced in a comprehensive programme in which community participation should be stimulated.

Government. A limited number of IPFs, such as the low-income level, the lack of knowledge on building techniques and the burdensome building codes are referred to. Further IPFs are the poor organization of the projects, lack of knowledge of building materials, the high interest rates and the inability to mobilize local financing. Although the government policy makers are aware of these IPFs, they are not willing or able to do anything about it. The government only takes some minor action and leaves the rest to private initiative. The government doesn't seem to have enough power and gives promotion and financing of alternative housing ideas a low priority.

Part Three
Epilogue

11 EPILOGUE

11.0 Introduction

This Chapter consists of three parts (i,ii,iii).
(i) The first part deals with the Kenya situation (pars. 11.1-11.5). We begin with the general remarks on research results emanating from Part Two. Paragraph 11.2 discusses 45 proposed measures for influencing the 13 most important impairing productivity factors (IPFs) and in 11.3 we indicate who should implement these measures. As this is an exploratory research, the thoughts developed and conclusions drawn are provisional and would therefore need further checking before implementation. In 11.4 we put forward suggestions on how to implement and in par. 11.5 we speculate on the effect of measures on the housing problem. (ii) Par. 11.6 evaluates the developed method and discusses improvements of its components, such as the framework, etc. We also review the applicability of the developed method to other countries. (iii) Par. 11.7 submits a number of general conclusions and recommendations.

11.1 General notes on research results -Part Two

In Chapter 5 a series of suggestions was presented on how to solve the housing problem. Most of them were also mentioned during the interviews. From the field survey a few other points of general interest have emerged and are given below.

1. In Chapter 5 it was stipulated that low-income people should be actively involved in reducing building costs. The survey revealed however, that most of them were only involved in organizing and not in constructing. Two major causes were found for this phenomenon:
* *Self construction was in most cases beyond the capacities of the individual.* However, when organized, for example by NGOs, it was found that self-help construction actually took place. This pleads for active government policy which stimulates, or at least allows NGOs and other organizations, such as missions, foreign aid agencies and also other bodies to develop activities in this direction.
* *Self-help management construction was mainly done by those households of the main target group at the lower end of the income scale, while the others just did management.* The last-named may have 'opportunity costs' which make

Fig. 11.1 Short-term and long-term measures, implementers and beneficiaries

measure		measures 1)		beneficiaries 2)			action by whom 3)					
1. PLANNING AND DESIGN		ST	LT	S&S	SQS	NWS	SH	FU	CO	NG	SG	GV
1 reduce number design, materials sensitive to price changes	315	x		x	x				x			
2 use less materials by better design	314	x		x	x				x		x	
3 promote and design compact housing for better plot use	70	x		x	x				x		x	
4 improve sizes and shapes of plots, when possible	70		x	x	x	x						x
2. LAND & LEGISLATION												
5 group organization reduces chance of eviction	541	x			x	x	x			x		
6 do not start before land is legalized	541	x		x	x		x					
7 speed up legislation procedures	541		x	x	x	x						x
8 do not start building before agreement on bylaws	503	x		x	x		x			x		
9 declare project as temporary, so bylaws are not applicable	503	x		x	x	x	x			x		
10 relaxation of the bylaws for materials, etc.	503	x		x	x	x						x
11 revise bylaws to promote use of cheaper materials	503		x	x	x							x
3. INFRASTRUCTURE												
12 build and preferably complete house in dry period	65	x		x	x		x	x				
13 provide for materials yards nearby during project	11	x		x	x	x				x	x	
14 provide for water kiosks near project	11	x		x	x	x				x	x	
15 joint use of skilled labourers by more builders	111	x		x	x		x					
16 provide for (permanent) roads in project areas	11		x	x	x	x						x
4. TECHNIQUES												
17 reduce dependence on skills by simplier building methods	111	x		x	x		x		x		x	
18 reduce dependence on infrastructure thro' other bldg methods	11	x		x	x		x	x	x		x	
19 reduce work in the open air by other sequence of construction	65	x		x	x		x	x			x	
20 develop all-weather construction techniques	65		x	x	x						x	
5. MATERIALS												
21 checking on materials' deliveries	349	x		x	x		x				x	
22 watching the materials, equipment	349	x		x	x		x					
23 proper storage	349	x		x	x		x					
24 reduce dependence on availability by using alternatives	312	x		x	x	x	x	x	x		x	
25 use alternative cheaper materials if available	314	x		x	x	x	x	x	x			
26 research and development of low-cost materials	312 314		x	x	x						x	
27 promote use of low-cost materials	312		x	x	x	x				x	x	x
28 stimulate materials production in general	314		x	x	x	x						x
29 stimulate production of materials by builders	312 314		x	x	x	x				x	x	x
30 improve control of materials production and flow	312		x	x	x	x						x
6. FINANCE												
31 better estimates of the funds required	203	x		x	x		x					
32 provide for assistance in estimating	203	x		x	x			x		x	x	
33 provide for assistance in acquiring funds	203	x		x	x					x	x	
34 arrange for fixed prices for materials deliveries	315	x		x	x		x					
35 early purchasing of materials	315	x		x	x		x					
36 take action to control and stabilize prices	314 315		x	x	x	x						x
37 stimulate cheaper building projects	223 222		x	x	x				x	x	x	x
38 ease credit terms	202 222 223		x	x	x						x	x
39 develop and arrange for other credit facilities	203		x	x	x					x	x	x
40 create a security fund as form of collateral for loans	203		x	x	x							x
7. MISCELLANEOUS												
41 improve gainful employment through national programmes	222		x	x	x	x					x	x
42 improve employment thro' income generating bldg. projects	222		x	x	x	x				x	x	x
43 improve number of skilled labour by schooling and training	111		x	x	x			x		x		x
44 improve quality civil servants by more services	503		x	x	x	x						x
45 general change in mentality to reduce theft	349		x	x	x	x	x	x	x	x	x	x

1) ST: short-term, LT: long-term

2) S&S: sites and services, SQS: squatter units upgrading/slum improvements, NWS: new squatter units

3) SH: self-help builders, FU: artisans and contractors, CO: consultants, NGO: non-governmental organizations, SG: semi-goverment: banks, universities, housing institutes etc., GV: government

it more profitable for them to work elsewhere instead of doing their own construction work. Both options should be stimulated. This may require additional research to find out the type of self-help that is feasible for what income-level and under what conditions.

2. The respondents expressed a need for various forms of housing for the main target group, which can be divided into owner-occupied and rental housing. We think this can be easily satisfied by (a), developing owner-occupied housing with an extra room for subletting (R602,603) or (b) developing cheap rental housing of less-durable materials owned (for example) by nonprofit organizations, allowing eventual occupiers to contribute their own labour and thus entitling them to a lower rent.

3. Respondents felt a number of other productivity factors to be important preconditioning factors (see par. 10.8), such as borrowing money, low-income level, limited resources for prefinancing, infrastructure, small overcrowded plots, insecurity of plot legalization, and burdensome building codes. Should these problems be capable of solution in the prebuilding phase, they can be expected to be much less impairing during the construction phase.

4. Integration of some of the identified positive factors in a more general policy is suggested. This is a reference to the role of women, the setting up of communities and the importance of community participation (R702). In the measures we will take these these points in account.

11.2 Measures for the 13 most important IPFs in Kenya

Introduction
In this paragraph we will discuss 45 measures for influencing the 13 most important impairing productivity factors by means of the updated productivity factor analysis sheets (see Appendix 10.E). More or less similar measures dealing with the same topic are arranged in one of the 7 clusters. The clusters differ from the framework, as not all measures could be clearly and properly categorized nor did they facilitate further reporting. The new clusters are (1) planning & design, (2) land & legislation, (3) infrastructure, (4) techniques, (5) materials, (6) finance and (7) miscellaneous. More or less similar measures were combined. All the short and long-term measures are indicated by the letter M, followed by a given reference number (1-45). Figure 11.1 lists the measures, the reference number of the productivity factor concerned and indicates the type of self-help housing (new squatter unit, squatter upgrading & slum improvement and sites and services) to which the measures are applicable.

We see that some of the measures simply do not apply to the new squatter units because of their specific nature. This figure further indicates, on the basis of interviews and our considered opinion, the persons/organizations called upon to take a particular measure. In the figure it is seen that the long-term measures mainly have to come from government and semi-governmental bodies and the short-term ones mainly from the others involved.

Measures to be taken first
We may start with those measures already mentioned in Chapter 5 as being of more general importance, that is measures M7 (legislation procedures), M10 (relaxation of bylaws), M11 (revision of bylaws), M36 (price stabilization) and M41 (gainful employment). Only measure M10 could be executed with immediate effect and at almost no additional costs. The other measures are long-term ones, and not without financial consequences.

We can further consider those measures which affect, for example the 3 main impairing productivity factors, (factor 11: measures M13, M14, M16 and M18; factor 203: M31, M32, M33, M39 and M40; factor 314: M2, M25, M26, M28 and M29). Only measures M2, M18, M25 and M31 might be taken at short notice, not likely costing much. The figure shows that the above measures are from more clusters, therefore covering a broad spectrum. The measures are indicated in bold both in the figure and in the detailed descriptions below.

Detailed description of measures
In the description of the measures below those printed in italics refer to measures to be taken first when considering the factors of more general importance. Those printed bold are measures to be taken when considering the 3 main productivity factors. (Rxx) refers to the respondent.

1.PLANNING/DESIGN

M1 (short-term) Prepare designs and specifications, in such a way that
- materials used are mainly cheap and less sensitive to price changes,
- materials can be replaced by others when available.

Consultants can make an effort to specify such materials.

M2 (short-term) **Materials can be saved by better design.**
- **designs that take the dimensions of materials into account,**
- **the ratio of volume/surface can be optimized in the same way,**
- **infrastructural facilities, sewer lines etc. can be shared,**
- **share walls with adjacent houses that are put up at the same time,**
- **make better use of materials, for example, dispense with lintels by using lighter materials,**
- **apply materials/ details which facilitate and/or reduce maintenance.**

Consultants and researchers can do research on and implement the measures suggested above. Courses of instruction should be developed for low-cost housing on materials, costs, detailing and maintenance.

M3 (short-term) The use made of a plot can be improved by a better layout of the housing unit on it. Detached housing (which is common in Kenya) could be discouraged and semidetached or terraced housing promoted instead. Here a task can be seen for researchers and designers, that of developing and promoting better layouts and compactness in housing.

M4 (long-term) It is desirable to improve plot shapes and, if possible, give consideration to plot enlargement (R326). Governments would be well advised to review their thinking on optimum sizes and shapes of housing plots, and modify existing plans so as to make new, long-term land use and plot subdivision plans part of a comprehensive housing policy.

2. LAND & LEGISLATION

M5 (short-term) The risk of eviction can be much reduced by organizing low-income people into communities, eventually with the assistance of NGOs. Experience in committing authorities to area-improvement plans has been good. Once involved in this way, they may be less ready to resort to eviction. Undugu experienced this in Kitui, where it obtained a Temporary Occupation License (TOL); there have also been interesting developments in Nakuru since the seventies [Verbeek, communications 1990].

M6 (short-term) Land legalization problems should be settled prior to construction, which could eventually be postponed. This is not always the easiest option, but certainly preferable to pulling down already erected structures.

M7 (long-term) *The unwieldy land legalization system can be curtailed if the government were to develop and apply simpler procedures, for example by registration of a building plot as part of a bigger lot. Moreover, if by this means self-help builders could be given their title deeds earlier, they would find it easier to obtain loans.* (R203,705).

M8 (short-term) In the light of the building codes it is important for the self-help builder to know what he/she may or may not do. The consultant or NGO may act as mediator with the authorities on what is permissible or not. As this can be a very lengthy procedure, the agreed standards should be put down in writing.

M9 (short-term) A way out of an impasse is possible if the self-help builder or, eventually, another project organizer (e.g. an NGO) declares a project to be temporary. In that case the bylaws don't apply, but the risk remains that the structure could be pulled down after a period of time. This would require contacts with authorities, e.g. through NGOs.

M10 (short-term) *Relaxation of bylaws is a possible way out of all problems in which illegal structures are involved. Not only do authorities have to show willingness, but must also have the power to do so. In the case of Kenya, there are examples in Dandora where it took much time and (foreign) pressure to bring this about* (R342,603).

M11 (long-term) *Amendment of the building bylaws enables simpler newly developed materials, building methods and structures to be used* (see Chapter 1 and R 206,403,503, 605).

3. INFRASTRUCTURE

M12 (short-term) It must be possible to complete a part of the house during the dry period; parts of the house which are less sensitive to weather can be built in the rainy period.

M13 (short-term) **The provision of materials yards in the vicinity of the construction areas would do much to reduce the problem of transport, bad roads and the efforts involved in acquiring the materials. The (semi-)government authorities and NGOs could stimulate private initiative, as in Dandora, where lorries with sand are stationed near the places where building activities are in progress.**

M14 (short-term) **If water is not readily available, the stationing of water kiosks could be considered, either as a private initiative or through the project organization (e.g. of semi-goverment agencies/ NGO).**

M15. The few hired skilled labourers who are available can be better utilized if the self-help builder does the unskilled tasks and shares the hired skills with others.

M16 (long-term) **The early provision of (at least murram) roads will facilitate the transport of heavy materials and equipment. This requires master planning and detailed planning of roads at a high level.**

4. TECHNIQUES

M17 (short-term) Self-help builders are generally far more familiar with traditional building methods than with modern methods. Research into appropriate methods and materials would reduce dependence on skilled

labour (for example, timber may be easier to use than stone). Dissemination of knowledge can take place through documentation, building courses and the setup of demonstration houses by semi- governmental or other bodies.

M18 (short-term) **Dependence on infrastructure can be reduced by using certain building methods and materials; a) timber instead of concrete reduces dependence on water, b) structures made of materials available in the vicinity reduce the need for roads, etc. There is a role here for researchers and designing consultants alike.**

M19 (short-term) Reliance on dry weather can be reduced by building in a different sequence, for example making the roof first, so that the walls, etc can be finished regardless of the weather [see Teerlink, Erkelens, 1980].

M20 (long-term) The development of all-weather techniques would require long-term research and experiments.

5. MATERIALS

M21 (short-term) Additional costs, due to loss of materials, can be reduced by observing some simple management methods, for instance proper checking by the self-help builder and counting of materials on delivery (people must, however have that ability).

M22 (short-term) Guarding materials reduces the risk of theft. For that purpose the materials have to be properly stored, to guarding easy. The self-help builders can store them in their own yards. If possible, the amount of materials should be reduced, if they can be delivered in batches at no extra cost. Upon delivery they should be either immediately used or properly stored.

M23 (short-term) Proper stacking and storage of materials reduce the chance of it disappearing (e.g. sand being blown away). Dry storage can be created, for instance, by earlier completion of one of the rooms.

M24 (short-term) Use of alternative materials when local materials are not available (e.g. steel instead of timber doors). The alternatives are not always suitable, but self-help builders should at least be aware of other options. Designers can also help here by searching for other possibilities and indicating them on the design drawings.

M25 (short-term) **The self-help builder can use cheaper materials so long as they satisfy certain criteria. This also requires information on availability. The consequence of the use of certain materials at a given construction stage**

may be the need for certain other materials in the following phase. Designers can indicate alternatives on drawings.

M26 (long-term) **There is need for research into and development of low-cost materials and structures. This joint research is essential, as not all low-cost materials allow of simple low-cost structures (e.g. low-cost sisal cement roofing sheet requires a heavier substructure than a cgi sheets does). The following additional requirements can be formulated: availability, low in cost, easy to handle** (R210,216,231,307, 705).

M27 (long-term) The use of low cost materials should be promoted (R503) the local authorities should allow their use and also the use of 2nd-hand materials. The government could set an example by designing and using low-cost materials in its own buildings.

M28 (long-term) **The production of materials has to be stimulated. Private initiative needs incentives and may even require support from government, donors, etc. If there is a good market, more competition may lead to better quality of materials at lower prices.**

M29 (long-term) **The production of on-site building materials needs to be stimulated, in particular when most raw materials are available close by. This affects both the availability of building materials and employment. For Kenya we can think of production of laterite blocks and sisal-cement roofing tiles. Women's groups running small tile-production units with NGO support is no novelty nowadays. The research institutes can also look into the potentialities of on-site production of certain materials.**

M30 (long-term) Control of materials production and product flow requires a professional setup by an authorized body. This setup could improve the availability, for example, of nails and cement.

6. FINANCE

M31 (short-term) **Estimating of the funds required should be improved. All the construction items can be established on the basis of a good estimate: what is available at no cost and what at (some) cost. Then the required loan can be estimated, taking into account savings, income and eventual subsidies. In general this depends on the availability of data.**

M32 (short-term) **Assistance in estimating required funds can be provided by professionals (consultants). They, in turn, must have knowledge of low-cost housing. There is need for research into estimating methods. The preparation and distribution of simple manuals giving standard rates and quantities could also be very useful.**

M33 (short-term) **Assistance in acquiring funds can be provided by NGOs, banks and other competent bodies which clarify the terms offered by the various moneylenders and do the requisite paper work.**

M34 (short-term) When materials are delivered under contract, prices are fixed. A contract may not be feasible for an individual but may be considered for a bigger project.

M35 (short-term) Fluctuations in the price of materials can be avoided by early purchasing. The disadvantage is the early expenditure and early storage. It may however, be worth while in the case of expensive items.

M36 (long-term) *The government can try to manipulate the price levels of certain commodities, but a more general policy for stabilizing prices and reducing inflation may be better* (R206, 226, 310, 405).

M37 (long-term) Reducing the cost of building projects is not just a matter of using lower-cost building materials, equipment and good details, but also of stimulating community participation, lower-cost management and lower profit margins. It depends on the philosophy of the project developer (consultant, NGO, semi-government authority) if these reductions are indeed to be achieved. To look into possibilities of reducing the cost of projects can serve as a challenge to research institutes, but even governments could do well to stimulate this type of low-cost project.

M38 (long-term) Terms for loans should be relaxed. One beneficial change would be to make the loan adjustable to circumstances, such as foundation problems encountered and inflation (R701).

M39 (long-term) **So far, it is not the house, but the income that is seen as collateral. The creation of other credit facilities (with other degrees of security) may improve access to a loan (e.g. roofing loans in Tanzania, where credit is given for just part of the house, reducing the amount of the loan and extending the benefits of available money to a greater number of people [United Nations, 1978, p. 67]). NGOs, semi-government bodies and banks should take it on themselves to start research and experiments. This may need the support of government and foreign institutes** [See also Yahya, 1982].

M40 (long-term) **Access to credit facilities can be further improved through a form of collateral based, for instance, on a local government guarantee fund. This fund can be filled by contributions from the borrowers, government, foreign banks, and donors.**

7. MISCELLANEOUS

M41 (long-term) *Government, semi-government authorities and NGOs can develop programmes on gainful employment. These may improve incomes and reduce the need for loans* (R603).

M42 (long-term) Gainful employment can also be created by means of units for production of building materials, using own skilled people or training people for own projects. This can be stimulated by government and, for instance, arranged by NGOs [UNCHS, 1986b, p. 20].

M43 (long-term) The amount and quality of skilled labour can be increased. The fundis could start with on-the-job training of unskilled labour, while NGOs and government can create possibilities for schooling and training on the job (R305).

M44 (long-term) Better training for civil servants can improve their interaction with the public need of their advice and approval. They can then better judge what is reasonable or not, and put an end to talk about harassment and bribery. The government can take various measures, such as improving the level of intake, level of payment, (in-house) courses for civil servants on a number of relevant topics.

M45 (long-term) Theft and disappearance of materials and equipment has partly to do with poverty, but also with mentality, as it occurs at all levels of society. A general change in mentality is essential, but cannot be stimulated without good examples.

11.3 Measures to be taken by whom

In this paragraph we will briefly summarize what the various actors are supposed to do. Appendix 11.A indicates the measures, but this time grouped by implementer.

The self-help builder in fact needs to acquire management capacities and also some knowledge of construction. In this case, courses could be organized in some form or other prior to, or during a housing project, which women should also be given the chance to attend (R704). Here, matters such as materials, costs, financing, checking on deliveries, but also building legislation can be touched on. He (or she) may further need support during actual construction. NGO support and that of other organizations is likewise important. Another form of dissemination of relevant knowledge can be obtained from proper documentation, which can be a task for research institutes like HRDU.

Fundis have to become more aware of other materials and construction possibilities; further they have to be more cost-conscious. The transfer of information is thus a matter of great importance to them.

A specific role can be allotted to the *consultants*. As they are involved in the process of building at an early stage, they *can influence the costs during the design stage* by selection of materials, layout and plot use. If they really are professionals they can prescribe simple but adequate materials and constructions for housing and infrastructure. They should also, where possible, indicate alternative materials and constructions. Furthermore, the quantity surveyors and consultants could open up 'workshops' for advising people.

The *NGOs* are qualified to play *a special mediating role* as they, (judging from reactions to the survey) are closest to the main target group. They can also be active in formulating and implementing the projects, income-generating activities and production of building materials.

The *semi-governmental organizations can carry out research* into low-cost building materials and constructions and carry out the dissemination of knowledge. They can apply the proposed measures when developing housing projects and formulating the conditions of contract for the consultants/contractors.

The government's role is a special one. It should serve as a catalyst in a number of areas.

11.4 Implementation

The proposed measures may benefit the individual self-help builder but can also be implemented as part of a more comprehensive approach at a general level. *The basic idea is a series of housing projects that can be incremented*: (i) start with a pilot project, which can be (ii) replicated, from that we expect (iii) a snowball effect leading to more projects and (iv) an overall housing policy to be executed at local level. The NGOs should play an important role in the first steps but later on the emphasis is more at the individual's level (eventually organized). First of all a good climate should be created between the actors involved, so that the government can be convinced that it could also be to its advantage to play an active role in this process. We will now briefly review the 4 separate steps (i-iv).

(i) A pilot project, in which the proposed short-term measures are implemented and from which all actors can gain experience should be developed. The cooperation of NGOs, already in charge of housing, would be of great value (NCCK, Undugu). We refer further to the successful Undugu experiences in a project in the Kynyago area of Nairobi which, as reported in Appendices 10.F and 11.B, already applied some of the measures proposed in the present thesis. This involvement assumes, of course, that the government will allow NGOs to intervene.

(ii) After a successful pilot project and evaluation and adaptation of measures, etc., this type of project can be repeated. In that context a very important precondition would then be the creation of more NGOs on, for instance, the Undugu model. This larger setup may also bring advantages of scale (cost reductions on purchasing materials, joint hiring of fundis, if needed, lower transport costs, etc.). This would require further studies on how to set up this kind of organization. In this respect, NGOs active under (i) could be asked to play a leading role and to transfer their philosophy and knowledge.

(iii) We may now reach a level at which the setup gathers momentum as other people see the success of the projects. At that stage people may start to organize their housing, eventually in greater numbers, after setting up cooperatives, etc. We may call this the 'snowball effect'. At this stage the NGOs can withdraw and start activities elsewhere.

(iv) The final step could well be an overall housing policy stimulating and facilitating housing projects put forward by individuals or organizations.

At all the foregoing stages, the role of the actors can be as described under 11.3. Meanwhile the government has the time to implement the proposed long-term measures, modified in the light of the experience gained from the progress of the housing projects. We trust that some of the criticisms set out in Chapter 6 have been met by the above approach, now that the government is a 'partner' in the housing process. In the first steps, the NGOs may serve as intermediaries in defending the interests of the low-income people.

11.5 Effect of measures on the housing problem

In Chapter 6 we indicated that self-help building results theoretically in a cost reduction of 37%, so that a better type of house can be within the reach of the low-income households. A productivity increase is needed because (i) what we learn from our interviews is that, without special measures, the cost-reduction figures achievable by self-help are not really impressive and

(ii) the pressure on cheaper housing is growing because incomes continue to fall (the urban household income in the year 2000 is expected to be 84% of that of 1990, so that 12.6% instead of 15% of the 1990 income will be available for housing).

The degree to which the individual measures may affect self-help productivity can only be discovered through further research. So far we have only identified the productivity factors and measures. Productivity measures may bring down the cost of self-help housing to approximately 63%. This lower cost level improves the housing situation at least to a certain degree, for the majority of the people between the 1st. and 7th. deciles (measured from the lower end of the income scale), as it moves them 1 or 2 deciles up the income scale. This may apply to approximately 2.8 million of people in 1990, doubling to 5.6 million by the year 2000.

Implementation of the measures proposed here will enable people to obtain better housing. This, however, does not mean that all of them will then be in a position to afford a house of reasonable standards (or what can be regarded as an acceptable minimum). Approaching the problem of achievement of reduced costs through self-help and improved productivity is not enough to ensure a final solution. However, in the light of what is possible and feasible in addition, it must be maintained that this approach constitutes an important contribution to an overall solution, and therefore very well worth promoting.

11.6 Evaluation of developed method

Although the method is felt, by and large, to meet the requirements, improvement on some points are considered below.

Productivity definition
The developed definition of self-help productivity is satisfactory (Chapter 7). The denominator contains 3 production factors: labour, materials and equipment. According to the field survey, no IPFs were found important enough to be influenced on account of the production factor equipment. This was to be expected, as low-cost housing has to manage with little in the way of equipment. As it remains an essential production factor, there is no reason to change it as regards the definition of self-help productivity.

Improvement of the framework
The setup of the framework doesn't need further improvement, as the clusters under the names labour, materials, equipment, organization, information and general are found satisfactory for structuring and analyzing

Fig. 11.2 Improved framework of productivity factors for self-help productivity

	B. LABOUR	C. EQUIPMENT	D. MATERIALS	
	151 labour conditions		311 quality of materials	
N	111 availability skilled labour		312 availability local materials	N
A	112 availability artisans		313 availability import materials	A
T	152 avail. trained inspector/superv.		314 price of materials	T
I	154 organization of labour market		315 price changes of materials	I
O	155 influence of labour unions		316 suitability of materials	O
N	N 68 degree quality of contractors		351 number of different materials offered	N
A			352 location materials shops	A
L				L
	21 committments to regular job		N 225 level of materials loan	
	22 responsibilities to family		N 324 knowledge where materials	
	23 size of family		N 325 ability to use new materials	
H	121 input of family members		321 knowledge of materials	H
O	122 available time for building		322 knowledge of mats prices	O
U	127 levels of skills		323 knowledge of quantities needed	U
S	123 available time for supervising			S
E	124 quality of supervision			E
H	125 available time for organizing			H
O	126 health conditions			O
L	128 literacy rate			L
D	N 129 traditions of workers			D
	131 influence of family traditions			
	N 159 length of working hours			
	170 degree of motivation			
	N 114 cost of labour	245 maintenance of equipment	341 quantity of materials used	
	165 relations between workers	246 availability spare parts	342 use of 2nd hand materials	
	175 quality of hired labour	259 wear and tear of equipment/tools	343 quality of blocks made	
		263 use of right tools	344 quality of mixed concrete	
P			345 transportation on foot/cart	P
R			346 soil conditions	R
O			347 soil survey carried out	O
J			N 348 import iso local materials	J
E			N 349 disappear./stealing of matls./equip.	E
C			353 mats quantity in designs	C
T			354 correctness quality standards	T
			355 degree of prefabrication	
			358 standardization	
			359 degree of materials waste	
	LEGEND:		360 storage methods	
	N: newly detected factor		361 reliability of supplies	
	N.B. codenumbers to be revised in a follow-up		54 quantity discount	

	E. ORGANIZATION	F. INFORMATION	A. GENERAL	
	452 structure of building process	N 1 gvt.'s reality standards/affordability	N 2 land acquisition procedures	
		501 influence of national procedures	N 3 attitude of gvt and other institutions	
		502 influence of regulations	N 5 availability view on future developments	
		503 influence of codes/bylaws	N 6 degree of bureaucracy	
N		N 504 available guidelines ministries	N 7 degree of imposing policies	N
A		551 speed of approvals/permits	N 8 availability of various housing	A
T		511 availability of good building manuals	N 9 degree of population growth	T
I		512 available standard specifications	N 10 availability of land	I
O		513 influence of council procedures	N 13 role of foreign (aid) donors	O
N		553 information new techniques	11 availability infrastruct (rds)	N
A		453 know how relation design execution	52 political stability	A
L		N 113 availab. low cost housing architects	56 competition	L
		N 515 availability of priv/publ surveyors	65 variability of weather	
		N 514 degree of dissemination of information	N 101 existing education policies	
			N 102 existing manpower training policies	
			N 214 available legislation quitting contractors	
			652 degree of technological progress	
			653 support for R & D	
			201 interest rates	
			203 credit policies	
			204 encouragement of savings	
			206 degree of inflation	
			244 attractiveness of plot value	
			N 209 initiatives innovative financing	
			N 505 type of land administration system	
HS	422 organizing ability	521 knowledge of procedure	N 212 buying out by higher income groups	
H	423 identifying good subcontractors	522 informal contracts	221 stresses to regular income	
O	456 organization of household	523 availability support for approvals	222 income level	H
L	457 cooperation between members	N 524 degree of expectations of project	223 financial resources	O
D	458 relation with other SH builders	559 decisiveness speed of household	N 205 availability of securities	U
		560 documentation of past projects	N 207 mobilizing local financing	S
	N 142 membership of building groups	421 knowledge of the project	N 208 mobilizing foreign financing	E
	441 familiarity with project coord.	621 knowledge building techniques	N 248 proper use of funds for purpose	H
	442 available project time	623 knowledge survey techniques	N 227 possibility of repayment	O
	443 building phases ready in time	224 knowl. criteria mats. loan	N 229 mentality towards loans	L
	55 stability of production	663 knowledge on fits & tolerances	N 141 acceptance of leadership in community	D
	460 project preparation	61 form of contract	N 425 degree of acceptance of realities	
	461 project organization		N 583 willingness of community cooperation	
	462 use of planning			
	463 degree of work organization	541 security of plot legalization	N 4 degree of interest of parties	
	N 401 coordin. betw. institut.	542 complexity of design	12 philosophy project organizer	
	464 participation in decisions	543 consistency of product specif.	N 15 behaviour of officials	
	465 accidents	544 quality of drawings	N 16 existence of crime	
P	466 safety	N 545 availability of detailed drawings	N 26 mentality of people	P
R	468 degree of quality control	N 546 standards for mats. vs. skills	N 42 provision of services (water)	R
O	N 516 correctness tendering procedures	N 547 standards of finishes vs. skills	N 70 crowding/ size of plots	O
J	472 cooperation between crafts	548 standards of construction vs. skills	N 71 outbreak of fires	J
E	459 number of subcontractors	549 allowed versus applied standards	N 582 duration of ownership transfer	E
C	N 215 cost awareness of designers	566 training programmes skilled labour	N 247 level of down payment	C
T	242 ability for cost control	569 adequate labour instructions	N 249 level of contributions bldg groups	T
	243 cost changes	571 availability general project info.	N 413 illegal occupation of plots	
	11 location of temporary unit	550 agreement betw. standards & provisions	N 213 available info on who gives loans	
	N 43 working premises for craftsmen	581 degree of communications	N 216 amount of connection costs	
	45 plot topography	27 degree of trust in project organization		
	46 plot remoteness			
	47 size of project			
	66 complexity of project			
	411 degree community participation			
	412 degree of formation bldg. grps.			
	451 number of participants			
	N 444 soil dumping at allowed places			
	N 445 degree of corrupt practices			
	N 611 capital- vs labour intensive			
	641 type of construction			
	656 method of construction			

the factors. The National, Household and Project levels were found helpful during the interviews. The updated framework now forms the basis for eventual future research (see Fig. 11.2). Further must be noted that some of the code numbers were not revised yet as they stem from the first approach.

Improvement of productivity factor analysis sheets
The 'productivity factor analysis sheets' that have been developed meet their purpose and don't need changing. They only need updating with data from the survey (see also par. 10.8).

Improvement of the instrument
The following remarks can be made on how the instrument functions.

1. The setup and the sequence of the questions were satisfactory.
2. If the aim is exclusively identification of the main factors, one might consider using only Section 3, question 1 and omitting Section 2. Both sections are retained on the basis of the following arguments: (i) Section 3, question 1 yielded 28 factors instead of 33 when Section 2 was also used; (ii) Section 2 functions as an introduction to Section 3; (iii) the interview answers in the Sections 2 and 3 are in a way complementary.
3. Section 3, question 2 didn't produce many positive factors, but the few were interesting enough to warrant retaining this question.
4. The same applies to question 3 on viewpoints and opinions.
5. Distinguishing three levels of factors, National, Household and Project was found useful during the interviews, as the respondents recognized the levels that they were familiar with.
6. The instrument has to be updated after each field survey, which means adding the newly detected factors and positive factors to Section 2 in the form of 'negative' questions.
7. Because of the local languages used by the self-help builders and fundi, it might be advisable to have the instrument made out in the local language concerned, instead of in the national language.

Potential use of the method in other countries and its limitations
We expect the method to be very helpful in identifying productivity factors and measures in other countries. The method was applied on the assumption that the output would remain homogeneous over the period of time considered. In the near future, no dramatic changes are expected in the field of income, income distribution, housing policies, needs and demand, either in Kenya or in a number of other African countries. The method can therefore be assumed to be applicable to them. Appendix 11.C gives a summary of the preferable sequence when applying the method.

11.7 Overall conclusions and recommendations

Conclusions

1. Self-help management was found to be actively pursued but self-help construction to a lesser extent. However, when organized, for instance by NGOs, we found that self-help construction took place as well.
2. Self-help building is not a final solution to the problem of cost reduction. However, it is an important aspect of that solution and very worth while applying, as it improves the housing situation to a certain degree for every household.
3. The method produced a number of productivity factors and can be used for formulating measures for improving self-help productivity and for policy formulation.
4. It was found from the survey, that a number of factors are not only considered as self-help productivity factors but also as preconditioning factors affecting the yes/no decision to engage construction. We refer to factors such as low-income situation, infrastructure, plot size and legalization, chance of borrowing money, prefinancing and building codes.
5. A number of measures proposed in this Chapter 11 were also mentioned as contributing to more general solutions. When these measures will indeed be taken, they will also have an effect on self-help productivity.

Recommendations

1. Self-help management and construction should be stimulated in various ways for the households in the various income brackets. This may need additional research to find out what type of self-help is feasible for particular income brackets and under what conditions.
2. Government policy should stimulate, or at least allow NGOs and other organizations to develop activities on self-help housing projects.
3. A situation has to be created in which all participants can be involved in implementing the proposed measures.
4. It is recommended to set up incremental pilot projects that enables measures to be checked and from which all concerned can obtain experience for future projects.
5. Preparation of a separate manual for dissemination of the method developed in the present thesis is recommended.
6. Improvement of the method by testing in other countries also merits recommendation.
7. Now that the method has shown its applicability, it would be an advantage to extend it by a module which allows the effects of measures and additional policies on productivity factors to be quantitatively estimated with a higher degree of accuracy.

Part Four

Appendices & References

2.A Socio-economic and housing indicators, overall situation various countries

COUNTRY	BANG-LADESH	INDIA	BUR-UNDI	SRI-LANKA	PAKI-STAN	KENYA	ARAB/ YEMEN	THAI-LAND	CONGO	TUNI-SIA	SOUTH KOREA	BRAZIL	PANAMA	URU-QUAI	IRAN	JAPAN	NETHER-LANDS	U.S.A.	SWE-DEN
REFERENCE YEAR A 1)	1973	1971	1979	1981	1980	1975	1975	1976	1980	1975	1980	1980	1980	1975	1976	1978	1980	1980	1980
SOCIO-ECONOMIC INDICATORS																			
1. GDP YEAR A IN US$ 1980 2)	15432	120469	966	4007	28077	5121	2083	25080	1601	5901	57450	192960	3559	7380	136500	1076100	158131	2688470	120083
2. POPULATION IN MILLIONS	74.3	548	4.1	15.0	87.1	13.4	5.3	43.0	1.6	5.6	38.1	121.9	1.82	2.83	33.7	203.0	14.1	227.7	8.3
3. HOUSEHOLD SIZE	5.9	5.6	4.3	5.0	'81 6.7	5.5	5.0	5.6	NA	5.5	4.5	4.2	4.5	3.4	5.0	3.2	3.0	2.7	2.3
4. PERCENTAGE URBAN	8.2	19.9	25.9	21.5	28.1	12.0	8.0	'75 14.0	35.6	48	56.9	67.2	49.3	83.0	47.0	'80 75.0	76.0	73.7	84.2
5. GDP/CAP YEAR A IN US$ 1980	208	220	236	267	322	382	393	583	1001	1054	1508	1590	1955	2608	4050	9365	11215	11807	14449
HOUSING INDICATORS																			
6. RESIDENT. GFCF in % of GDP	NA	2.2	NA	3.3	1.7	3.6	NA	2.3	NA	4.1	3.4	NA	2.62	8.98	7.44	7.3	5.9	4.5	4.6
7. AVER. NR. OF ROOMS/HOUSE	2.0	2.0	NA	2.5	1.9	NA	1.9	1.9	NA	1.9	4.1	NA	'81 2.6	3.5	2.4	4.3	4.4	4.7	4.1
8. % HOUSES WITH 1 ROOM	45.0	47.8	NA	30.8	51.5	NA	46.0	38.6	NA	45.8	4.0	33.6	'81 26.9	9.4	28.5	5.1	0.3	1.6	4.6
9. % HOUSES WITH 2 ROOMS	30.4	28.2	NA	32.3	29.6	NA	31.4	37.7	NA	28.4	26.5	39.9	'81 25.7	18.4	34.1	13.6	3.8	3.3	8.4
10. % HOUSES > 2 ROOMS	24.6	24.0	NA	36.9	18.9	NA	22.6	23.7	NA	25.8	69.5	26.5	'81 47.4	72.2	37.4	81.3	95.9	95.1	87.0
11. AVERAGE PERS./ROOM	2.9	2.8	NA	2.1	3.5	NA	2.8	NA	NA	3.1	NA	1.0	1.8	2.1	2.0	0.8	0.7	0.6	0.6
12. % HOUSES >2 PERSONS/ROOM	56.9	NA	NA	NA	68.1	NA	54.3	NA	NA	58.0	NA	27.7	27.2	40.4	35.6	0.4	NA	0.2	0.2
									NA										
13. % HOUSES WITH PIPED WATER	NA	NA	3.0	20.0	20.3	NA	13.5	13.9	NA	26.4	51.2	53.2	75.4	80.6	46.8	NA	99.5	99.3	NA
14. % WITH PIPED WATER INSIDE	NA	NA	NA	8.0	12.6	NA	5.7	11.7	NA	NA	NA	NA	44.8	66.8	40.9	92.7	99.5	99.3	NA
15. % HOUSES WITH TOILET	NA	NA	39.2	69.1	NA	NA	NA	50.3	NA	43.3	98.4	77.2	89.0	93.0	NA	99.7	99.5	NA	98.5
16. % HOUSES W. FLUSH TOILET	NA	NA	NA	4.7	NA	NA	NA	0.5	NA	NA	18.4	NA	43.5	62.2	NA	NA	99.5	NA	96.2
17. % HOUSES WITH ELECTRICITY	NA	NA	0.6	14.9	30.6	NA	4.6	24.0	NA	34.2	NA	67.4	64.8	80.7	48.3	NA	99.5	NA	NA

1) All the indicators are from this year
2) GDP year A expressed in values of 1980 and than expressed in millions of US$ 1980
NA: no data available

Sources:
CBS,(Netherlands) 1980, 1982, 1983, 1987, 1990;
Centrale Directie, 1975, 1977; IMF, 1983; NCIV, 1980;
O.E.C.D., 1984, 1987a,b, 1988; UNCHS, 1986c;
United Nations 1973b, 1974, 1976, 1979a,b, 1980a-d, 1981, 1982a-c, 1983a,b, 1985, 1986, 1987b; World Bank, 1973, 1978, 1979, 1980, 1982, 1983a,b, 1985

2.B Socio-economic and housing indicators, rural situation various countries

COUNTRY	BANG-LADESH	INDIA	BUR-UNDI	SRI-LANKA	PAKI-STAN	KENYA	ARAB/ YEMEN	THAI-LAND	CONGO	TUNI-SIA	SOUTH KOREA	BRAZIL	PANAMA	URU-QUAI	IRAN	JAPAN	NETHER-LANDS	U.S.A.	SWE-DEN
REFERENCE YEAR A 1)	1973	1971	1979	1981	1980	1975	1975	1976	1980	1975	1980	1980	1980	1975	1976	1978	1980	1980	1980
GENERAL INDICATORS																			
1. GDP YEAR A IN US$ 1980 2)	15432	120469	966	4007	28077	5121	2083	25080	1601	5901	57450	192960	3559	7380	136500	1076100	158131	2688470	120083
2. RURAL POPULATION IN MILLIONS	68.2	439	3.05	11.8	62.6	11.8 3)	4.9 3)	37	1	2.9	16.4	40	0.92	0.48	17.9	50.75	3.4	59.9	1.3
3. RURAL HOUSEHOLD SIZE	5.6	5.6	4.3	NA	'81 6.6	5.65	4.8	5.6	NA	5.6	4.7	4.5	4.8	3.7	5.2	3.7	NA	NA	2.6
4. PERCENTAGE RURAL	91.8	80.1	74.1	78.5	71.9	88.0	92.0	'75 86.0	64.4	52.0	43.1	32.8	50.7	17.0	53.0	25.0	24.0	26.3	15.8
5. GDP/CAP YEAR A IN US$ 1980	205	220	236	267	322	382	393	583	1001	1054	1508	1590	1955	2608	4050	9365	11215	11807	14449
HOUSING INDICATORS																			
6. RESIDENT. GFCF in % of GDP	NA	2.2	NA	3.3	1.7	3.6	NA	2.3	NA	4.1	3.4	NA	2.62	8.98	7.44	7.3	5.9	4.5	4.6
7. AVER. NR. OF ROOMS/HOUSE	2	2.0	NA	2.4	1.8	NA	NA	1.9	NA	1.5	3.8	NA	'81 2.3	3.7	2.3	5.1	NA	NA	4.4
8. % HOUSES WITH 1 ROOM	44.1	47.3	NA	30.8	55.1	NA	NA	39.7	NA	58.2	4.5	NA	'81 30.2	8.7	28.4	0.9	NA	NA	1.6
9. % HOUSES WITH 2 ROOMS	30.8	28.5	NA	33.0	28.8	NA	NA	37.7	NA	25.8	33.9	NA	'81 30.4	16.6	38.1	6.4	NA	NA	3.8
10. % HOUSES > 2 ROOMS	25.1	24.2	NA	35.9	16.1	NA	NA	22.6	NA	16.0	61.6	NA	'81 39.4	74.7	33.5	92.7	NA	NA	94.6
11. AVERAGE NO PERSONS/ROOM	2.9	2.8	NA	2.1	3.6	NA	NA	NA	NA	3.8	NA	NA	2.1	2.1	2.2	0.7	NA	NA	0.6
12. % HOUSES >2 PERSONS/ROOM	56.5	NA	NA	NA	70.5	NA	NA	NA	NA	69.5	NA	NA	34.3	41	39.6	0.2	NA	NA	0.4
13. % HOUSES WITH PIPED WATER	NA	4.7 4)	4.3	13.3	5.4	NA	NA	2.6	NA	3.0	23.5	3.2	50.9	41.7	16.9	84.5	99.5	97.6	NA
14. % WITH PIPED WATER INSIDE	NA	NA	NA	4.4	2.5	NA	NA	1.6	NA	NA	NA	NA	13.4	25.4	10.0	NA	99.5	97.6	NA
15. % HOUSES WITH TOILET	NA	7.0 4)	39.2	65.8	NA	NA	NA	42.5	NA	13.1	98.8	42.7	75.5	78.2	NA	100.0	99.5	NA	94.2
16. % HOUSES W. FLUSH TOILET	NA	0.5 4)	NA	2.3	NA	NA	NA	'0.0	NA	NA	2.3	NA	10.8	22.5	NA	NA	99.5	NA	82.1
17. % HOUSES WITH ELECTRICITY	NA	6.6 4)	'0.0	8.0	14.7	NA	NA	12.2	NA	6.0	NA	20.6	NA	34.2	14.2	NA	99.5	NA	NA

1) All the indicators are from this year
2) GDP year A expressed in values of 1980 and than expressed in millions of US$ 1980
3) calculated from other data in table
4) 1973
NA: no data available

Sources:
CBS,(Netherlands) 1980, 1982, 1983, 1987, 1990;
Centrale Directie, 1975, 1977; IMF, 1983; NCIV, 1980;
O.E.C.D., 1984, 1987a,b, 1988; UNCHS, 1986c;
United Nations 1973b, 1974, 1976, 1979a,b, 1980a-d, 1981, 1982a-c, 1983a,b, 1985, 1986, 1987b; World Bank, 1973, 1978, 1979, 1980, 1982, 1983a,b, 1985

2.C Intercorrelation tables socio-economic and housing indicators

INTERCORRELATION TABLE SOCIO-ECONOMIC AND HOUSING INDICATORS, OVERALL SITUATION

	HOUSE HOLDSIZE	% URBAN	GDP PER CAPITA	RESIDENT GROSS FIXED CAPITAL FORMATION	AVERAGE NUMBER OF ROOMS PER HOUSE	% HOUSES WITH 1 ROOM	% HOUSES WITH 2 ROOMS	% HOUSES WITH MORE ROOMS	AVERAGE NUMBER OF PERSONS PER ROOM	% HOUSES WITH MORE 2 PERSONS PER ROOM	% HOUSES WITH PIPED WATER	% HOUSES WITH WATER INSIDE	% HOUSES WITH TOILET	% HOUSES WITH FLUSH TOILET	% HOUSES WITH ELEC
HOUSEHOLDS	1 0000	-0 7211	0 7475	-0 8598	-0 7631	0 8105	0 4737	-0 8286	0 9450	0 9550	-0 5654	-0 4038	-0 6867	-0 9000	-0 2515
PERCURB		1 0000	0 8179	0 6970	0 7012	-0 6923	-0 6084	0 8042	-0 9646	-0 8867	-0 9273	0 9429	0 7619	0 9000	0 8333
GDPCAPITA			1 0000	0 8303	0 5423	-0 7063	-0 4985	0 6993	-0 7256	-0 8108	0 8909	0 8571	0 8571	0 8000	0 8810
RGFCF				1 0000	0 7236	-0 8333	-0 7333	0 9167	-0 7748	-0 9487	0 8571	0 6000	0 6571	1 0000	0 6000
AVARROOM					1 0000	-0 8508	-0 7620	0 9089	-0 8885	-0 8009	0 7964	0 6375	0 9710	0 8747	0 3381
ONEROOM						1 0000	0 4685	-0 9301	0 8476	0 8929	-0 7333	-0 6000	-0 9286	-0 9000	-0 4286
TWOROOM							1 0000	-0 6154	0 4085	0 3063	-0 5833	-0 7143	-0 6786	-1 0000	-0 3214
MOREROOM								1 0000	-0 8354	-0 8488	0 7833	0 6000	0 9286	1 0000	0 5000
PERSROOM									1 0000	1 0000	-0 6786	-0 6000	-0 9000	-0 5000	-0 5429
MOREPERSRO										1 0000	-0 7000	-0 5000	-1 0000	1 0000	-0 4000
PIPEDWATER											1 0000	0 9429	0 8571	1 0000	0 9762
WATERINSID												1 0000	0 5000	0 5000	1 0000
TOILET													1 0000	1 0000	0 7714
FLUSHTOILET														1 0000	0 5000
ELECTRICITY															1 0000

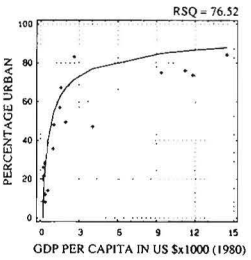
INTERCORRELATION TABLE SOCIO-ECONOMIC AND HOUSING INDICATORS, URBAN SITUATION

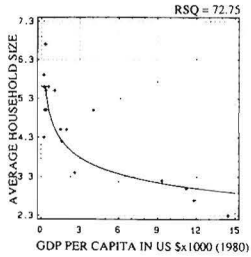
	HOUSE-HOLDSIZE	% URBAN	GDP PER CAPITA	RESIDENT GROSS FIXED CAPITAL FORMATION	AVERAGE NUMBER OF ROOMS PER HOUSE	% HOUSES WITH 1 ROOM	% HOUSES WITH 2 ROOMS	% HOUSES WITH MORE ROOMS	AVERAGE NUMBER OF PERSONS PER ROOM	% HOUSES WITH MORE 2 PERSONS PER ROOM	% HOUSES WITH PIPED WATER	% HOUSES WITH WATER INSIDE	% HOUSES WITH TOILET	% HOUSES WITH FLUSH TOILET	% HOUSES WITH ELEC.
HOUSEHOLDS	1.0000	-0 3187	-0 8445	-0 7857	-0 2857	0 2000	0 5238	-0 8095	0 8428	1 0000	-0 5941	-0 5000	-0 7290	-0 8000	-0 4828
PERCURB		1.0000	0 8179	0 6970	0 4781	-0 7333	-0 2500	0 7500	-0 5238	-0 8000	0 5594	0 7714	0 6273	0 7143	0 3810
GDPCAPITA			1 0000	0 8303	0 7805	-0 7455	-0 2333	0 9167	-0 6429	-0 8000	0 7133	1 0000	0 8545	0 5714	0 8095
RGFCF				1.0000	0 4458	0 4286	-0 5952	0 9018	-0 7714	-1 0000	0 5238	0 6000	0 8095	0 8788	0 2571
AVARROOM					1 0000	-0 9086	-0 2089	0 8238	-0 7785	-0 8323	0 0589	0 2000	0 7308	0 4286	-0 3581
ONEROOM						1 0000	0 1833	-0 8000	0 7857	0 8000	0 0000	-0 4000	-0 7857	0 0714	0 1000
TWOROOM							1 0000	0 4000	0 4643	0 8000	0 0337	1 0000	-0 4286	-0 8286	0 9000
MOREROOM								1 0000	-0 7500	-0 8000	0 4286	0 4000	0 8571	0 5429	-0 1000
PERSROOM									1 0000	1 0000	0 5429	0 5000	-0 9429	0 0000	0 8000
MOREPERSRO										1 0000	0 5000	1 0000	-1 0000	-1 0000	1 0000
PIPEDWATER											1 0000	1 0000	0 7578	0 7500	0 9286
WATERINSID												1 0000	0 8000	0 4000	1 0000
TOILET													1 0000	0 5714	0 8333
FLUSHTOILET														1 0000	0 4000
ELECTRICITY															1 0000

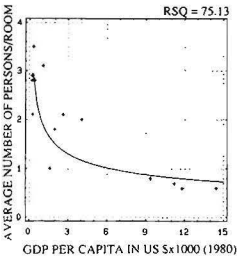
INTERCORRELATION TABLE SOCIAL-ECONOMIC AND HOUSING INDICATORS, RURAL SITUATION

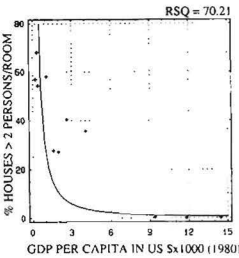
	HOUSE-HOLDSIZE	% URBAN	GDP PER CAPITA	RESIDENT GROSS FIXED CAPITAL FORMATION	AVERAGE NUMBER OF ROOMS PER HOUSE	% HOUSES WITH 1 ROOM	% HOUSES WITH 2 ROOMS	% HOUSES WITH MORE ROOMS	AVERAGE NUMBER OF PERSONS PER ROOM	% HOUSES WITH MORE 2 PERSONS PER ROOM	% HOUSES WITH PIPED WATER	% HOUSES WITH WATER INSIDE	% HOUSES WITH TOILET	% HOUSES WITH FLUSH TOILET	% HOUSES WITH ELEC
HOUSEHOLDS	1 0000	0 4895	-0 5025	-0 5930	-0 8151	0 8078	0 2167	-0 8078	0 6708	0 9487	0 0371	1 0000	-0 5559	-0 9487	0 3339
PERCURB		1 0000	-0 8179	-0 6970	-0 3593	0 3333	0 4524	-0 3333	0 0857	0 4000	-0 5879	0 9000	-0 6500	0 7819	-0 4782
GDPCAPITA			1 0000	0 8303	0 2755	-0 4286	-0 1905	0 2619	-0 0857	-0 1000	0 3929	0 5000	0 7333	0 6183	0 6905
RGFCF				1 0000	0 4286	-0 4643	-0 4286	0 4286	-0 4000	-1 0000	0 6190	0 8000	0 7143	0 9276	0 0286
AVARROOM					1 0000	-0 9222	0 0240	0 9940	-0 8958	-0 8000	0 7143	0 5000	0 7714	0 9747	0 1000
ONEROOM						1 0000	0 2381	-0 9286	0 8429	0 8000	-0 6000	-0 5000	-0 8857	-0 8721	-0 3000
TWOROOM							1.0000	0 0476	0 0286	0 4000	0 1429	-0 5000	0 1429	-0 6869	0 7000
MOREROOM								1.0000	-0 9429	-0 8000	0 7143	0 5000	0 7714	0 9747	0 1000
PERSROOM									1 0000	0 8000	-0 8000	-1 0000	-0 8000	-1 0000	-0 1000
MOREPERSRO										1 0000	1 0000	1 0000	-1 0000	1 0000	1 0000
PIPEDWATER											1 0000	1 0000	0 6429	0 9747	0 3571
WATERINSID												1 0000	1 0000	1 0000	0 4000
TOILET													1 0000	0 8407	0 7500
FLUSHTOILET														1 0000	0 4000
ELECTRICITY															1 0000

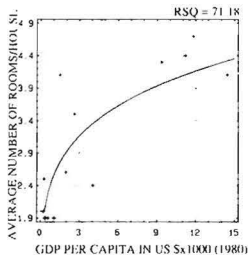
2.D Socio-economic and housing indicators versus GDP/capita, overall situation

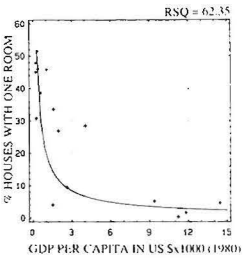


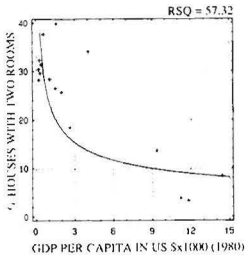


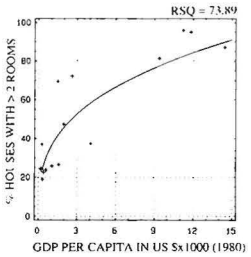


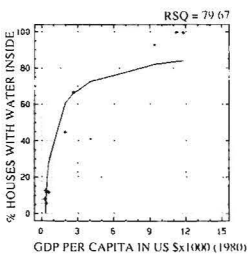


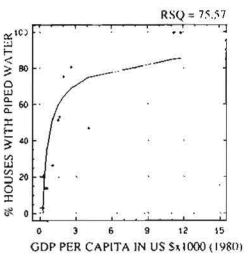


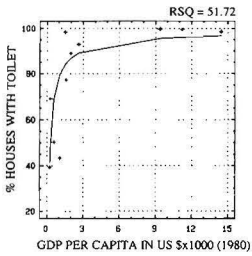


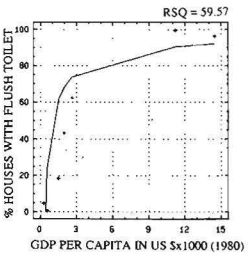


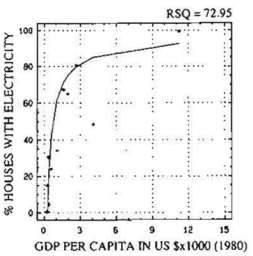




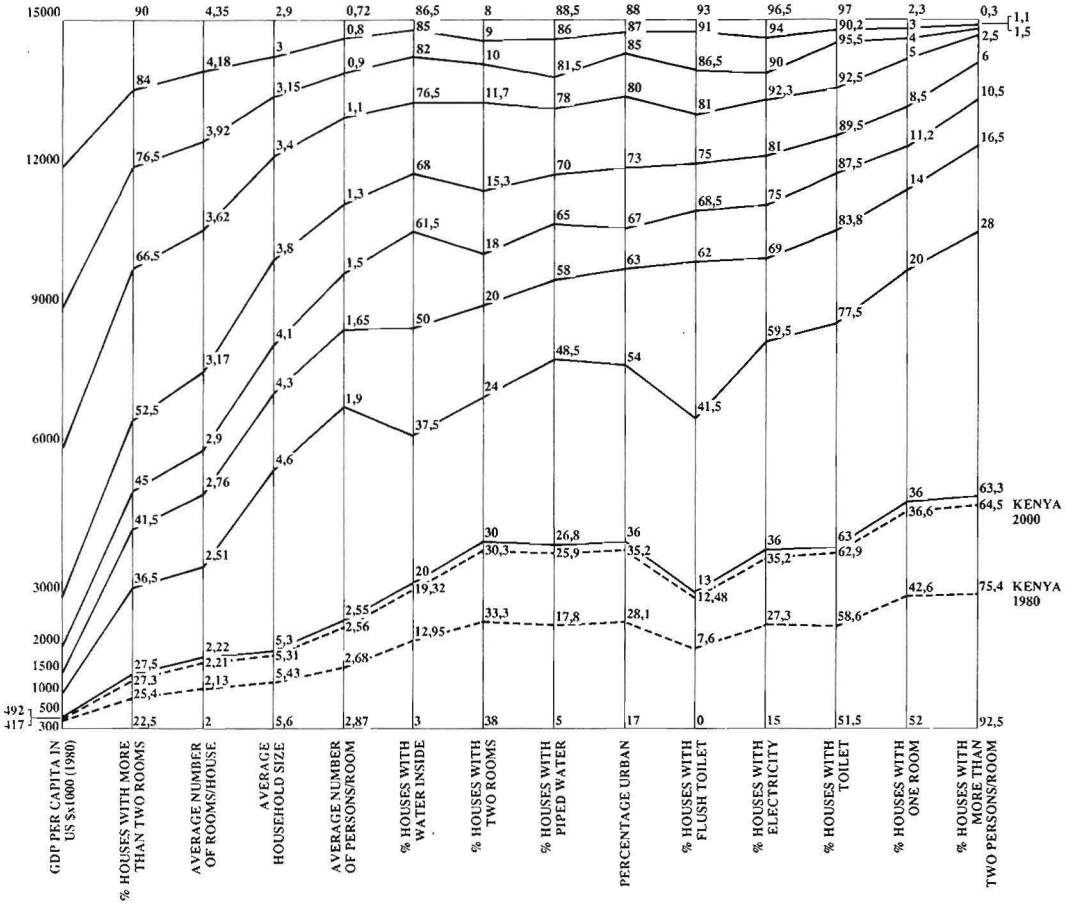








2.E Compiled housing and socio-economic indicators versus GDP/capita, overall situation, with Kenya 1980 and 2000



3.A Review of building materials applying to low-cost housing

FOUNDATIONS:	- reinforced concrete - plain concrete - stones - murram
WALLS:	- concrete blocks - quarry stones - burnt bricks - sun-baked bricks - sun-baked mud/cement blocks - mud and wattle - sawn timber - timber off-cuts - timber poles - prefabricated panels - reinforced concrete - structural steel - steel products
ROOFS:	Structural materials: - sawn timber - steel - poles - bamboo Cladding materials: - galvanized corrugated iron sheets - corrugated asbestos cement sheets - sisal cement sheets - clay tiles - concrete tiles - makuti - grass/reeds - tins - shingles - felt - mastic asphalt
FLOORS:	-concrete screed -cement screed - concrete slabs - p.v.c. tiles
WINDOWS:	- metal - timber - glass - concrete
DOORS:	- flush panels - steel doors - timber doors
OTHERS:	- electricity - street lighting - roads - drainage - sewers - water

3.B Annual production of public and private housing 1955-1988

year	NHC 1) houses total	S&S	MOPW 2) housing	other	total	private 3)	total
1955						577	577
1956						830	830
1957						773	773
1958						636	636
1959						676	676
1960	665				665	562	1227
1961	977				977	123	1100
1962	1898		240		1898	57	1955
1963	272		242		512	86	598
1964	936		155		1178	98	1276
1965	890		327		1045	44	1089
1966	611		177		938	129	1067
1967	550		502		727	258	985
1968	1588	48	578		2090	314	2404
1969	1928	169	501		2506	328	2834
1970	2340	1465	962		2841	470	3311
1971	3445	2100	572		4407	1426	5833
1972	4598	96	1046		5170	1832	7002
1973	1190	84	565		2236	1499	3735
1974	1630	363	628		2195	1451	3646
1975	2196	1128	254	1068	2824	1855	4679
1976	1445	355	106	193	2767	791	3558
1977	1271	1077	359	257	1570	742	2312
1978	3942	2389	156	221	4558	835	5393
1979	6464	2454	482	481	6841	2716	9557
1980	4077	2719	471	206	5040	2065	7105
1981	2735	2550	49	443	3412	1918	5330
1982	2928	598	968	790	3420	2083	5503
1983	687	2048	457	552	2445	981	3426
1984	2398	882	626	116	3407	646	4053
1985	1009	276	467	184	1751	578	2329
1986	615	50	383	150	1266	1078	2344
1987	575		NA	NA	1108	1042	2150
1988	229				NA	1262	NA
up to 1987:	53860	20851	11273	4661	69794	29499	99293

1) National Housing Corporation (NHC) and Central Housing Board (CHB)
2) MOPW: Ministry of Public Works
3) Private covers main towns only: Nairobi, Mombasa, Kisumu, Nakuru Eldoret, Kitale, Thika, Nyeri, Kakamega, Embu and Meru
Not all the units completed are actually registered as not all completion certificates are returned
Source: Central Bureau of Statistics Kenya, Statistical Abstracts: 1955-1988

3.C Government disbursements, period 1955-1989, current KShs

year	total KShs mio	general social security, others	defence	education	health	economic affairs	housing community development & social services	% of total
1955	781	533	32	72	36	107	1	0.07
1956	940	636	28	95	37	131	13	1.3
1957	925	575	44	107	43	138	18	2.0
1958	889	533	36	118	49	128	25	2.8
1959	922	548	34	126	46	138	29	3.2
1960	927	513	30	142	61	138	43	4.6
1961	1019	561	7	162	69	179	42	4.1
1962	1049	573	6	172	68	188	42	4.0
1963	1130	603	4	167	68	257	30	2.7
1964	1363	791	23	148	61	317	23	1.7
1965	1410	775	61	136	63	325	50	3.5
1966	1588	921	84	146	75	321	41	2.6
1967	1641	889	106	178	76	317	75	4.6
1968	1880	968	123	197	103	413	76	4.0
1969	2100	1052	111	238	118	476	105	5.0
1970	2429	1202	114	351	159	473	130	5.4
1971	3117	1455	140	568	196	623	135	4.3
1972	3610	1676	186	674	244	617	213	5.9
1973	4028	1795	239	808	256	732	198	4.9
1974	4603	1984	285	923	289	883	239	5.2
1975	6029	2378	380	1235	407	1348	281	4.7
1976	7461	2840	412	1437	478	1977	317	4.2
1977	8195	2430	858	1616	591	2591	108	1.3
1978	11808	3562	1588	1890	738	3820	209	1.8
1979	13952	3954	2113	2182	862	4673	167	1.2
1980	15626	5004	2237	2741	1070	4352	222	1.4
1981	19441	6600	1795	3526	1306	5919	295	1.5
1982	22446	7993	2569	3953	1423	6228	280	1.2
1983	23814	9864	2755	4129	1394	5463	209	0.9
1984	24849	10019	2801	4401	1466	6041	121	0.5
1985	30693	13448	2244	5196	1655	8083	67	0.2
1986	33114	14314	2547	6594	1854	7478	327	1.0
1987	41769	18399	3335	7930	2205	9636	264	0.6
1988	44396	19317	4886	9136	2363	8472	222	0.5
1989	60286	27339	4144	11598	3115	13477	613	1.0
Average								0.89

1) 1977 onwards without unallocatable expenditure on residential buildings
Source: Central Bureau of Statistics, Statistical Abstracts 1955-1988

3.D Description of housing stock in urban areas

Fig. 3.D.1 Urban housing stock, 1983

town	house	maison-nette	flat	swahili	shanty	other 1)	total
Nairobi	121,181	11,923	20,662	35,242	54,339	855	244,202
Mombasa	7,989	4,285	16,733	61,666	836	3,398	94,908
Eldoret	9,178	42	-	-	1,318	9,318	19,856
Kisimu	10,578	179	710	1,834	-	36,544	49,845
Nakuru	37,119	-	305	-	662	7,222	45,308
Bungoma	2,249	-	95	228	-	9,322	11,894
others	66,415	-	3,318	18,440	17,733	32,329	138,232
total	254,707	16,429	41,823	117,410	74,888	98,988	604,245
revised 2)	286,190	18,460	46,992	131,922	84,144	111,220	678,930
% total	42.2	2.7	6.9	19.4	12.4	16.4	100.0

Source: Ministry of Works, 1986 b, p. 40
1) 'shanty' and 'other' can be treated as the same
2) figures rectified according p(iii) same source

The private individuals delivered 61% of the total housing stock for themselves or for rental. Private development companies provided 4.8% of the housing units for rental and sale. The public sector delivered the remaining 34% of the following categories: 2% of the total is tenant purchase, 3.1% are site and service projects both mainly provided by the National Housing Corporation. 29% are mainly rental units provided by public agencies of central and local government [CBS, 1985, pp. 34,35]. according to the survey 20 percent are owner occupied, 66 percent rental and about 14 percent are distributed by employers, relatives, etc. This means that most of the Kenyan urban dwellers do not own the units in which they stay [Ministry of Works, 1986b, p. 43]. The private individuals delivered 61% of the total housing stock for themselves or for rental, private development companies provided 4.8% and the public sector the remaining 34%. [CBS, 1985, pp. 34,35].

With regard to the age of houses, the survey brought to light that approximately 24% are not older than 5 yrs, 21% between 5-9 years, 18% between 10- 20 years and 37% are more than 20 years old [Ministry of Works, 1986b, p. 41]. For the urban areas of the country as a whole, nine out of ten dwellings have roofs of durable materials, nearly eight out of ten have durable floors, while seven out of ten have durable walls [idem, p. 45].

4.A Household size projections

According to the 1979 census, Nairobi and Mombasa had, on average, 4.25 persons per household (census 1969: 4.09), while in other urban areas the number was 4.43 (1969: 4.41). The total urban average was 4.32 (1969: 4.18). For the rural areas the average figure was 5.65 (1969: 5.84). The national average was 5.49 (1969: 5.26) [see Lee, 1983, p. 36].

urban household size development
The views on the development of household sizes are contradictory in publications
- Lee assumes that these household sizes remain stable up to the year 2000 at 4.32 urban and 5.65 rural [idem, p. 6].
- However, Rourk [1983, p. 18] expects an increase in urban household sizes between 1983 to 1998 from 4.25 to 4.6 for Nairobi and Mombasa and 4.43 to 4.85 resp. for the other towns, with a stable rural household size of 5.65. According to him the urban household size should increase because of shortage of housing.
- The Urban Housing Survey 1983 gives lower figures for urban household sizes in 1983: Nairobi 3.45, Mombasa 3.72, Kisumu 3.30, medium-size towns 3.50 and other towns 3.36, with an urban average of 3.47, but no prediction is given for the coming years. This survey argues that a decrease in household size should be expected, considering the trends in other countries [Min. of Works, 1986b, p. 22].
- Personal communications [Verbeek and others] showed that the household size in urban areas was stabilizing after the 1979 census as, during the inter-census period 1969-1979, many of the incomplete households (from the period before 1969) were now completed, because mothers and their children joined the fathers already living in the urban areas.

rural household-size development
For the rural areas, the Agricultural Production Survey (APS '86) found an average household size of 5.66 and no significant differences from earlier periods [Central Bureau of Statistics, 1989, p. 27].

projections
The following assumptions are made as to projections
- from the in the graphs of Chapter 1, can be seen that household sizes tend to decrease when GDP/capita increases. As regards Kenya this GDP/capita is likely not to increase dramatically in the future, so that it is reasonable to assume that the household sizes will remain stable;
- the average rural household size taken as 5.65 on the basis of the '79 census;
- the average urban household size is 4.00, arbitrarily chosen between 4.32 (1979 census) and 3.47 (UHS'83) [see also Verbeek, 1978, p. 6]. We do not

distinguish between different towns as the data on household sizes differ too much. The overall picture is not distorted as a result. Fig. 4.A.1 reviews the household sizes from the various sources and the assumptions for the present study.

Fig. 4.A.1 Household sizes, rural and urban 1969-2000

source	census 1)		UHS '83 2)	Rourk 3)	assumed
year	1969	1979	1983	1983-1998	1983-2000
rural	5.84	5.65	5.65	5.65-5.65	5.65-5.65
Nair./Momb.	4.09	4.25	3.53	4.25-4.60	4.00-4.00
other towns	4.41	4.43	3.40	4.34-4.85	4.00-4.00
total urban	4.18	4.32	3.47	4.34-4.74	4.00-4.00
national	5.26	5.49	5.35	5.40-5.42	5.39-5.23

Sources: 1) Central Bureau of Statistics, 1989, p. 27
2) Ministry of Works, 1986b, p. 22
3) Rourk, 1984, p.18

From the Agricultural Production Survey we obtained some information on the distribution of household sizes, but for the rural areas. See Fig. 4.A.2.

Fig. 4.A.2 Number of persons per rural household

	household size	percentage of total
	1 - 2	14
	3 - 4	20
	5 - 7	37
	8 - 9	15
	9 - over	14
average	5.66	100

Source: Central Bureau of Statistics, 1989, p. 27

4.B Projections of rural and urban GDP at factor cost

The development of the GDP over 1955-2000
For a projection of the per capita incomes and rural/urban income distribution to the year 2000 we need to know the forecast development of the Gross Domestic Product (GDP). Sessional Paper no 1 [Min. of Planning, 1986, p. 5] shows the targeted growth rates per annum for 1984-1988: 4.8% and for 1988-2000: 5.9%. The real growth rates for the period 1983-1988 were: 1983: 3.9%; 1984: 0.7%; 1985: 4.9%; 1986: 5.5%; 1987: 4.8% and for 1988: 5.2% (provisional); 1989: 5.0% (expected) [Central Bureau of Statistics, Kenya, 1989, pp. 7,8].

Although the GDP of 1984 was exceptionally low because of the severe drought, the targeted growth rate of 5.9% seems to be overoptimistic. The New Development Plan 89-93 forecasts an annual growth of 5.4%, but the Economic Survey 1989 [idem, p. 7,8] has forecast a growth of 5% for the year 1989. This figure may not be unrealistic, the past growth of GDP may justify this, although this figure might be on the optimistic side for the future. Combining the projected GDP with the (expected) size of population gives the expected GDP/cap. Fig. 4.B.1 gives a review of historical data and projections for both GDP and GDP per capita.

Rural and Urban GDP at factor cost (GDPafc)
The agricultural factor income can be considered as the total of: agriculture, forestry, fishing, mining and quarrying for both the monetary and nonmonetary economies. Over the period 1979-1988 this varied between a high 34.4% ('79) and a low 30.3% ('88) of the total GDPafc with a downward tendency over the years, and 32.77% in '83 [Central Bureau of Statistics, 1987, p. 35, and idem, 1989, p. 15]. For the other incomes (like in health, education, etc.) earned in rural areas, we assume an additional 20% of the remainder GDPafc (=total GDPafc minus agricultural factor income). For 1983, this results in a total rural income of 47% (= urban 53%) of total GDPafc (see Fig. 4.B.2).

Fig. 4.B.1 Actual and projected GDP and GDP per capita 1955-2000

	year	GDP SHS million current 1)	ex-change rate current	GDP US $ million current	defla-tor 1988=100	GDP US$ 1988 million constant	popu-la-tion 2) million	GDP/ cap SHS current	GDP/ cap US $ current	GDP/ cap US $ 1988
ACTUAL	1955	3610	7.143	505	8.178	1587	7.001	516	72	227
	1956	3863	7.143	541	7.684	1596	7.209	536	75	221
	1957	4118	7.143	577	7.408	1640	7.432	554	78	221
	1958	4162	7.143	583	7.124	1594	7.652	544	76	208
	1959	4296	7.143	601	6.981	1613	7.880	545	76	205
	1960	4510	7.143	631	6.981	1693	8.115	556	78	209
	1961	4494	7.143	629	6.756	1633	8.352	538	75	195
	1962	4881	7.143	683	6.519	1711	8.636	565	79	198
	1963	6586	7.143	922	6.390	2263	8.866	743	104	255
	1964	7120	7.143	997	6.163	2359	9.100	782	110	259
	1965	7140	7.143	1000	6.200	2380	9.471	754	106	251
	1966	8318	7.143	1164	6.101	2729	9.645	862	121	283
	1967	8805	7.143	1233	5.916	2801	9.938	886	124	282
	1968	9600	7.143	1344	5.855	3022	10.245	937	131	295
	1969	10452	7.143	1463	5.775	3245	10.942	955	134	297
	1970	11505	7.143	1611	5.633	3484	11.225	1025	143	310
	1971	12860	7.143	1800	5.405	3737	11.671	1102	154	320
	1972	14470	7.143	2026	5.066	3941	12.067	1199	168	327
	1973	16580	6.901	2403	4.598	4099	12.483	1328	192	328
	1974	20363	7.143	2851	3.896	4265	12.912	1577	221	330
	1975	23374	8.260	2830	3.479	4372	13.399	1744	211	326
	1976	28580	8.310	3439	2.978	4576	13.847	2064	248	331
	1977	36667	7.947	4614	2.546	5020	14.337	2558	322	350
	1978	40966	7.404	5533	2.472	5445	14.856	2758	372	366
	1979	45437	7.328	6200	2.317	5661	16.141	2815	384	351
	1980	52649	7.568	6957	2.116	5990	16.667	3159	417	359
	1981	60468	10.286	5879	1.883	6121	17.342	3487	339	353
	1982	69280	12.725	5444	1.703	6343	18.047	3839	302	351
	1983	78520	13.790	5694	1.514	6392	18.784	4180	303	340
	1984	87780	15.781	5562	1.385	6534	19.482	4506	286	335
	1985	98280	16.284	6035	1.287	6803	20.241	4855	298	336
	1986	116620	16.042	7270	1.147	7191	21.021	5548	346	342
	1987	132294	16.515	8011	1.062	7556	21.826	6061	367	346
	1988	152680	18.599	8209	1.000	8209	22.657	6739	362	362
PROJECTED	1989	160314	18.599	8619	1.000	8619	23.513	6818	367	367
	1990	168330	18.599	9050	1.000	9050	24.397	6900	371	371
	1991	176746	18.599	9503	1.000	9503	25.308	6984	375	375
	1992	185583	18.599	9978	1.000	9978	26.247	7071	380	380
	1993	194863	18.599	10477	1.000	10477	27.214	7160	385	385
	1994	204606	18.599	11001	1.000	11001	28.211	7253	390	390
	1995	214836	18.599	11551	1.000	11551	29.237	7348	395	395
	1996	225578	18.599	12128	1.000	12128	30.292	7447	400	400
	1997	236857	18.599	12735	1.000	12735	31.375	7549	406	406
	1998	248700	18.599	13372	1.000	13372	32.487	7655	412	412
	1999	261135	18.599	14040	1.000	14040	33.626	7766	418	418
	2000	274192	18.599	14742	1.000	14742	34.792	7881	424	424

1) from 1989 assumed 5% growth p.a. inflation not accounted for and expressed in KShs 1988
2) low-growth scenario figures

Source: period 1955-1988 Central Bureau of Statistical Abstracts Kenya
period 1989-2000 extrapolations, this thesis

Projected GDP at factor cost

For an assumed 5% growth of the GDP the estimated agricultural GDPafc growth is 4.16% (proportionally scaled down from 4.5%) [Ministry of Planning, 1989, p. 45, table 3.1]. In the year 2000 the agricultural GDPafc reaches 27.58% of total GDPafc.

The other rural earnings are assumed to decrease proportionally with the decrease of ratio of the rural population to the total (down from 85% in 1983 to 75% in 2000) being 75/85 x 0.20 x (total GDPafc minus agricultural GDPafc) = 12.68%. This brings the rural GDPafc to 27.58 + 12.68 = 40.26% of total GDPafc. The actual and projected GDPafc from 1983-2000 are shown in Fig. 4.B.2.

***Fig. 4.B.2** Actual ('83-'88) and projected GDP at factor cost('89-'00), in KShs. million*

	year	GDP afc 1) in KShs mio 2)	agricultural GDP in KShs mio	agricultural GDP % of GDP afc	rural % of GDP afc	urban % of GDP afc
ACTUAL	1984	105305	36307	34.48	47.54	52.46
	1985	110492	36833	33.34	46.55	53.45
	1986	116583	38528	33.05	46.24	53.76
	1987	122103	37456	30.68	44.25	55.75
	1988	128428	39004	30.37	43.92	56.08
PROJECTED	1989	134849	40626	30.13	43.63	56.37
	1990	141592	42316	29.89	43.34	56.66
	1991	148671	44076	29.65	43.05	56.95
	1992	156105	45910	29.41	42.76	57.24
	1993	163910	47820	29.17	42.46	57.54
	1994	172105	49809	28.94	42.16	57.84
	1995	180711	51881	28.71	41.85	58.15
	1996	189746	54040	28.48	41.54	58.46
	1997	199234	56288	28.25	41.23	58.77
	1998	209195	58629	28.03	40.91	59.09
	1999	219655	61068	27.80	40.59	59.41
	2000	230638	63609	27.58	40.26	59.74

1) GDP at factor cost

2) 1984-1988 current, 1989-2000 in KShs 1988

Source: 1984-1988 Central Bureau of Statistics, 1987, p. 35 and 1989, p.15

4.C Urban income 1983-2000

Urban income for 1983

For 1983, the total urban income can be calculated as 53% of the GDP at factor cost or 66,200 million = KShs. 35,080/- million (value 1983). With 707,750 urban households, the average monthly income was KShs. 4130/-. This can be compared with data from Lee [1983, p. 16] and Rourk [1983, p. 34], who updated these figures to 1983 using household sizes of 4.25 and 4.43 (see Appendix 4.A). Fig. 4.C.1 presents their figures but adapted to an overall household size of 4.0.

***Fig. 4.C.1** Estimated mean urban household income KShs per month and per capita 1983*

	Nairobi/Mombasa			other towns		
quintiles	monthly income	monthly per cap.	% of total	monthly income	monthly per cap.	% of total
1	775	194	3.9	624	156	4.8
2	1371	343	6.9	1248	312	9.6
3	2545	636	12.8	1908	477	14.7
4	4136	1034	20.8	2896	724	22.3
5	11055	2764	55.6	6308	1577	48.6
mean/total	3976	994	100.0	2596	649	100.0

The average monthly mean per capita is KShs. 825/-.
For a household of 4 persons it is KShs 3301/-. Source: Rourk, 1984, p. 34

Another indication but for personal income, is the official minimum monthly wage (which includes housing allowances) as established by the Ministry of Labour. These wages were for the Nairobi area 1981: KShs. 456/- ; 1983: 480/- ; 1987: 640/- current prices (see Figure 4.C.2) [Central Bureau of Statistics, Statistical Abstracts, 1981, 1983, 1987]. A few statistics on income and income distribution cover wage employment of only 40% of the estimated employment in urban areas. (In total, that is 500,000 wage employed and estimated 1,250,000 employed in modern and urban informal sector) [Central Bureau of Statistics, 1984, table 227a and Ministry of Finance, 1983, p.7]. In 1983 the average income was KShs.2150/- for wage earners in main towns (see Figure 4.C.2). Generally, it can be said that Figures 4.C.1 up to 4.C.3 are not contradictory, they support each other. The UHS'83 also surveyed the total expenditure pattern of the households and adopted their total expenditure as an approximation of the total household income, owing to lack of better data from the survey. The median consumption was KShs. 1050/- while the mean was KShs. 1617/- [idem, p. 28]. In the document it is said that these figures need careful treatment.

Fig. 4.C.2 Income distribution wage earners, in main towns various years in KShs. per month

range	percentage distribution 1980	1983	1986
under - 215/-	0.8	0.4	0.3
215/- - 399/-	7.6	1.7	3.6
400/- - 699/-	24.4	13.7	11.7
700/- - 999/-	23.1	18.6	14.6
1000/- - 1499/-	15.6	22.3	22.8
1500/- - 1999/-	9.4	13.5	11.8
2000/- - 2999/-	7.6	12.1	14.4
3000/- - 5999/-	7.4	11.1	12.8
6000/- - over/-	4.1	6.6	8.2
total percentages:	100	100	100
(calculated) mean:	1606/-	2150/-	2365/-

Source: Central Bureau of Statistics, 1984, table 227a

N.B. These wage employment figures include casual employees, part-time workers, directors and partners serving on a regular basic salary contract. Self-employed persons and family workers who do not receive regular wages or salaries are excluded. All activities in rural non-agriculture are excluded. Earnings or wages cover all payments including basic salary, costs of living allowances, profit bonus, together with the value of rations and free board and an estimate of the employer's contribution towards housing [Central Bureau of Statistics, 1984, p. 227].

Comparing the urban income data for 1983 we now see that the mean income of the households (Fig 4.C.1) is roughly 1.5 times that of the wage earners (Fig. 4.C.2). The difference can be explained by assuming some form of additional income from the informal sector, income from other members of the family and some occasional employment. Another source for data on income distribution is the Urban Housing Survey 1983 (see also Fig. 4.C.3).

Fig. 4.C.3 Urban household income distribution 1983

income group	percentiles range	% of total	income range KShs. per month
low	0- 69	69.17	0 - 2000
middle	70- 94	25.62	2001 - 8000
high	95-100	5.21	8001 - over

Source: Ministry of Works, 1986a, p. 27

The mean consumption is lower than the income quoted by Rourk (KShs. 3300/-), the income as calculated from the urban GDPafc (KShs. 4130/- and found from the wage employment figures (KShs. 2150/-), but considerably higher than the quoted minimum wage of around KShs.480/-.

Summary of findings and assumptions, urban income and distribution 1983
For the purpose of the present study, the calculations of the income distribution, mean and median income and number of households are based on the following assumptions

- A median income of around KShs. 1050/- as reported by the UHS'83
- A mean income as calculated from GDPafc (KShs. 4130/-)
- The income distribution as found during the UHS '83, as this is the most up-to-date information.
- For detailing of the first range from 0-69.17% (UHS '83) we use the data from the income distribution profile from wage earners in main towns in 1983 (see Fig. 4.C.2).

The resulting urban income and income distribution are shown in Chapter 4, Fig. 4.4. For deciles 1-7 in particular, the results are in line with the above assumptions but the deciles 8-10 differ somewhat. For the present study this is not a problem as the higher income groups fall outside its scope. The following figure presents annual incomes estimated for the years 1988, 1989 and 2000.

***Fig. 4.C.4** Urban and rural household income per decile per annum 1988, 1989 and 2000*

year	1988		1989		2000	
decile:	rural	urban	rural	urban	rural	urban
1	3895	11247	3941	11086	4641	9465
2	6208	14702	6282	14492	7398	12372
3	6208	17790	6282	17535	7398	14970
4	6208	22789	6282	22462	7398	19177
5	10698	26758	10825	26375	12748	22517
6	11072	29699	11204	29273	13194	24991
7	13521	44548	13682	43910	16113	37487
8	16633	107032	16831	105500	19822	90068
9	25239	178412	25540	175858	30078	150134
10	70377	282136	71215	278097	83868	237418

4.D Financial affordability for urban housing

There is much written about which percentage would be realistic to be spent on housing. Payne mentions only as a rule of thumb 20 - 25% of income can be assumed to be available , but the figures need very careful evaluation in the light of prevailing social, cultural and economic circumstances [Chana, 1984, p. 211]. Also The Urban Edge [TUE, 1985, p. 2] reports of a problematic average of the 20 - 25% of income to be available for shelter. When we assume spending of a too high percentage of income on housing by the low-income groups, other spendings may be seriously affected.

More specific for Kenya, England [1982, p. 454] reports from a survey on low-income earners in Kenya on nutrition and concludes that: the assumption that people will spend between 20 - 30% of their income on housing, will give the risk that this goes at cost of their nutrition. He indicates that a reasonable spending % for housing may be around 10%. The Fourth Development plan of Kenya 1979-1983 [Ministry of PLanning, 1979, p. 170] assumes for planning purposes that households spend 15 - 20% of their income on shelter and facilities in urban areas [Government of Kenya, 1979, p. 170]. It is found however that people owning a house are prepared to pay up to 47% of their income, when they can (or have to) afford it, as they consider this as a kind of investment [Hoek-Smit, 1977, p. 13]. On the percentages we can also look at the official data such as the housing allowance can be a yard stick. The allowance sets in practice the trend for the market rents etc. For Nairobi, for instance, the housing allowance, as a percentage of the minimum wages, was in the period 1981-1984 in the order of 10.8 - 11.4% [Central Bureau of Statistics, 1984].

The Urban Housing Survey '83 [Ministry of Works 1986b] reports of a percentage of spending by income group for 1983 (Fig. 4.D.1). The spendings were taken as a proxy for income. This may be more or less correct for the low-income groups but for the middle and high-income groups corrections are needed (according to the UHS'83). In all income groups, food was the major spending item. Rent accounted for 14.21% in the low-income groups, 20,37% in the middle-income groups and 22.61% in the high-income groups. We note that this tendency of spending is contrary to what should be expected in developed countries. But this can be explained by the fact that the top income in Kenya equals to the medium income in a country like the Netherlands. We further note that this 14% is spent on a bad type of housing with no water, electricity. When you could put more housing near the place of work, the transport costs (9.42%) may be reduced so could be added to that 14%. Another drawback is however the food, that is the first basic priority and that percentage is high [Ministry of Works, 1986b, p. 28].

Fig. 4.D.1 Percentage household expenditure by income group in urban areas, 1983

income group	house-holds %	food	rent	household requirements	transport	total (%)
low	69.17	56.29	**14.21**	20.08	9.42	100
middle	25.62	47.83	**20.37**	17.53	14.27	100
high	5.21	42.97	**22.61**	16.36	18.06	100

Source: Ministry of Works, 1986b, p. 28

From the Kenya Central Bureau of Statistics [1987, p. 260] we learn that the consumers' index takes (depending on the income level) the following percentages for rent, which don't necessarily reflect the real % of spending on housing

lower-income	index	0-699	KShs/month	22.9%
middle-income	index	700-2499	KShs/month	16.0%
upper-income	index	2500-&over	KShs/month	27.1%

Verbeek [1978, p. 20] reports that in the lower range, the variations on spending % for housing are the greatest and the smallest for the high-income earners. Therefore a generally assumed figure of 20% to be spent on housing may be too high for the low-income groups. It is far more realistic to assume a lower figure. It is proposed to use the percentages from UHS ' 83, see Fig. 4.D.1. We hereby assume that for the very low-income group the same percentage is applicable as for 'low'.

Based on the above information we assume the following percentages of income to be spent on housing, see Fig. 4.D.2.

Fig. 4.D.2 Assumed expenditure of income on housing

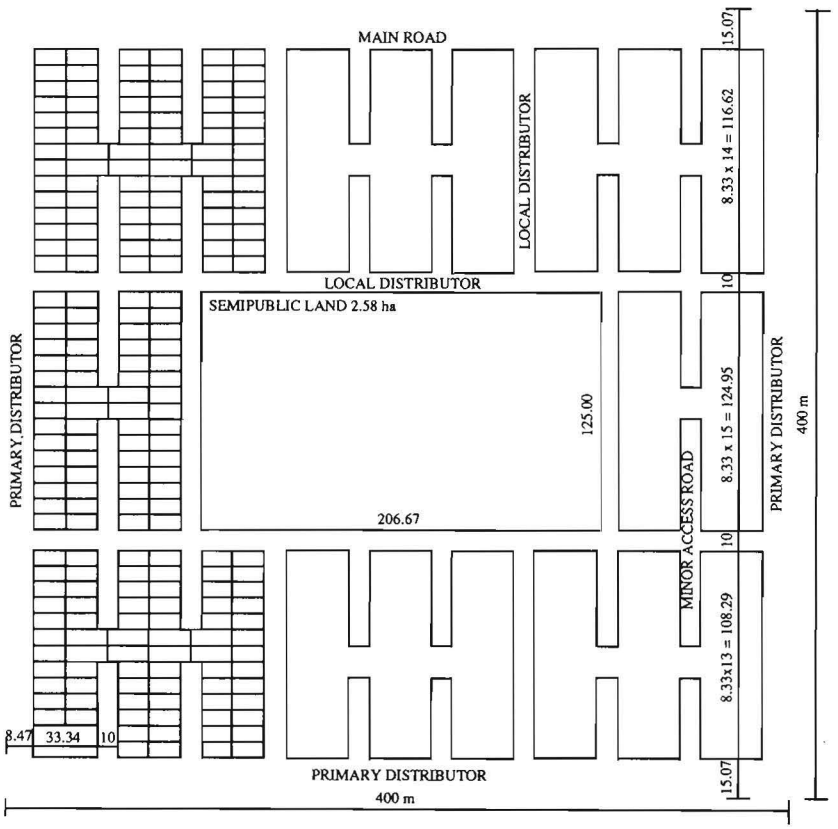
income range	% households	% spending on housing
low	0- 60	14
medium	61- 80	20
high	81-100	23

Source: this study

4.E Layouts and costs of infrastructure and housing

The overall plot layout grid and upgradable infrastructure
For an optimum location of the plots in an area we used the 'Urbanization Primer' of Caminos & Goethert [1978] with optimized plot sizes and plot layout grids, taking into account space for infrastructural facilities, such as roads and access roads. Also an open space is reserved for shops, health facilities, etc. We selected a grid with 726 plots per 16 hectare with plot sizes of 8.33m x 16.67m (= 138 m^2, an acceptable plot size for Kenya), minimizing public land. The assessment model uses one grid for all combinations of housing and infrastructure (see Figure 4.E.1). The depicted area assumes an idealized location. In reality we have to account for the characteristics of the location, the terrain, accidentation, existing buildings, trees, etc. [idem, 1978].

Fig. 4.E.1 Plot layout grid for model housing and upgradable infrastructure



726 PLOTS OF 8.33 X 16.67 m. sq.
[Caminos & Goethert, MIT Press, 1978]

Upgradable standards of infrastructure

The following specifies the upgradable infrastructure, like roads, etc. It shows a code (e.g. RO1) for reference purposes on drawings and cost estimates. In this context a **minimum** level of standards is the lowest possible level for roads and drainage, etc. **Standard** is seen as ideal by the authorities; while the **low level** is somewhere in between. See Fig. 4.E.4 for cost estimates.

Demarcation/clearance (DC1). It is assumed that the site is cleared of shrubs, etc., taking into account environment, etc., prior to demarcation of plots, roads, etc.

Refuse collection (RC1). Initially it can be assumed that refuse is burned or otherwise disposed of by the people themselves. While at a later stage refuse can be dumped at hard stands for collection by the local council.

Circulation roads (RO). The area will have a main road, primary distributor roads, local distributor roads and minor access roads. Whether the two last named do really exist depends on the phase of upgrading. There are 3 levels of upgradable standards, i.e RO1, RO2 and RO3, although intermediate levels are also possible. These can be in one of the following modes

mode I for pedestrians only,
mode II for pedestrians (predominantly) and some vehicles, while
mode III is for vehicles and pedestrians.

-level (RO1) main road and primary distributor roads mode I-II of minimum level with a compacted subgrade and an earth or single-course construction. Carriage 5.0m and right of way 10.0m with shallow ditches.Local distributor and minor access roads are only cleared, demarcated and graded.

-level (RO2) main roads minimum-level mode III, with compacted subgrade, base course & and surface course, deep ditches, carrriage 7.00m and right of way 20.0m. Primary distributor roads and local distributor roads, minimum-level mode I-II (for specification see RO1). Minor access roads are only cleared, demarcated and graded.

-level (RO3) main road and primary distributor roads, minimum-level mode III (for specification see RO2). Local distributor roads; minimum-level mode I-II (see further RO1). Minor access roads: compacted subgrade, murram surface course 2.5m wide, right of way 10.0m and shallow ditches.

Water supply (WS). The following upgradable phases are assumed

-level (WS1), 4 communal water points for the whole area,
-level (WS2), 28 communal water points for the whole area,
-level (WS3), lines for individual connections and fire hydrants.

Sewage disposal (SD). Level (SD1), at off-plot facilities there are sewer lines and control pits for water-borne sanitation.

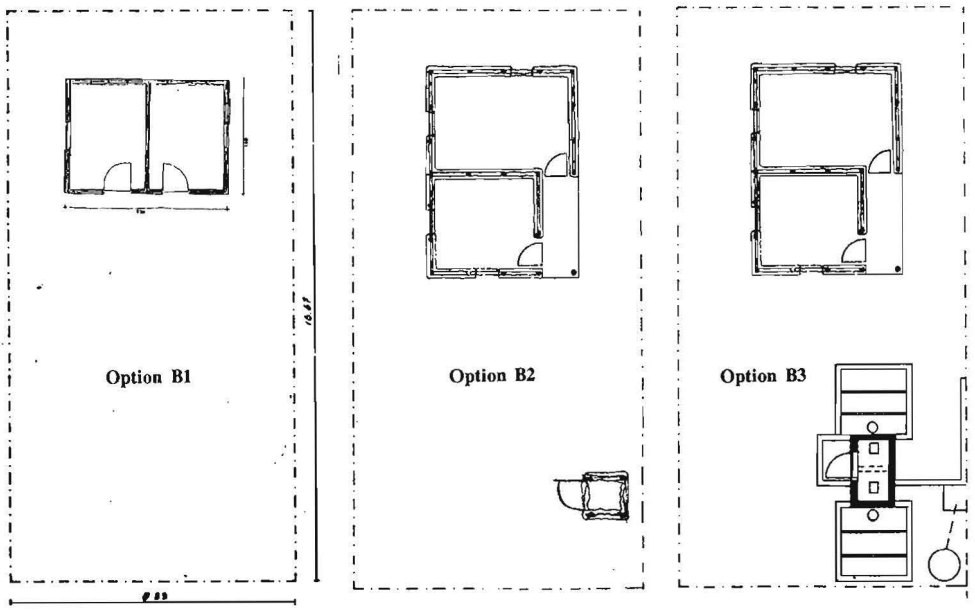
Electricity and street lighting (EL).

-level (EL1) minimum level, 20 streetlamps on poles at intersections of main streets

-level (EL2) low level, 64 streetlamps on poles at all street intersections and in between (safety lighting).

Housing options A up to C

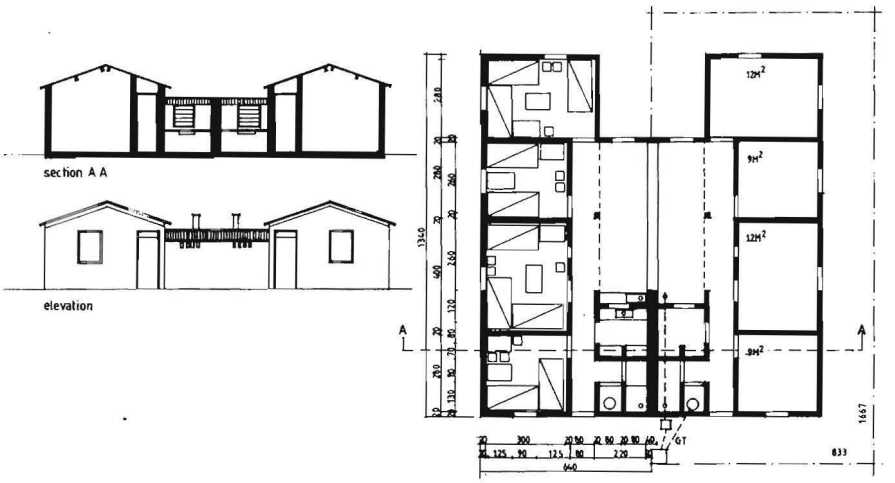
***Fig. 4.E.2** Housing of less durable materials, options B1, B2, B3*



Option A -plot only (+ primitive structure), and a communal water tap
Site-only schemes involve making unserviced land available to private developers with limited planning effort but proper enforcement of the planned development, so as to ensure that upgrading can be effected at a later date. For option A, the owner-occupant only gets a title deed to a plot of 138 sq.m. and can construct his own (primitive) house ('squatter unit'). This unit consists of an area of 2 by 3 metres, 2 m in height, the frame consists of 20 barks covered with plastic sheets laid on top of cardboard walls. The estimated costs are KShs. 1300/- (1988 costs). The infrastructural facilities are of a minimum level. Only a communal water point is provided and a minimum of circulation.

Option B -'less durable materials' house
This option envisages a plot with a two-roomed house of 'less durable materials' on it in two different versions, with on-plot sewage facilities. The unit is situated on the plot in such a way that next option C can eventually be implemented without interfering with the existing structures.
Option B1 -A house built in Kynyago in Nairobi under supervision of the Undugu Society, made of mud-and-wattle walls and plastered with sand-cement screed. The roof is of currugated iron roofing sheets, 3.80m by 5.30m and 2m in height. It has two rooms, one of which is intended for subletting. There is a shared pit latrine and no improved infrastructural facilities. The total costs are estimated as in the order of KShs. 9600/-.
Option B2 -An HRDU design with bigger rooms based on the Kenyan building bylaws. The toilet unit is a shared ventilated improved pit latrine (KShs. 17000/-).
Option B3 is the same as B2 but has a concrete floor and a shared Reed's odourless earth closet (costs KShs. 28000/-).

Fig. 4.E.3 Housing of more durable materials, options C3 and C5



Option C- From core house (C1) to 4-roomed house (C5)
More durable or permanent materials are used in housing option C. The houses can be developed incrementally. The starting unit is a core unit consisting of kitchen and toilet/shower. The next phase (option C2, etc.) can be the addition of more rooms of 9m2 and/or 12 m2 in area. Option C3 is a minimum layout of the grade-II standard house as designed by HRDU [Olesen, 1979] and specified in detail by Erkelens [1980e]. Options C4 and C5 have additional rooms which allow for subletting.

Costs of combinations

From Fig. 4.E.4 it can be seen that combination nr. 1, the minimum housing provision, costs KShs.4,150/- when built by a contractor. Built through self-help management it would cost KShs. 3,500/- and if built by the owner himself, the cost would be reduced to KShs. 3,160/-. For this he would have a plot, with a squatter unit and a communal water tap, etc. At the other end of the housing provision scale, combination 9, which provides a 4-roomed self-contained unit with waterborne sanitation and electricity, would cost KShs. 117,400 if completely built by a contractor. If the owner is able to undertake the management himself it would cost him KShs. 93,200/- and if he is going to build his house himself, it would cost him KShs. 75,200/-. Thus in combination 1, the savings in monetary terms are KShs. 990/- or 24 percent, and combination 9 is KShs. 42,200/- or 36 percent. The difference in % is due to the higher savings on the more expensive infrastructure of combination 9.

Fig.4.E.4 Costs of combined housing and infrastructure options

ITEM	COMBINATION	1 CB	1 SHM	1 SHB	2 CB	2 SHM	2 SHB	3 CB	3 SHM	3 SHB	4 CB	4 SHM	4 SHB	5 CB	5 SHM	5 SHB	6 CB	6 SHM	6 SHB	7 CB	7 SHM	7 SHB	8 CB	8 SHM	8 SHB	9 CB	9 SHM	9 SHB
HOUSING																												
OPTION C5: core + 4 rooms																										98050	77315	61852
OPTION C4: core + 3 rooms																						82367	64949	51959			
OPTION C3: core + 2 rooms																				67885	53530	42824						
OPTION C2: core + 1 room																	52203	41163	32931									
OPTION C1: kitchen/toilet														37721	29744	23795												
OPTION B3: temp.mats+ concr. fl											28295	21875	16043															
OPTION B2: temp.materials								17299	13374	9205																		
OPTION B1: temp.materials					9628	7592	6053																					
OPTION A : plot only+squatter unit		1328	1050	927																								
INFRASTRUCTURE																												
demarcation/clearanc	standard	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014
refuse stand	standard													186	151	125	186	151	125	186	151	125	186	151	125	186	151	125
water supply	individual													3120	2526	2101	3120	2526	2101	3120	2526	2101	3120	2526	2101	3120	2526	2101
	28 communals							1514	1226	1020	1514	1226	1020															
	4 communals	864	700	582	864	700	582																					
sewage disposal	trunksewer													6061	4907	4082	6061	4907	4082	6061	4907	4082	6061	4907	4082	6061	4907	4082
	no facilities																											
roads & drainage	standard																			3876	3138	2610	3876	3138	2610	3876	3138	2610
	low level													2289	1853	1542	2289	1853	1542									
	min level	940	761	633	940	761	633	940	761	633	940	761	633															
electricity & street	low level																			5128	4151	3454	5128	4151	3454	5128	4151	3454
lighting	secur. light.													2564	2076	1727	2564	2076	1727									
	no facilities																											
total in case of constructor built		4147			12446			20767			31763			52955			67437			87270			101752			117434		
total per option & plot			3525			10067			16375			24876			42270			53689						80835			93201	
total per option & plot				3156			8282			11871			18710			34387			43522					65346			75239

notes:
1) Number of combination of housing and infrastructure
CB: contractor built
SHM: self-help management
SHB: self-help built

4.F Calculations of capital costs for the various housing options

General
The calculations of the capital costs for the various combinations 1-9 are based on tenant purchase (for site only and eventually materials loan, sites and services), rental and mortgage. We will calculate the annual payment percentage per capital of KShs. 1000/-. The affordable capital is found from this formula:

Affordable annual expenditure = annual payment % x affordable capital.

The following assumptions were made
- It has been assumed that the value of land takes about 10% of the total capital cost [Syagga, 1979, p. 96],
- It has been assumed that the land is leased,
- The cost of the building includes also the cost of the on-plot infrastructure, legal fees, stamp-duty etc.,
- The rates cover expenses done by local authorities for
    - site development, trunk water lines, roads, sewerage to the area,
    - maintenance of infrastructure in the area,
    - service charges for refuse collection etc. The rates are expressed in a percentage of the unimproved land value. The percentage depends not only on the services offered but also on the policy of the councils [Verbeek 1971, p. 4-6, interviews Syagga 1988].

Site-Only Loan, site + communal water tap + loan for structure of less durable materials (Options A, B1, B2, B3)

Capital		KShs	1000.00
Deposit		"	50.00
Loan		"	950.00
XXX gives a loan for a period of 20 years			
at 11.0% Annuity 950 x 0.125575		"	119.30
Maintenance of housing unit			
say 1% of building costs		"	9.00
Landers 3% of land value (=100/-) for lease		"	3.00
Annual payments		"	131.30
Administration	7.5%		
Bad debts	5.0%		
	12.5% of the Annual Payments	"	16.41
Rates 5% of unimproved land value (900/-)		"	5.00
Total Annual Payments.		KShs	152.71
Annual payments as % of Total Costs			
(152.71 : 1000) x 100 = 15.27%			**15.3%**

Sites and Services Scheme (options C)

Capital		KShs	1000.00
Deposit		"	50.00
Loan		"	950.00
N.H.C. gives loan over a period of 20 yrs			
at 11.0% Annuity 950 x 0.125575		"	119.30
Maintenance 2% of the building cost		"	18.00
Insurance 0.25% of the building cost		"	2.25
Land rent 3% of land value for lease		"	3.00
Annual payments		"	142.30
Administration	7.5%		
Bad debts	5.0%		
	12.5% of the Annual Payments	"	17.79
Rates 8% of unimproved land value (100/-)		"	8.00
Total Annual Payments		KShs	168.09
Annual payments as % of Total Costs			
(168.09 : 1000) x 100 = 16.81%			**16.8%**

Mortgage (options C)

Capital cost	KShs	1000.00
10% Downpayment	"	100.00
Loan	"	900.00
The H.F.C.K. gives loan over a period of 20 years max at an interest rate of 14.5% for owner-occupiers, Annuity 900 x 0.155373	"	139.84
Maintenance 2% of building cost	"	18.00
Insurance 0.3 of building cost	"	2.70
Land rent 3% of land value for lease	"	3.00
Rates 8% of unimproved land value: (in fact not a payment as it is paid directly to the council)	"	8.00
Total Annual Payments	KShs	171.54
Annual payments as % of Capital cost		
(171.54: 1000) x 100 = 17.154%		**17.2%**

Rental accommodation (options B3, C)

Capital Cost	KShs	1000.00
Loan	"	1000.00
N.H.C. gives loan over period of 40 years at 6.5% to local authorities		
Annuity 1000x0.07069373	"	70.69
Maintenance 2% of building cost	"	18.00
Insurance 0.25% of building cost	"	2.25
Land rent 5% of land value for lease	"	5.00
Annual Payment	KShs	95.94
Administration 7.5%		
Bad debts 5.0%		
12.5% of Annual Payments	"	12.00
Rates 8% of unimproved land value (to be paid to owner who pays to council)	"	8.00
Total annual payments.	KShs	115.94
Annual payments as capital cost		
(115.94 : 1000) x 100 = 11.594%		**11.6%**

4.G Urban affordable capital costs for housing and infrastructure in 1988, 1989, 2000

year	decile	annual affordable per decile 1)	rental annual repayment 11.6 percent	site loan annual repayment 15.3 percent	S&S annual repayment 16.8 percent	mortgage annual repayment 17.2 percent
1988	1	1575	13574	10292	9373	9155
	2	2058	17744	13453	12252	11967
	3	2491	21470	16278	14825	14480
	4	3190	27503	20852	18990	18549
	5	3746	32294	24484	22298	21780
	6	4158	35843	27175	24749	24173
	7	8910	76806	58232	53033	51800
	8	21406	184538	139911	127419	124456
	9	41035	353746	268200	244253	238573
	10	64891	559406	424125	386257	377274
1989	1	1552	13381	10145	9239	9024
	2	2029	17491	13261	12077	11796
	3	2455	21164	16046	14614	14274
	4	3145	27111	20555	18720	18284
	5	3693	31834	24136	21981	21469
	6	4099	35332	26788	24396	23829
	7	8783	75712	57403	52277	51062
	8	21101	181909	137918	125604	122683
	9	40450	348706	264379	240773	235174
	10	63967	551436	418082	380753	371899
2000	1	1325	11422	8660	7887	7703
	2	1732	14931	11320	10309	10070
	3	2096	18066	13697	12474	12184
	4	2685	23142	17546	15979	15608
	5	3152	27174	20602	18763	18326
	6	3499	30160	22866	20825	20340
	7	7497	64628	48999	44624	43587
	8	18012	155279	117728	107216	104723
	9	34528	297658	225676	205526	200746
	10	54602	470710	356878	325014	317455

1) also affordable for rental accomodation

8.A Explanation of codes

The factors are given a code number for processing purposes and for easier reference to the location in the framework. The code numbers are explained as follows, see Fig. 8.A.1.

Fig. 8.A.1 Set-up of framework and structure of code numbers

level	categories of factors					
	A. GENERAL	**B. LABOUR**	**C. EQUIPMENT**	**D. MATERIALS**	**E. ORGANIZATION**	**F. INFORMATION**
NATIONAL	01- 20	101-120	201-220	301-320	401-420	501-520
HOUSEHOLD	21- 40	121-140	221-240	321-340	421-440	521-540
PROJECT	41- 70	141-170	241-269	341-370	441-470	541-570
others	71-100	171-200	270-300	371-400	471-500	571-600

For instance, we can have a productivity factor from the category Labour (B) at the level of Project (3) with number 165.

Housing Research and Development Unit

General information for the interviewer

1. Documents for the interviews
There is a 4 pages general information sheet for the interviewers setting out the main points of the research.
The following documents are needed for the interviews:
*-general information and instructions for the respondent (Appendix 1).
*-general information sheets (appendix 2a,2b,2c,2d);
Appendix 2a,for Government/Semi-government and NGOs;
Appendix 2b, for consultants/large contractors and medium size contractors;
Appendix 2c, for small contractors and fundis;
Appendix 2d, for key informants of self-help builders.
*-A structured checklist with problems (Appendix 3).
*-(Appendix 4) for the open-end questions 1, 2 and 3.
*-Instructions in case of an interview with an illiterate person (Appendix 5).

2. Preparation of the interviews
For all the interviews you need a set of documents containing Appendices 1; 2a or 2b,2c,2d; 3 ; 4. All the pages must bear the number of the interview, date and your name.

3. The field interview
If you have to deal with an illiterate person you are referred to Appendix 5 for further instructions. If the respondent can read and write:
3.1 Give him the documents Appendices 1; 2a or 2b, 2c, 2d; 3 and 4.
3.2 Let the respondent read the text of Appendix 1 which explains the purpose of the interview.
3.3 Let him now complete the information sheet of Section 1 (Appendix 2a or 2b,2c,2d).
3.4 Let the respondent enter up the complete checklist of Section 2 (Appendix 3).
On each page of the checklist, the respondent can enter up missing factors or problems. If possible, ask for a brief explanation and let him write this down at the bottom of the checklist. (PLEASE STAY CLOSE BY WHILE HE IS COMPLETING THE LIST SO THAT YOU CAN SUPPLY ADDITIONAL INFORMATION, HE MAY NEED.)
3.4 After completion of the checklist, continue with Section 3, questions 1, 2 and 3.
Question 1. Ask for the 5 main problems (this is a control) and let him write them down (on Appendix 4).
Question 2. Ask for positive (enhancing) factors and let him write them down (on Appendix 4).
Question 3. Ask for his opinion on how to solve the low-income housing problem and let him write this down (on Appendix 4).

4. After completion of the questions express your thanks to the respondent.

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General information and instructions for the respondent (Appendix 1)

1. Why this interview?
By the year 2000 many people in urban Kenya can only afford to live in a house which doesn't fulfil the basic requirements. Most likely the government doesn't have enough funds to provide for better housing. Therefore not only housing, but also the infrastructure will have to be built by the people themselves.

For a formulation of a policy (for government, cities, NGOs, like NCCK and UNDUGU, etc.) it is now of interest to determine the problems of the self-help builder. These problems affect his construction output and the building-productivity *). The problems can occur during upgrading of a slum or squatter unit or new housing unit. Your contribution will be very much appreciated. As you know a lot about the possible problems of the self-help builders thanks to your position, your information, together with that of others, may help to improve the housing situation. And if you are interested, we can provide you in due course with the research results.

2.Now follow the instructions below.
2.1 Complete the information sheet (Appendix 2).
2.2 Now complete the checklist (Appendix 3).
This checklist shows impairing productivity factors at three different levels: the national level, the household of the self-help builder, and the project in which the self-helper takes part. You are asked to indicate *), according to your experience, whether it is a problem for the self-help builder.
- You put (X) in the 'yes' column if you think it is a problem for the self-help builder,
- You put (X) in the 'no column' if it is not a problem,
- You put (X) in the don't know column if you don't know.

2.3 While completing he checklist, please fill in under 'others' those factors or problems which are missing. And, if possible, write a brief explanation (under the remarks heading).

2.4 After completion of the checklist, please answer the last 3 questions:
1: Please write down the 5 main impairing productivity factors (on Appendix 4).
2: We asked for the problematic factors. Are there also enhancing productivity factors? (Please write these down on Appendix 4).
3: What is your opinion on solving the low-income housing problem. Please write this on Appendix 4.

*)The definition for the productivity of the self- help builder is

$$\frac{\text{production of a housing unit}}{\text{total expenditures on labour + equipment + material}}$$

The denominator includes the possible expenditures for labour (inclusive of knowledge, skills and tools) and for materials (inclusive transport).
**) Sometimes you will find similar problems, please cross yes, no or don't know. When you are in doubt, cross what is correct in general.

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Section 1 General information (Appendix 2d)

date of interview.....,interview number... .....

information on self-help builders
site and services/squatter upgrading/new squatter unit
slum improvement *) *) please encircle what is relevant
area..... .....
name of respondent.....
address/area.....
town..... .....

information on household
number of households in area.....
majority of the tribe or coming from:..... ....
average household size.....
female headed households,.....male headed households.....
usual income per month in KShs.....
part of income spent for shelter in KShs.....per month.

total number of plots..... ..of which owner occupied.....

information on this project

	What is usually built by the self-help builder (in this project) (please mark with cross)	what is usually built by a fundi (in this project) (please mark with cross)
foundation		
floor		
walls		
doors/windows		
roof		
waterlines & taps		
sanitation		
electricity		
roads		
others? please specify		

HOUSING RESEARCH AND DEVELOPMENT UNIT, UNIVERSITY OF NAIROBI page
INTERVIEW NUMBER:.....

NAME OF INTERVIEWER:.....

NATIONAL LEVEL	IS IT A PROBLEM ? yes	no	unknown	REMARKS
206. high inflation of money				
201. high interest rates				
203. difficult to borrow money				
204. private savings are not encouraged				
52. low political stability				
154. complex organization of labour market				
151. bad labour conditions				
502. burdensome health regulations				
503. burdensome building codes and bylaws				
501. restrictive approval procedures				
551. lack of speed of approvals/permits				
513. constraints of city procedures				
452. complex structure of building process				
56. lack of competition between fundi				
112. lack of small contractors or fundi				
111. lack of skilled labour				
152. lack of trained inspectors/supervisors				
566. lack of training programs for fundi				
311. poor quality and variations of materials				
316. lack of good materials				
312. local materials not available				
313. import materials not available				
351. too many materials (difficult to select)				
352. location of materials shops not near by				
314. high cost of building materials				
315. often price changes of materials				
512. limited standard specifications for materials				
511. lack of good building manuals				
553. lack of information on new techniques				
652. limited technological innovations				
653. lack of support for Research & Development				

HOUSING RESEARCH AND DEVELOPMENT UNIT, UNIVERSITY OF NAIROBI page
INTERVIEW NUMBER:.....

SELF HELP BUILDER HOUSEHOLD LEVEL	IS IT A PROBLEM ? yes	no	unknown	REMARKS
22. stresses due to responsibilities to family				
21. stresses due to commitments of regular job				
221. stresses due to earning a regular income				
222. low income level				
223. limited financial resources for prefinancing				
224. unknown criteria when eligible for a materials loan				
126. low health conditions of family members				
23. size of the family				
121. low input of familymembers in construction				
456. bad organization of the family				
457. lack of cooperation in family				
127. low levels of skills of family				
128. high illiteracy rate of family				
129. not used to modern construction methods				
559. slow decisiveness speed of family on building				
122. insufficient time for building				
125. insufficient time for organizing labour & materials				
123. insufficient time for supervising				
124. low quality of supervision by family				
159. lengthy working hours on building				
321. lack of knowledge of materials				
322. lack of knowledge of materials-prices				
323. lack of knowledge on quantities needed				
421. lack of knowledge of the project one takes part				
560. lack of experience on other constructing				
621. lack of knowledge on building techniques				
623. lack of knowledge on measuring techniques				
521. don't know how to hire or buy labour or materials				
422. cannot organize things				
453. doesn't know cost of alteration				
458. relations with other self help builders				
523. too often support needed for approval seeking				
423. difficult to identify good fundi				
522. problems to informal contracts with fundi				
61. problems with type of contract (eg.labour contracts)				

(note: family = household)

Other problems at the household level ? Please specify:.....

HOUSING RESEARCH AND DEVELOPMENT UNIT, UNIVERSITY OF NAIROBI page
INTERVIEW NUMBER:.....

THE PROJECT LEVEL	IS IT A PROBLEM ? yes	no	unknown	REMARKS
12. the project organizer lacks a good philosophy				
441. coordinator of project is unknown				
66. the whole project is too complicated				
47. size of project too big to handle				
460. bad preparation of the project				
461. bad organization of the project				
468. lack of quality control of the project				
462. bad use of planning methods				
244. plotvalue is too attractive for selling				
411. community participation is low				
411a building groups are not formed				
451. too many participants in building group				
571. inavailable/ incomplete project information				
542. bad design / complexity of design				
543. complex / inconsistent product specification				
544. incomplete / low quality of drawings				
545. lack of detailed drawings				
641. the building is difficult to make				
656. wrong building technique applied				
663. doors/windows, roofs etd. don't fit				
245. poor maintenance of equipment				
246. lack of spare parts				
263. wrong tools are used				
259. wear and tear of equipment & tools				
341. over use of materials				
342. use of 2nd hand materials not allowed				
343. poor quality of blocks made				
353. design requires too many materials (e.g. bad layout				
354. incorrect quality standards				
355. not many prefabricated products available				
358. lack of standardization (different sizes etc.)				
359. waste of materials (breakage etc.)				
360. bad storage of materials on site				
361. materials supplies are unreliable				
344. poor quality of mixed concrete on site				
345. heavy/ difficult transportation on foot/ cart				

HOUSING RESEARCH AND DEVELOPMENT UNIT, UNIVERSITY OF NAIROBI page
INTERVIEW NUMBER:.....

(PROJECT LEVEL)	IS IT A PROBLEM ? yes	no	unknown	REMARKS
546. the used materials need more skills than expected				
547. the applied finishes need more skills than expected				
548. the construction need more skills than expected				
549. applied standards are lower than allowed				
541. insecurity of legalization of plot				
41. wrong location of temporary unit on plot				
45. topography of plot difficult to build on				
46. remoteness of plot, problems for transport				
11. inavailability of infrastructure (roads/ water)				
346. bad soil conditions				
347. soil survey often not done				
466. low degree of safety on site				
465. too many accidents on site				
55. many interruptions during building				
65. variability of weather				
242. difficulties with controlling the costs				
243. cost increases due to unclear tasks for fundi				
459. too many fundi involved				
165. bad relations between hired labour on site				
472. lack of cooperation between fundi				
175. low quality level of hired labour				
569. inadequate labour instructions				
463. confusion on site due to bad work organization				
442. unclear tasks/ delays requiring more time				
443. construction phases rarely ready in time				
464. no participation of self help builder in decisions				
54. materials quantities too small for a discount				

Other problems at the project level ? Please specify:.....

PLEASE TURN OVER TO THE LAST PAGE NOW

Housing Research and Development Unit

Section 3 questions 1, 2, 3.

Date of interview.....Interview number.....

QUESTION 1: What are the 5 main impairing productivity factors?

1 .....

2 .....

3 .....

4 .....

5 .....

QUESTION 2. What are the enhancing productivity factors?

1 .....

2 .....

3 .....

4 .....

5 .....

QUESTION 3: What is your opinion on solving the low-income housing problem?

.....

.....

.....

.....

THANK YOU VERY MUCH FOR YOUR COOPERATION.

9.B Details of field survey

Kenya, description of the population / selection of samples
The following reviews the populations in detail and discusses the samples to be taken. (Rxxx) refers to respondents of the field survey.

A Interviews with government officials*
-The Ministry of Lands and Housing (R 705, 707)
-The Ministry of Local Government and Physical Planning (R 706)
-The Ministry of Works, Kenya Building Research Centre (R 704).
-The Housing Development Department of Nairobi (R 703). These departments also have offices in Kisumu and Mombasa. We assume that the Nairobi Department is representative of the other towns as well. Assuming that the selected key officials are representative of the whole organization, we have a full coverage, so that the size of the population and the sample = 4.

B Interviews with people from semi-governmental bodies / parastatal organizations* The following organizations are of interest.
-National Housing Corporation (NHC, R 602),
-National Cooperatives Housing Union (NACHU, R 605)
-Housing Research and Development Unit, University of Nairobi (R 604).
On the assumption that the selected key officials are representative of the whole organization we have from a population of 3 a full size of 3.

C Interviews with officials from the non governmental organizations*
There are 42 organizations active in the field of shelter provision in Kenya [Yahya interview 1988]. However, the majority deal only with community-development aspects and income- generating activities. Just two are active in housing (slum improvement), to wit Undugu Society (R502) and National Christian Council of Kenya (R503). The population is therefore 2. By interviewing key informants from these organizations we expect to obtain a full picture of the actual (NGO) vision throughout the country. We assume that these selected key officials are representative of the whole of their organization. Sample size is 2.

D Interviews with consultants*
There are around 800 professional architects, planners, project developers, quantity surveyors and engineering consultants. Just a small number of them [30% according to HRDU] are involved in the provision of low-cost housing with a self-help component. The size of the population is therefore 240. In order to obtain some insight into these organizations we interviewed the key persons of at least three of them. This figure is selected because one or even two may give atypical answers. By interviewing at least three of them this will be minimized. Size of sample 3, (R 401-406).

E Interviews with contractors*
We will distinguish between large, medium and small contractors, who have work experience in self-help building projects.
-Large contractors. It is estimated that just a small number of big contractors (15 according to HRDU) are involved in the provision of low-cost housing with a self-help component. The intention is to visit at least 3 of these organizations to minimize atypical answers to questions. We assume that the key officers represent the views of their organizations. Size of sample 3, (R351-353).
-Medium sized contractors. A number of medium sized contractors is active in the field of low-cost housing. The population is in the order of 75. There are no so-called key organizations available. Our funds are limited, but as we want to know their views, we will visit 3 of them, taking the usual steps to obviate atypical answers. We assume that the key officers represent the view of their organizations. Size of sample 3, (R341-343).
-Small contractors. Small contractors and fundis are not easily accessible and are thus difficult to interview. Here we can not use key informants, as contractors and fundis work on an individual basis. But this group is very important as they, in general, carry out that part of management and construction which is left to them by the self-help builder. The estimated number of small contractors is 1400 as registered by MOPW. We take the sample size as 3, (R311,312,329).

F Interviews with fundis (artisans)*
In this case, the population size needs to be estimated and it is probably in the region of several hundred. There are many different professions, but for low-cost housing we can distinguish the following main trades: masons, carpenters, plumbers, painters, electricians and welders/ blacksmiths [Erkelens, 1980b, p. 33]. Based on information from the HRDU it is estimated that roughly 4000 fundis are engaged in building. Around 50% are involved in low-cost housing, 1/3 of them in sites and services and 2/3 in squatter upgrading/ slum improvement. As to the numbers involved we have pursued the following train of thought. According to information from Agevi [1987, pp. 48,51] these artisans are very mobile and work on different types of housing projects. It is expected that the type of craft carried out will not result in a different view on the productivity factors of the self-help builder. In order to cover the views of some of the different crafts, it is nevertheless proposed to interview the 6 trades mentioned above. They can all be interviewed on the same project site, in order to obviate possible differences due to project dissimilarities. These trades can be expected on sites and services projects and on squatter upgrading/ slum improvement areas. The minimum number of cases is therefore 6 for both sites and services and squatter upgrading/slum improvement sites. The total size of the sample is therefore 12, (R301-312).

G Interviews with self-help builders* on the sites of the different housing types. We prefer interviewing on sites where building activities are ongoing or have recently taken place. The estimated number of units with building activities is given below [Ministry of Finance, 1983, p. 148; 1988, Interviews HRDU].

-Sites and services projects, planned 17,964 units in '83-'88 but actually produced 814 units p.a. When we add another 400% for informal sites and services projects we have in total 4,770 units, (R201-210).

-Slum improvement and squatter upgrading, the government of Kenya lumps squatter and slums together in the development plan. The planned upgrading and improvement is 13,200 units (2,640 units p.a.). When we assume additional informal activities (400%) the figure totals to 3,880 units per annum, (R211-226).

-Squatter units construction, the estimated annual construction is 22,770 units per annum, (R231-236).

For the purpose of the interviews we approached key persons in the areas. These key persons were pointed out to us by inhabitants of the areas as being representatives from that area. When certain information was lacking, a second or even a third key person from the same area was interviewed. We select 2 areas for each of the 3 project types and aim at interviewing at least 3 key persons on each site, in order to obviate out atypical samples. The total proposed number of samples 18 nos (=2x3x3).

The selected building sites

After discussions and a reconnaissance mission, the building sites were selected, preferably spread over Nairobi. We assumed that the sites are representative of all the other urban areas in the country where there is the same type of construction activity. The following self-help building sites were selected

-Sites and Services Dandora 1 and 2 and Kayole, which are three different sites in Nairobi.

-Squatter upgrading/slum improvement. As just a limited number of projects have been developed, Mathare North I and II and Kawangware were selected for the interviews.

-New squatter units. There is limited construction activity on squatter sites going on in Nairobi and not all of them are easily accessible for interviews. The HRDU has some links with Mathare North area, for which reason it was decided to interview people in that area only.

Field experiences
The following figure shows the number of interviews planned and actually held.

***Fig. 9.B.1** Review of populations, sizes of samples/ number of key persons and actually held interviews*

respondent group	population	sample	actually interviewed
government	4	4	4 (key persons)
semi-government	3	3	3 (key persons)
non-governmental organization	2	2	2 (key persons)
consultants	240	3	6
contractors, large	10	3	2
contractors, medium	75	3	3
contractors, small	1400	3	3
fundis in sites & services	700	6	10
fundis in slum improv./squatt. upgrading	1400	6	12
self-help builders:			
sites & services	4770	6	10
slum improv./squatter upgr.	3880	6	16
squatter units	22770	6	6
total		51	77

The interviews
The free interviews were carried out by the author. The first group of scheduled interviews were partly done by the author, in order to set out the path for further field research. The remainder was done by trained interviewers, who were selected, instructed and accompanied during the interviews by HRDU's own social interviewer.

Results of observations
A number of low-cost housing sites were visited. The observations were laid down in numerous pictures and in written notes. These were further used during the processing and interpretation of the interviews.

10.A Crude score data of impairing productivity factors, Section 2

total 129 factors	SELF-HELP BUILDERS				FUNDIS			CONTRACTORS				CONS	NGO	SEMI GVT		TOTAL
accepted 127 factors	S&S	SQ SL	NW SQ	ALL	S&S	SQ SL	sub all	S	M	L	sub all	ALL		GVT		Σ ALL scores by factor
not accepted 2 factors 1)	10	16	6	32	10	12	22	3	3	2	8	30	6	2	3	4	77
	4)	5)	6)					7)	8)	9)			10)	11)	12)		
2)																	
206. high inflation of money	60%	88%	67%	75%	70%	75%	73%	33%	67%	100%	63%	70%	83%	50%	67%	100%	74% 57
314. high cost of building materials	80%	88%	100%	88%	70%	67%	68%	100%	67%	0%	63%	67%	83%	0%	33%	75%	74% 57
315. often price changes of materials	70%	75%	100%	78%	90%	75%	82%	100%	33%	100%	75%	80%	67%	50%	33%	25%	73% 56
203. difficult to borrow money	70%	94%	100%	88%	60%	58%	59%	67%	33%	50%	50%	57%	83%	100%	67%	25%	71% 55
223. limited financial resources for prefinancing	60%	94%	100%	84%	60%	67%	64%	67%	33%	50%	50%	60%	67%	50%	67%	0%	68% 52
222. low income level	50%	69%	100%	69%	90%	67%	77%	67%	0%	0%	25%	63%	67%	100%	67%	25%	65% 50
65. variability of weather	60%	69%	83%	69%	90%	67%	77%	67%	33%	100%	63%	73%	50%	0%	0%	0%	61% 47
22. stresses due to responsibilities to family	60%	75%	67%	69%	50%	67%	59%	67%	0%	0%	25%	50%	67%	0%	67%	25%	57% 44
242. difficulties with controlling the costs	40%	88%	83%	72%	70%	33%	50%	67%	0%	100%	50%	50%	67%	0%	33%	0%	56% 43
503. burdensome building codes and bylaws	40%	38%	100%	50%	70%	33%	50%	33%	33%	50%	38%	47%	67%	100%	67%	50%	52% 40
55. many interruptions during building	30%	63%	83%	56%	60%	58%	59%	100%	33%	50%	63%	60%	50%	0%	0%	0%	51% 39
111. lack of skilled labour	40%	63%	17%	47%	70%	58%	64%	67%	67%	100%	75%	67%	17%	0%	67%	25%	51% 39
201. high interest rates	40%	69%	17%	50%	60%	33%	45%	33%	33%	50%	38%	43%	83%	50%	33%	75%	51% 39
553. lack of information on new techniques	40%	75%	17%	53%	70%	42%	55%	100%	33%	0%	50%	53%	67%	0%	33%	25%	51% 39
346. bad soil conditions	50%	63%	67%	59%	70%	17%	41%	33%	33%	100%	50%	43%	50%	50%	33%	25%	49% 38
501. restrictive approval procedures	30%	44%	83%	47%	80%	17%	45%	33%	0%	100%	38%	43%	67%	100%	33%	50%	48% 37
359. waste of materials (breakage etc.)	40%	81%	50%	63%	30%	42%	36%	67%	33%	50%	50%	40%	67%	0%	0%	0%	47% 36
221. stresses due to earning a regular income	50%	69%	83%	66%	40%	17%	27%	67%	0%	0%	25%	27%	50%	50%	67%	0%	45% 35
224. unknown criteria when eligible for mats. loan	40%	81%	33%	59%	50%	33%	41%	100%	0%	0%	38%	40%	50%	50%	0%	0%	45% 35
360. bad storage of materials on site	40%	63%	83%	59%	40%	33%	36%	67%	67%	0%	50%	40%	67%	0%	0%	0%	45% 35
513. constraints of city procedures	20%	50%	100%	50%	50%	17%	32%	67%	0%	50%	38%	33%	67%	50%	33%	25%	43% 33
653. lack of support for Research & Development	30%	63%	0%	41%	40%	58%	50%	67%	0%	100%	50%	50%	50%	0%	67%	0%	43% 33
45. topography of plot difficult to build on	30%	44%	100%	50%	50%	17%	32%	33%	33%	100%	50%	37%	50%	50%	0%	25%	42% 32
443. construction phases rarely ready in time	30%	38%	83%	44%	50%	25%	36%	67%	0%	0%	25%	33%	67%	0%	33%	75%	42% 32
54. materials quantities too small for a discount	50%	56%	17%	47%	70%	42%	55%	0%	0%	0%	0%	40%	50%	0%	33%	0%	40% 31
361. materials supplies are unreliable	60%	38%	50%	47%	50%	25%	36%	67%	0%	50%	38%	37%	67%	0%	33%	0%	40% 31
442. unclear tasks/ delays requiring more time	30%	56%	50%	47%	20%	42%	32%	67%	33%	0%	38%	33%	67%	0%	33%	25%	40% 31
621. lack of knowledge on building techniques	20%	56%	83%	50%	30%	25%	27%	33%	33%	0%	25%	27%	50%	0%	100%	25%	40% 31
21. stresses due to commitments of regular job	60%	56%	50%	56%	10%	17%	14%	67%	0%	0%	25%	17%	67%	50%	67%	0%	39% 30
129. not used to modern construction methods	40%	63%	83%	59%	40%	25%	32%	0%	0%	0%	0%	23%	50%	0%	33%	0%	39% 30
204. private savings are not encouraged	30%	50%	83%	50%	40%	33%	36%	33%	0%	50%	25%	33%	17%	100%	0%	25%	39% 30
423. difficult to identify good fundi	50%	56%	50%	53%	30%	25%	27%	33%	33%	0%	25%	27%	67%	0%	33%	0%	39% 30
11. inavailability of infrastructure (roads/ water)	30%	44%	83%	47%	40%	17%	27%	0%	33%	50%	25%	27%	50%	0%	67%	25%	38% 29
125. insufficient time for organizing labour & mats.	50%	38%	50%	44%	30%	33%	32%	33%	0%	0%	13%	27%	67%	0%	67%	25%	38% 29
312. local materials not available	40%	31%	50%	38%	40%	42%	41%	67%	0%	100%	50%	43%	33%	50%	33%	0%	38% 29
316. lack of good materials	60%	25%	50%	41%	40%	75%	59%	0%	0%	50%	13%	47%	33%	0%	0%	0%	38% 29
322. lack of knowledge of materials-prices	40%	56%	67%	53%	30%	50%	41%	0%	0%	0%	0%	30%	33%	0%	33%	0%	38% 29
358. lack of standardization (different sizes etc.)	40%	31%	50%	38%	40%	50%	45%	33%	33%	50%	38%	43%	50%	0%	33%	0%	38% 29
511. lack of good building manuals	20%	50%	17%	34%	40%	50%	45%	100%	33%	0%	50%	47%	33%	0%	67%	0%	38% 29
523. too often support needed for approval seeking	40%	44%	50%	44%	40%	33%	36%	67%	0%	0%	25%	33%	50%	0%	33%	25%	38% 29
541. insecurity of legalization of plot	20%	50%	83%	47%	30%	17%	23%	33%	33%	0%	25%	23%	67%	50%	67%	0%	38% 29
551. lack of speed of approvals/permits	30%	38%	33%	34%	50%	25%	36%	0%	67%	100%	50%	40%	67%	0%	33%	25%	38% 29
566. lack of training programs for fundi	30%	31%	0%	25%	70%	50%	59%	67%	33%	50%	50%	57%	33%	0%	33%	25%	38% 29
122. insufficient time for building	50%	38%	83%	50%	10%	25%	18%	33%	0%	0%	13%	17%	67%	0%	67%	25%	36% 28
123. insufficient time for supervising	60%	38%	50%	47%	20%	25%	23%	33%	0%	0%	13%	20%	67%	0%	67%	25%	36% 28
311. poor quality and variations of materials	10%	31%	83%	34%	30%	83%	59%	33%	0%	100%	38%	53%	17%	0%	0%	0%	36% 28
352. location of materials shops not near by	30%	44%	50%	41%	40%	50%	45%	33%	0%	0%	13%	37%	17%	50%	33%	25%	36% 28
502. burdensome health regulations	40%	25%	100%	44%	50%	42%	45%	0%	33%	50%	25%	40%	33%	0%	0%	0%	36% 28
652. limited technological innovations	10%	44%	0%	25%	60%	42%	50%	0%	67%	50%	38%	47%	67%	0%	33%	25%	36% 28
127. low levels of skills of family	20%	56%	83%	50%	40%	8%	23%	33%	0%	0%	13%	20%	67%	0%	33%	0%	35% 27
152. lack of trained inspectors/supervisors	10%	6%	0%	6%	60%	58%	59%	100%	0%	100%	63%	60%	33%	50%	67%	50%	35% 27
46. remoteness of plot, problems for transport etc.	30%	38%	83%	44%	20%	17%	18%	33%	67%	50%	50%	27%	50%	0%	33%	0%	34% 26
321. lack of knowledge of materials	50%	50%	50%	50%	10%	33%	23%	33%	0%	0%	13%	20%	33%	0%	33%	25%	34% 26
411. community participation is low	50%	38%	17%	38%	20%	8%	14%	33%	0%	0%	13%	13%	67%	100%	67%	50%	34% 26
243. cost increases due to unclear tasks for fundi	40%	25%	50%	34%	50%	17%	32%	33%	0%	0%	13%	27%	67%	0%	67%	0%	32% 25
412. building groups are not formed	60%	31%	33%	41%	20%	8%	14%	67%	0%	50%	38%	20%	33%	50%	67%	25%	32% 25
452. complex structure of building process	20%	38%	33%	31%	30%	33%	32%	67%	0%	50%	38%	33%	67%	0%	33%	0%	32% 25
623. lack of knowledge on measuring techniques	30%	44%	83%	47%	10%	17%	14%	33%	33%	50%	38%	20%	50%	0%	33%	0%	32% 25
347. soil survey often not done	0%	19%	67%	22%	40%	17%	27%	33%	67%	50%	50%	33%	67%	50%	33%	25%	31% 24
522. problems to informal contracts with fundi	20%	44%	67%	41%	30%	17%	23%	67%	0%	0%	25%	23%	50%	0%	33%	0%	31% 24
548. the construction need more skills than expected	30%	56%	33%	44%	10%	33%	23%	67%	0%	50%	38%	27%	33%	0%	0%	0%	31% 24
23. size of the family	0%	56%	83%	44%	30%	17%	23%	33%	0%	0%	13%	20%	0%	50%	0%	50%	30% 23
323. lack of knowledge on quantities needed	60%	50%	50%	53%	0%	0%	0%	0%	0%	0%	0%	0%	67%	0%	33%	25%	30% 23
345. heavy/ difficult transportation on foot/ cart	40%	50%	33%	44%	20%	17%	18%	0%	0%	0%	0%	13%	50%	50%	33%	0%	30% 23
355. not many prefabricated products available	40%	31%	50%	38%	30%	25%	27%	67%	33%	0%	38%	30%	17%	0%	33%	0%	30% 23
453. doesn't know cost of alteration	20%	38%	67%	38%	20%	33%	27%	0%	0%	50%	13%	23%	50%	0%	33%	0%	30% 23
126. low health conditions of family members	10%	38%	83%	38%	20%	33%	27%	0%	0%	0%	0%	20%	17%	50%	0%	50%	29% 22
175. low quality level of hired labour	10%	31%	17%	22%	30%	17%	23%	100%	33%	100%	75%	37%	50%	0%	33%	0%	29% 22
259. wear and tear of equipment & tools	20%	38%	33%	31%	50%	8%	27%	33%	33%	100%	50%	33%	33%	0%	0%	0%	29% 22

(continued)	SELF-HELP BUILDERS				FUNDIS			CONTRACTORS				CONS	NGO	SEMI GVT			TOTAL	
	S&S	SQ SL	NW SQ	ALL	S&S	SQ SL	sub all	S	M	L	sub all	ALL			GVT		Σ ALL	scores by factor
	10	16	6	32	10	12	22	3	3	2	8	30	6	2	3	4	77	
421. lack of knowledge of the project one takes part	30%	44%	50%	41%	20%	8%	14%	0%	0%	0%	0%	10%	50%	50%	67%	0%	29%	22
547. applied finishes need more skills than expected	30%	56%	33%	44%	0%	33%	18%	33%	0%	0%	13%	17%	50%	0%	0%	0%	29%	22
549. applied standards are lower than allowed	20%	25%	83%	34%	20%	17%	18%	67%	0%	0%	25%	20%	50%	50%	0%	25%	29%	22
61. problems with contract type,eg.labour contracts	0%	44%	0%	22%	50%	25%	36%	33%	0%	0%	13%	30%	67%	0%	33%	0%	27%	21
159. lengthy working hours on building	20%	38%	50%	34%	40%	33%	36%	33%	0%	0%	13%	30%	0%	0%	33%	0%	27%	21
468. lack of quality control of the project	10%	31%	50%	28%	0%	33%	18%	67%	0%	50%	38%	23%	67%	0%	33%	0%	27%	21
543. complex / inconsistent product specification	20%	25%	0%	19%	20%	50%	36%	33%	0%	50%	25%	33%	67%	0%	33%	0%	27%	21
544. incomplete / low quality of drawings	10%	44%	0%	25%	40%	25%	32%	67%	0%	50%	38%	33%	50%	0%	0%	0%	27%	21
545. lack of detailed drawings	10%	38%	0%	22%	50%	25%	36%	67%	0%	50%	38%	37%	50%	0%	0%	0%	27%	21
560. lack of experience on other constructing	30%	44%	83%	47%	0%	8%	5%	0%	33%	0%	13%	7%	50%	0%	33%	0%	27%	21
245. poor maintenance of equipment	20%	25%	17%	22%	30%	25%	27%	33%	0%	50%	25%	27%	67%	50%	0%	0%	26%	20
512. limited standard specifications for materials	20%	25%	17%	22%	20%	33%	27%	33%	33%	0%	25%	27%	50%	0%	0%	50%	26%	20
542. bad design / complexity of design	30%	25%	0%	22%	30%	17%	23%	67%	33%	50%	50%	30%	50%	0%	33%	0%	26%	20
571. inavailable/ incomplete project information	20%	38%	33%	31%	20%	17%	18%	33%	0%	0%	13%	17%	50%	0%	67%	0%	26%	20
124. low quality of supervision by family	20%	31%	50%	31%	10%	17%	14%	0%	0%	50%	13%	13%	50%	0%	33%	25%	25%	19
353. design requires too much materials,eg bad layout	20%	25%	50%	28%	20%	25%	23%	33%	0%	0%	13%	20%	50%	0%	33%	0%	25%	19
460. bad preparation of the project	10%	13%	33%	16%	10%	50%	32%	33%	0%	0%	13%	27%	50%	50%	67%	0%	25%	19
461. bad organization of the project	10%	19%	33%	19%	10%	42%	27%	33%	0%	0%	13%	23%	50%	50%	33%	25%	25%	19
463. confusion on site due to bad work organization	30%	19%	67%	31%	20%	25%	23%	0%	0%	0%	0%	17%	50%	0%	33%	0%	25%	19
546. used materials need more skills than expected	30%	50%	33%	41%	0%	17%	9%	33%	0%	0%	13%	10%	50%	0%	0%	0%	25%	19
569. inadequate labour instructions	30%	25%	33%	28%	10%	25%	18%	0%	0%	50%	13%	17%	67%	0%	33%	0%	25%	19
128. high illiteracy rate of family	0%	25%	83%	28%	30%	8%	18%	0%	0%	0%	0%	13%	50%	0%	33%	25%	23%	18
341. over use of materials	20%	31%	17%	25%	30%	17%	23%	33%	0%	0%	13%	20%	50%	50%	0%	0%	23%	18
151. bad labour conditions	10%	25%	0%	16%	40%	42%	41%	33%	33%	0%	25%	37%	17%	0%	0%	0%	22%	17
344. poor quality of mixed concrete on site	10%	31%	17%	22%	20%	25%	23%	33%	0%	0%	13%	20%	50%	50%	0%	0%	22%	17
351. too many materials (difficult to select)	10%	31%	0%	19%	10%	58%	36%	33%	0%	0%	13%	30%	0%	0%	0%	25%	21%	16
354. incorrect quality standards	10%	13%	50%	19%	10%	33%	23%	33%	0%	0%	13%	20%	50%	0%	33%	0%	21%	16
465. too many accidents on site	20%	6%	17%	13%	50%	33%	41%	33%	0%	0%	13%	33%	33%	0%	0%	0%	21%	16
472. lack of cooperation between fundi	30%	19%	17%	22%	20%	17%	18%	0%	0%	100%	25%	20%	50%	0%	0%	0%	21%	16
56. lack of competition between fundi	20%	19%	17%	19%	40%	8%	23%	0%	33%	50%	25%	23%	17%	50%	0%	0%	19%	15
244. plotvalue is too attractive for selling	10%	19%	0%	13%	10%	17%	14%	33%	0%	50%	25%	17%	50%	0%	67%	25%	19%	15
466. low degree of safety on site	10%	19%	17%	16%	40%	17%	27%	33%	0%	0%	13%	23%	50%	0%	0%	0%	19%	15
521. don't know how to hire/buy labour or materials	20%	25%	50%	28%	20%	0%	9%	0%	0%	0%	0%	7%	50%	0%	0%	25%	19%	15
641. the building is difficult to make	10%	13%	67%	22%	10%	8%	9%	67%	0%	0%	25%	13%	50%	0%	33%	0%	19%	15
112. lack of small contractors or fundi	10%	19%	17%	16%	30%	25%	27%	0%	33%	0%	13%	23%	17%	0%	33%	0%	18%	14
246. lack of spare parts	0%	13%	0%	6%	30%	25%	27%	0%	33%	100%	38%	30%	50%	0%	0%	0%	18%	14
263. wrong tools are used	10%	25%	33%	22%	20%	17%	18%	0%	0%	0%	0%	13%	50%	0%	0%	0%	18%	14
313. import materials not available	20%	6%	0%	9%	20%	25%	23%	33%	0%	0%	13%	20%	33%	0%	33%	50%	18%	14
343. poor quality of blocks made	10%	13%	33%	16%	10%	25%	18%	67%	0%	0%	25%	20%	33%	50%	0%	0%	18%	14
459. too many fundi involved	20%	19%	0%	16%	40%	17%	27%	33%	0%	0%	13%	23%	33%	0%	0%	0%	18%	14
462. bad use of planning methods	10%	13%	50%	19%	0%	25%	14%	0%	0%	0%	0%	10%	67%	0%	33%	0%	18%	14
464. no participation of self-helper in decisions	10%	13%	0%	9%	40%	8%	23%	33%	33%	0%	25%	23%	33%	0%	67%	0%	18%	14
165. bad relations between hired labour on site	10%	19%	33%	19%	0%	17%	9%	0%	0%	0%	25%	13%	50%	0%	0%	0%	17%	13
451. too many participants in building group	20%	19%	17%	19%	20%	0%	9%	100%	0%	0%	38%	17%	33%	0%	0%	0%	17%	13
12. the project organizer lacks a good philosophy	20%	0%	0%	6%	10%	8%	9%	0%	0%	0%	0%	7%	67%	100%	67%	0%	16%	12
154. complex organization of labour market	10%	13%	0%	9%	30%	42%	36%	33%	0%	0%	13%	30%	0%	0%	0%	0%	16%	12
342. use of 2nd hand materials not allowed	10%	19%	0%	13%	30%	17%	23%	33%	0%	0%	13%	20%	17%	50%	0%	0%	16%	12
559. slow decisiveness speed of family on building	20%	13%	33%	19%	10%	17%	14%	0%	0%	0%	0%	10%	33%	0%	33%	0%	16%	12
41. wrong location of temporary unit on plot	10%	19%	67%	25%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%	14%	11
52. low political stability	20%	31%	17%	25%	20%	0%	9%	0%	0%	0%	0%	7%	17%	0%	0%	0%	14%	11
121. low input of familymembers in construction	10%	25%	33%	22%	0%	0%	0%	33%	0%	0%	13%	3%	33%	0%	33%	0%	14%	11
422. cannot organize things	0%	13%	50%	16%	0%	0%	0%	0%	0%	0%	0%	0%	33%	50%	67%	25%	14%	11
458. relations with other self help builders	20%	13%	0%	13%	30%	8%	18%	0%	0%	0%	0%	13%	33%	0%	33%	0%	14%	11
47. size of project too big to handle	0%	13%	0%	6%	0%	8%	5%	33%	0%	0%	13%	7%	67%	0%	33%	25%	13%	10
656. wrong building technique applied	20%	0%	33%	13%	10%	0%	5%	67%	0%	0%	25%	10%	50%	0%	0%	0%	13%	10
457. lack of cooperation in family	10%	19%	17%	16%	10%	0%	5%	0%	0%	0%	0%	3%	33%	50%	0%	0%	12%	9
441. coordinator of project is unknown	10%	0%	0%	3%	0%	8%	5%	33%	0%	0%	13%	7%	50%	0%	33%	0%	9%	7
66. the whole project is too complicated	0%	0%	0%	0%	0%	17%	9%	0%	0%	0%	0%	7%	50%	0%	33%	0%	8%	6
accepted total 127 factors																		
663. doors/windows, roofs etd. don't fit *3)	10%	6%	33%	13%	20%	8%	14%	33%	0%	0%	13%	13%	33%	0%	0%	0%	13%	10
456. bad organization of the family *	0%	6%	0%	3%	10%	0%	5%	0%	0%	0%	0%	3%	33%	0%	0%	0%	5%	4
not accepted 2 factors																		

1) number of interviewees in group
2) code number of productivity factor
3) not accepted impairing factors
4) S&S: sites and services
5) SQSL: squatter upgrading/slum improvement
6) NWSQ: new squatter units
7) S: small
8) M: medium
9) L: large
10) CONS: consultants
11) NGO: non-governmental organization
12) SEMI GVT: semi government

10.B Crude score data of newly detected impairing productivity factors, Section 2

total 63 factors		SELF-HELP BUILDERS				FUNDIS				CONTRACTORS					CONS	NGO	SEMI GVT		TOTAL
accepted 48 factors		S&S	SQ	NW		S&S	SQ	sub		S	M	L	sub				GVT		Σ scores
not accepted 15 factors			SL.	SQ	ALL		SL.	all					all	ALL					ALL by
	1)	10	16	6	32	10	12	22		3	3	2	8	30	6	2	3	4	77 factor
		4)	5)	6)						7)	8)	9)			10)	11)	12)		
2)																			
349. Disapearance / Stealing of materials and equipment		10%	38%	17%	25%	10%	0%	5%		0%	0%	50%	13%	7%	0%	0%	0%	25%	14% 11
445. Corruption practises (causing low quality etc.)		10%	31%	0%	19%	10%	0%	5%		0%	33%	0%	13%	7%	17%	50%	0%	25%	14% 11
227. Repayment problems		0%	0%	0%	0%	20%	8%	14%		33%	33%	0%	25%	17%	17%	0%	33%	25%	10% 8
70. Crowding, small plots		10%	19%	17%	16%	0%	8%	5%		0%	0%	0%	0%	3%	0%	50%	0%	0%	9% 7
3. Attitude of government and other institutions		10%	0%	0%	3%	0%	0%	0%		0%	0%	0%	0%	0%	33%	50%	67%	0%	8% 6
10. Availability of land		0%	0%	33%	6%	0%	0%	0%		0%	0%	0%	0%	0%	33%	0%	67%	0%	8% 6
15. Harassment of officers	*3)	10%	0%	33%	9%	0%	8%	5%		0%	0%	50%	13%	7%	0%	0%	0%	0%	6% 5
225. Too low materials loan		20%	0%	0%	6%	0%	0%	0%		0%	0%	0%	0%	0%	17%	0%	33%	25%	6% 5
212. Buying out by higher income groups		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	17%	0%	33%	50%	5% 4
1. Government lacks reality on standards & affordability		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	17%	0%	33%	25%	4% 3
2. Land acquisition procedures		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	100%	33%	0%	4% 3
4. Vested interests of certain people, organizations		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	50%	67%	0%	4% 3
13. Role of ((foreign aid) donors		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	17%	50%	0%	25%	4% 3
205. Mostly insufficient securities available		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	50%	33%	25%	4% 3
207. Inability of mobilizing local financing		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	17%	0%	33%	25%	4% 3
213. Lack of info on who can make money available+terms		0%	0%	33%	6%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	4% 3
5. Lack of a common view on future developments		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	25%	3% 2
7. Imposed policies	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	100%	0%	0%	3% 2
8. Lack of low cost, intermediate and high income housing	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	33%	0%	0%	0%	3% 2
43. Lack of working premises for fundi		0%	0%	0%	0%	10%	8%	9%		0%	0%	0%	0%	7%	0%	0%	0%	0%	3% 2
68. Poor quality of contractors	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	50%	13%	3%	0%	0%	33%	0%	3% 2
71. Fires always break out		0%	0%	33%	6%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%	3% 2
141. Leadership of community conflicts	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	50%	0%	25%	3% 2
209. Lack of initiative for innovative financing, ROI big		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	33%	0%	0%	0%	3% 2
214. Lack of proper legisl. against quitting contractors	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	50%	13%	3%	0%	0%	33%	0%	3% 2
215. Designers lack of cost awareness		0%	0%	0%	0%	0%	0%	0%		0%	0%	50%	13%	3%	17%	0%	0%	0%	3% 2
248. Other use of housing funds (school)/ misuse groups		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	25%	3% 2
401. Lack of coordination between institions		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	67%	0%	3% 2
413. Too early occupation of plots (kraken)		0%	0%	0%	0%	10%	0%	5%		0%	0%	0%	0%	3%	0%	0%	0%	25%	3% 2
425. Lack of acceptance of realities		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	25%	3% 2
514. Lack of dissemination of information		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	50%	0%	25%	3% 2
524. Gap in expectations on the project		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	25%	3% 2
550. Applied standards/ layouts differ from provided		0%	0%	0%	0%	0%	0%	0%		0%	33%	0%	13%	3%	0%	0%	0%	25%	3% 2
583. Community unwilling to cooperate due to lack of info.		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	67%	0%	3% 2
6. Bureaucracy	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	50%	0%	0%	1% 1
9. High population growth	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	17%	0%	0%	0%	1% 1
16. Crime		0%	6%	0%	3%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%	1% 1
26. Mentality of people (more materialistic)		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	50%	0%	0%	1% 1
27. Low degree of trust in project organization	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	50%	0%	0%	1% 1
42. Services (water) not provided individ., so a problem		0%	0%	0%	0%	0%	0%	0%		0%	33%	0%	13%	3%	0%	0%	0%	0%	1% 1
101. Existing education policies		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	1% 1
102. Existing manpower training policies	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	1% 1
113. Lack of good Low cost housing architects	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	17%	0%	0%	0%	1% 1
114. High cost of labour		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	17%	0%	0%	0%	1% 1
131. Family traditions influence working together		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	50%	0%	0%	1% 1
142. Withdrawal of members from building groups	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	25%	1% 1
170. Lack of motivation		0%	6%	0%	3%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%	1% 1
208. Inability of mobilizing foreign financing	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	1% 1
216. Connection costs are high		0%	6%	0%	3%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%	1% 1
229. Wrong mentality towards loans (traditional vs modern)		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	50%	0%	0%	1% 1
247. Downpayment on plot is too much		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	25%	1% 1
249. Increase of contributions		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	25%	1% 1
324. Knowledge lacks where materials are available		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	1% 1
325. Hesitant to apply new developments in materials		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	25%	1% 1
348. Import materials specified in stead of local		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	1% 1
444. Soil dumping at unallowed locations		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%	25%	1% 1
504. Lack of guidelines by ministries	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	1% 1
505. Problematic land administration system		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	17%	0%	0%	0%	1% 1
515. Shortage of priv. & publ. surveyors: long waiting	*	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	1% 1
516. Malpractises with tendering		0%	0%	0%	0%	0%	0%	0%		0%	33%	0%	13%	3%	0%	0%	0%	0%	1% 1
581. One way of communications cause of sorts of problems		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	1% 1
582. Ownership transfer can be lengthy		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	1% 1
611. Capital intensive in stead of labour intensive.		0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	33%	0%	1% 1

1) number of interviewees in group
2) code number of productivity factor
3) not accepted impairing factors
4) S&S: sites and services
5) SQSL: squatter upgrading/slum improvement
6) NWSQ: new squatter units
7) S: small
8) M: medium
9) L: large
10) CONS: consultants
11) NGO: non-governmental organization
12) SEMI GVT: semi government

10.C Crude score data of main impairing productivity factors, Section 3

Section-3 main impairing productivity factors, crude score data. total 79 factors accepted 37 factors not accepted 42 factors		SELF-HELP BUILDERS				FUNDIS			CONTRACTORS					CONS	NGO	SEMI GVT		Σ	TOT. scores by
		S&S	SQ SL	NW SQ	ALL	S&S	SQ SL	sub all	S	M	L	sub all	ALL					ALL	
	1)	10	16	6	32	10	12	22	3	3	2	8	30	6	2	3	4	77	factor
		4)	5)	6)					7)	8)	9)			10)	11)	12)			
2)																			
203. Difficult to borrow money		50%	63%	67%	59%	10%	8%	9%	33%	0%	0%	13%	10%	17%	0%	67%	0%	32%	25
11. Invailability of infrastructure (roads/ water)		10%	19%	50%	22%	10%	17%	14%	0%	33%	50%	25%	17%	0%	0%	0%	0%	16%	12
314. High cost of building materials		0%	25%	0%	13%	20%	8%	14%	33%	0%	0%	13%	13%	17%	0%	33%	25%	14%	11
222. Low income level		0%	6%	0%	3%	30%	17%	23%	0%	0%	0%	0%	17%	17%	50%	67%	0%	13%	10
312. Local materials not available		0%	13%	0%	6%	10%	33%	23%	67%	0%	0%	25%	23%	0%	0%	0%	0%	12%	9
349. Dissapearance / Stealing of materials and equipment		10%	38%	17%	25%	10%	0%	5%	0%	0%	0%	0%	3%	0%	0%	0%	0%	12%	9
70. Crowding, small plots		10%	19%	17%	16%	0%	8%	5%	0%	0%	0%	0%	3%	0%	50%	0%	0%	9%	7
315. Often price changes of materials		10%	13%	0%	9%	30%	8%	18%	0%	0%	0%	0%	13%	0%	0%	0%	0%	9%	7
111. Lack of skilled labour		20%	0%	0%	6%	0%	8%	5%	0%	67%	0%	25%	10%	0%	0%	33%	0%	8%	6
218. Reliability of employers		0%	6%	0%	3%	10%	17%	14%	67%	0%	0%	25%	17%	0%	0%	0%	0%	8%	6
46. Remoteness of plot, problems for transport etc.		10%	6%	0%	6%	0%	8%	5%	0%	67%	0%	25%	10%	0%	0%	0%	0%	6%	5
65. Variability of weather		0%	0%	0%	0%	0%	33%	18%	33%	0%	0%	13%	17%	0%	0%	0%	0%	6%	5
541. Insecurity of legalization of plot		0%	0%	50%	9%	0%	0%	0%	0%	0%	0%	0%	0%	17%	0%	33%	0%	6%	5
15. Harassment of officers		10%	0%	33%	9%	0%	8%	5%	0%	0%	0%	0%	3%	0%	0%	0%	0%	5%	4
227. Repayment problems		0%	0%	0%	0%	10%	0%	5%	0%	33%	0%	13%	7%	17%	0%	33%	0%	5%	4
45. Topography of plot difficult to build on	*3)	10%	0%	0%	3%	0%	8%	5%	0%	33%	0%	13%	7%	0%	0%	0%	0%	4%	3
223. Limited financial resources for prefinancing		0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	13%	3%	17%	0%	33%	0%	4%	3
263. Wrong tools are used	*	0%	6%	0%	3%	10%	8%	9%	0%	0%	0%	0%	7%	0%	0%	0%	0%	4%	3
316. Lack of good materials		0%	0%	0%	0%	10%	8%	9%	0%	0%	0%	0%	7%	0%	0%	33%	0%	4%	3
345. Heavy/ difficult transportation on foot/ cart	*	0%	13%	0%	6%	10%	0%	5%	0%	0%	0%	0%	3%	0%	0%	0%	0%	4%	3
445. Corruption practises (causing low quality etc.)		0%	6%	0%	3%	0%	0%	0%	0%	33%	0%	13%	3%	0%	50%	0%	0%	4%	3
503. Burdensome building codes and bylaws		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	67%	25%	4%	3
566. Lack of training programs for fundi		0%	0%	0%	0%	10%	17%	14%	0%	0%	0%	0%	10%	0%	0%	0%	0%	4%	3
621. Lack of knowledge on building techniques		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	67%	25%	4%	3
2. Land acquisition procedures		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	33%	0%	3%	2
10. Availability of land	*	0%	0%	33%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	2
22. Stresses due to responsibilities to family	*	0%	13%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	2
43. Lack of working premises for fundi	*	0%	0%	0%	0%	10%	8%	9%	0%	0%	0%	0%	7%	0%	0%	0%	0%	3%	2
71. Fires always break out	*	0%	0%	33%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	2
112. Lack of small contractors or fundi	*	10%	0%	17%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	2
152. Lack of trained inspectors/supervisors	*	0%	0%	0%	0%	20%	0%	9%	0%	0%	0%	0%	7%	0%	0%	0%	0%	3%	2
175. Low quality level of hired labour	*	0%	13%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	2
346. Bad soil conditions	*	0%	0%	0%	0%	10%	0%	5%	0%	33%	0%	13%	7%	0%	0%	0%	0%	3%	2
352. Location of materials shops not near by	*	10%	6%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	2
461. Bad organization of the project		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	17%	0%	0%	25%	3%	2
545. Lack of detailed drawings	*	10%	0%	0%	3%	0%	0%	0%	0%	50%	13%	3%	0%	0%	0%	0%	0%	3%	2
1. Governments' lacks reality on standards & affordability		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	1%	1
3. Attitude of government and other institutions	*	10%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
12. The project orgamizer lacks a good philosophy		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	1%	1
16. Crime	*	0%	6%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
42. Services(water) not provided individually, problems	*	0%	0%	0%	0%	0%	0%	0%	33%	0%	13%	3%	0%	0%	0%	0%	0%	1%	1
55. Many interruptions during building	*	0%	6%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
56. Lack of competition between fundi	*	0%	0%	0%	0%	10%	0%	5%	0%	0%	0%	0%	3%	0%	0%	0%	0%	1%	1
68. Poor quality of contractors	*	0%	0%	0%	0%	0%	0%	0%	0%	50%	13%	3%	0%	0%	0%	0%	0%	1%	1
69. Bad image of the contractor	*	0%	0%	0%	0%	0%	0%	0%	33%	0%	13%	3%	0%	0%	0%	0%	0%	1%	1
121. Low input of familymembers in construction		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	1%	1
122. Insufficient time for building	*	0%	6%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
123. Insufficient time for supervising	*	0%	6%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
125. Insufficient time for organizing labour & materials	*	0%	6%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
127. Low levels of skills of family	*	0%	0%	17%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
141. Leadership of community conflicts		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	1%	1
151. Bad labour conditions	*	0%	0%	0%	0%	0%	8%	5%	0%	0%	0%	0%	3%	0%	0%	0%	0%	1%	1
159. Lengthy working hours on building	*	0%	0%	0%	0%	0%	8%	5%	0%	0%	0%	0%	3%	0%	0%	0%	0%	1%	1
165. Bad relations between hired labour on site	*	0%	6%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
170. Lack of motivation	*	0%	6%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
201. High interest rates		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	1%	1
206. High inflation of money	*	0%	6%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
207. Inability of mobilizing local financing		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	1%	1
216. Connection costs are high	*	0%	6%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
242. Difficulties with controlling the costs		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	1%	1
311. Poor quality and variations of materials	*	0%	0%	17%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
313. Import materials not available	*	0%	0%	0%	0%	0%	8%	5%	0%	0%	0%	0%	3%	0%	0%	0%	0%	1%	1
321. Lack of knowledge of materials		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	1%	1
413. Too early occupation of plots (kraken)	*	0%	0%	0%	0%	10%	0%	5%	0%	0%	0%	0%	3%	0%	0%	0%	0%	1%	1
422. Cannot organize things		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	1%	1
423. Difficult to identify good fundi	*	0%	0%	17%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
443. Construction phases rarely ready in time	*	0%	0%	0%	0%	0%	8%	5%	0%	0%	0%	0%	3%	0%	0%	0%	0%	1%	1
453. Doesn't know cost of alteration	*	0%	0%	0%	0%	0%	0%	0%	0%	50%	13%	3%	0%	0%	0%	0%	0%	1%	1
466. Low degree of safety on site	*	0%	0%	0%	0%	0%	8%	5%	0%	0%	0%	0%	3%	0%	0%	0%	0%	1%	1
502. Burdensome health regulations	*	0%	6%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
505. Problematic land administration system	*	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	17%	0%	0%	0%	1%	1
512. Limited standard specifications for materials		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	1%	1
516. Malpractises with tendering	*	0%	0%	0%	0%	0%	0%	0%	33%	0%	13%	3%	0%	0%	0%	0%	0%	1%	1
521. Don't know how to hire or buy labour or materials		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	1%	1
522. Problems to informal contracts with fundi		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	1%	1
542. Bad design / complexity of design		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	1%	1
550. Applied standards/ layouts differ from provided	*	0%	0%	0%	0%	0%	0%	0%	33%	0%	13%	3%	0%	0%	0%	0%	0%	1%	1
551. Lack of speed of approvals/permits	*	10%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1
641. The building is difficult to make		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	1%	1

1) number of interviewees in group
2) code number of productivity factor
3) not accepted impairing factors
4) S&S: sites and services
5) SQSL: squatter upgrading/slum improvement
6) NWSQ: new squatter units
7) S: small
8) M: medium
9) L: large
10) CONS: consultants
11) NGO: non-governmental organization
12) SEMI GVT: semi government

10.D The 33 main impairing productivity factors, ordered to the framework

impairing productivity factor	relative weight 1) 1-10	11-20	21-30	31-33
A. GENERAL				
1. Governments' lack of reality on standards & affordability			30	
2. Land acquisition procedures		19		
11. Unavailability of infrastructure (roads/ water)	2			
65. Variability of weather	10			
201. High interest rates			23	
203. Difficult to borrow money	1			
207. Inability of mobilizing local financing				32
222. Low income level	4			
223. Limited financial resources for prefinancing		12		
206. High inflation of money		20		
B. LABOUR				
111. Lack of skilled labour	9			
121. Low input of family members in construction			28	
141. Leadership of community conflicts				31
22. Stresses due to responsibilities to family		17		
C.EQUIPMENT / D. MATERIALS				
312. Local materials not available	5			
316. Lack of good materials		15		
314. High cost of building materials	3			
315. Often price changes of materials	7			
349. Disappearance / Stealing of materials and equipment	6			
321. Lack of knowledge of materials			24	
E. ORGANIZATION				
422. Self-help builder cannot organize things			29	
461. Bad organization of the project		18		
445. Corrupt practices (causing low quality, etc.)		16		
55. Many interruptions during building			22	
70. Crowding, small plots	8			
242. Difficulties with controlling the costs			21	
641. The building is difficult to make			26	
F. INFORMATION				
503. Burdensome building codes and bylaws		13		
541. Insecurity of legalization of plot		11		
521. Don't know how to hire or buy labour or materials			27	
512. Limited standard specifications for materials			25	
553. Lack of information on new techniques				33
621. Lack of knowledge on building techniques		14		

1) based on crude scores

10.E Productivity-factor analysis sheets

Introduction
The sheets are developed for a standard form of presentation of identified productivity factors. The information is based on literature survey, on interviews and on own experiences and views. The sheets contain the following information.

- the name and assigned code number of the productivity factor,
- the collected background information on the impact of the factor.
- where applicable, literature references in brackets [ ]
- suggestions for (i) short-term and (ii) long-term measures.
    i. Short-term measures usually affect the process of building directly leading either to a permanent solution or to a temporary solution by avoiding the problem. These measures can be arranged in a relatively short time and, in fact prior to a new project.
    ii. Long-term measures mainly have to be taken by external sources and lead more to comprehensive changes not directly related to the project in hand. Organizing such measures may require more time and their effect is calculated on the longer term.

  effect of the measures is indicated and other issues.

Fig. 10.E.1 Set-up of productivity factor analysis sheet

CODE NUMBER & NAME OF THE PRODUCTIVITY FACTOR

Description	: brief description of the productivity factor [with literature references]
Impact	: possible impact on construction of housing
Measures	
short-term	: measures on how to influence the process of construction
long-term	: measures on how to improve the circumstances by external actions
Effect	: possible effect of measures on the productivity factor and on other issues.

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11. AVAILABILITY OF INFRASTRUCTURE

Description	:	the availability of an adequate infrastructure was felt to be an important productivity factor. In this context we can think of the availability of good roads to the site and of water [Erkelens, 1983a, p. 322; Pen, 1958, p. 43; Vaessen, 1987, p. 5, interviews 1988].
Impact	:	it has mainly an impact on the delivery of building materials and equipment. Furthermore, the process of construction can be interrupted if water is not continuously available and has to be fetched outside the area.
Measures		
short-term	:	- reduce dependence on roads by having shops/yards near the building site - reduce dependence by using other building methods
long-term	:	- provide for materials yards close by during the project - provide for water kiosks close by (as part of basic infrastructure)
Effect	:	- shorts waiting time and cuts transport costs for water and materials/equipment

65. VARIABILITY OF WEATHER

Description : six sources refer to weather as an important cause of loss of productivity [Agency Int. Dev., 1970, p. 13; Fazio, 1984, p. 68; Moavenzadeh, 1978, p. 214; Pen, 1958, p. 43; Shaddad, 1984, p. 619]. The unpredictability of weather or the character of the climate in general can be unfavourable.

Impact : it can cause interruption of work but also affect the working conditions of the labourers, the quality of materials and, the mixes used.

Measures

short-term :
- according to Moavenzadeh [1978, p. 214] little can be done to alter the conditions but has to be borne in mind when selecting production techniques
- rearrange the work sequence so that there is less work in the open construction; (e.g. roof first)

long-term :
- develop all-weather construction techniques [idem, p. 215]
- build during dry period and, preferably, complete it in the dry period.

Effect :
- more continuous production,
- better working conditions.

70. PLOT SIZE

Description : plots are sometimes too small and crowded [interviews 1988].

Impact : this prevents buildings from being put up economically but lack of space during the construction is also a hindrance. This may need more construction time.

Measures

short-term : ---

long-term :
- better subdivision into plots, where possible
- design and build detached housing, more occupants in one structure, leaving more space on the plot

Effect :
- improved plot usage
- more economical building and use of housing.

111. AVAILABILITY OF SKILLED LABOUR

Description : the availability of skilled labour is an important factor in subcontracted self-help [Chromokos, 1981, p.D.150; Fazio, 1984, p. 68]. There is a shortage of skilled labourers at certain locations in Kenya and this situation will not change dramatically in the near future [Erkelens, 1983b, p. 8].

Impact : this has a considerable impact on construction as the fundis are not always available when needed, as planning is on a very limited scale.

Measures

short-term :
- organize the use of skilled labourers per group of self-help builders.
- reduce dependence on skilled labourers by simpler building methods.

long-term :
- improve the number of skilled labourers by more educational facilities, training on the job, village polytechnics.

Effect :
- decrease in use of skilled labour
- increased availability of fundi
- less dependence on certain skills.

203. LOAN SITUATION

Description : difficult access to credit systems is regarded as an impairing productivity factor [Agency, 1970, p. 13; Bergh, 1983, p. 5; Vaessen, 1987, p. 5].

Impact : apart from a delay the actual start of construction (as finance is not yet available) the impact during the construction can also assume the form of delays or even lead to abandoning work. When the funds are depleted (due to unexpected cost increases) new loans have to be arranged. This can be time-consuming. There are also cases on record that promised instalments of a loan were not forthcoming [Syagga Interview 1990].

Measures

short-term :
- reducing dependence on credit e.g. savings and more self-help building
- better estimates of funds required
- make loan adjustable to construction circumstances e.g. foundation problems encountered.

long-term :
- ease of access to credit facilities
- development and arrangement of additional credit facilities
- project office providing assistance in estimating
- project office providing assistance in acquisition of funds
- set up of a security fund for loans (e.g. local council guarantee)

Effect :
- completion of the project in expected time
- easier access to existing and new credit facilities on basis of better estimation of funds required
- easier to arrange changes in credit levels.

222. INCOME LEVEL

Description : constraints and stresses suffered by the plot- holding family due to a low income level are mentioned by Soni [1981, p. 57] as a problem. A low income level doesn't leave much money to save for building. It therefore takes a long(er) time before a room can be completed and the expenditures recouped by subletting, for instance. A low income may require self-help builders to go out and look for other work.

Impact : In case the self-help builder has one or more jobs in order to earn an income, he may not have the time left to organize or to build. This may lead to slowing down or even abandoning construction.

Measures

short-term :
- lower the cost of construction

long-term :
- improve gainful employment through national employment programmes
- improve gainful employment through income-generating building projects
- stimulate cheaper building projects
- improve terms and conditions for loans

Effect :
- people may get more time to organize / and or to build.

223. AVAILABLE FINANCIAL RESOURCES FOR PREFINANCING

Description : Duchart [1986, p. 8] and Soni [1981, p. 57] report of constraints and stresses due to lack of financial resources.

Impact : (as under 222) people need to seek additional finance either through extra loans or by savings from extra earnings. When they are not successful in this, construction work will be stopped for a while or even abandoned.

Measures

short-term :
- lower the cost of building.

long-term :
- provide funds for financing
- ease access (e.g. through cooperatives)
- stimulate savings.

Effect :
- earlier completion of house, thus earlier return on investment.

312. AVAILABILITY OF LOCAL MATERIALS

Description : the lack of local building materials is reported as a fundamental problem. [Business Round Table, 1983, p. 14; Chromokos, 1981, p. D.150, Erkelens, 1981, pp. 15,29 and 1983b, p. 7; Fazio, 1984, p. 68; ILO, 1979, p. 13; Soni, 1981, p. 57; Thung, 1985, p. 24]. For Kenya there are reports of shortages of cement and of traditional materials, although the country is 'self-supporting' [Erkelens, 1981, p. 29].

Impact : a discontinuous flow of materials causes stoppage of construction and eventual price increases of materials. People can now be forced to look for (other) materials at greater distances. That can be both time-consuming (delaying in building) and cost-increasing.

Measures

short-term :
- on-site production of building materials
- use of alternative materials

long-term :
- improved control of materials production and distribution at national level
- promote research & development of low-cost materials by government and others
- promote use of low-cost local materials by government and other organizations

Effect :
- improve availability of materials
- price stabilization, possibly a cost reduction of building materials.

314. COST OF BUILDING MATERIALS

Description : the high cost of building materials can influence the total building costs. [Erkelens, 1981, p. 38].

Impact : due to high cost of some materials people may tend (i) to postpone purchasing certain materials, (ii) buy lower quality at lower prices, (iii) buy less in quantity or just enough, no reserve. This all has its effect on building, causing delay of completion.

Measures

short-term :
- reduce the high cost by using alternative materials if available
- rely on less materials by better design

long-term :
- stimulate production of materials by self-help
- stimulate materials production in general
- take action to control and stabilize prices (Kenya: extend gazetted prices list)
- research into and development of low-cost building materials

Effect :
- (other) low-cost materials may become available

315. PRICE CHANGES OF MATERIALS

Description : price changes were reported as a problem [Interviews 1988, Erkelens, 1981, p. 29], people exploit and sell at whatever price they like.

Impact : It causes an increase in building costs and consequently quicker depletion of the available funds. Moreover, the construction process may have to be stopped or even abandoned when funds are inadequate.

Measures

short-term :
- design for reduced use of those materials which are sensitive to price changes (if possible and predictable)
- early purchase of materials
- contractual fixed prices for delivery

long-term :
- government price regulation(and control)

Effect :
- less sensitivity to price fluctuations.

349. DISAPPEARANCE & STEALING OF BUILDING MATERIALS and EQUIPMENT

Description : theft of building materials and equipment from the site but also disappearance during transport from the yard to the site [interviews 1988].

Impact : delay in construction, replacement of stolen equipment and materials at additional cost, quicker depletion of funds.

Measures

short-term :
- watch kept on materials and equipment
- check on deliveries
- arrangement of proper storage

long-term :
- lowering the price of materials (if possible)
- general change in mentality of the people

Effect :
- less scarcity of materials/ equipment.

503. INFLUENCE OF CODES/ BYLAWS

Description : construction when there is uncertainty as to what is allowed or not [Chromokos, 1981, p. D.150; Shaddad, 1984, p. 616] Inspectors may delay construction and require additional approvals, or they go back on previously agreed standards. Reference is made here to the numerous problems around the Dandora S&S project where health authorities held up further building and construction [Chana et al.]. Even where the bylaws allow certain articles to be waived, civil servants were reluctant to do so [Interviews 1988].

Impact : extension in building time, use of more expensive materials and or more materials than estimated.

Measures

short-term :
- do not start construction before 100% agreement is reached on codes and bylaws, if possible.
- declare a project as temporary, so that the legislation is not applicable. (This may give other problems with financiers' demand for securities)
- relax the bylaws

long-term :
- improve civil-servant quality, so that he can better judge reasonable proposals.
- review bylaws so as to accommodate cheaper materials for low-cost housing.

Effect :
- greater freedom in the use of materials may result in lower building costs.

541. SECURITY OF PLOT LEGALIZATION

Description : there is a risk that land you have bought will not become your property. The start of construction is delayed as the land is not yet legalized.

Impact : this leads to claims from contractors and fundis [Duchart, 1986, p. 9; Erkelens, 1981, p. 34; Vaessen, 1987, p. 5]. The nonlegalized situation may lead to building interruptions. Would-be builders may be chased off their sites. This all leads to financial problems, waste of labour and materials.

Measures

short-term :
- do not start building before land is legalized
- reduce eviction chance by organizing in fairly big groups [Duchart, 1986, p. 8]

long-term :
- speed up legislation procedures

Effect :
- fewer building problems
- higher investments, resulting in more permanent structures.

10.F Kynyago Housing project of Undugu Society

General
The UNDUGU Society of Kenya (Undugu means brotherhood or solidarity) is a Non-Governmental Organization and a movement based on Nairobi, which grew out of the welfare work of Father Arnold Grol, the Netherlands missionary who tried to help the so-called 'parking boys', who lived troubled lives in the streets. Contact with them led him to their families in the slums, very often one-parent families unable to cope with their problems. The support of the family structures of traditional rural society fails to function in the city. From the very beginning, many different programs have been started by Undugu, primary education for school drop-outs, community health programmes, income-generating projects, like carpentry and mechanical-engineering workshops, women's groups and low-cost housing programmes, to mention but a few.

House building
Undugu became involved in building after a number of provoked fires in '81-'82. The fires destroyed a group of houses made of plastic and off cuts of timber on government land. The occupants appealed to Undugu for help in rebuilding. Undugu agreed, but insisted on full participation by the occupants at every stage of building, in order to create a community. Undugu first approached the local authorities for some form of guarantee that the houses would not be bulldozed in 5-6 years time. Some sort of Temporary Occupation License (TOL) was obtained, declaring that eviction wouldn't take place after having been given another site. Together with these people, the Undugu social team and the building adviser prepared house designs. Undugu donated 85% of the cost of the materials. The remaining 15 % and most of the labour were provided by the occupants, for example through their own supplies of doors, labour, etc. The design consisted of a village layout with 2-roomed houses. The intention was that one room would be for the parents, the other for the children. In practice it was one room for rental and one for own use.

Balloting of the plots
The plots were indicated on a map. There was a secret balloting. Every one drew a number and this was indicated on the map and these numbers were also put up on all the sites.

Description of the project area
The total area was filled with hard core from the quarry, which improved the underground, after which construction was started. The houses were 5.3 x 3.8 metres, consisted of mud-and-wattle bark with corrugated galvanized iron sheets (cgi sheets) on top. Cross-ventilation is through the openings between

roof and walls. The mud was found on the site, the wattles and wattle bark came in full lorry loads from the forest to the site, centrally organized by Undugu. The occupants provided for the doors. Rain water for washing is collected in water tanks, fed by the gutters along the roofs. Fruit trees were planted in the open spaces between groups of houses. Water is provided by 7 water kiosks, which have their own water meters. Women's groups exploit these kiosks. Groups of women watch over the kiosks in turn.

Building the houses
Before building started, Undugu put up a demonstration house from the same materials. Undugu provided a craftsman to monitor the building process. The setting out of sites and houses was done by Undugu, but this had to be redone after some of the walls were put up, as people tended to increase the plot sizes. There were no problems in putting up the houses as the people were used to the mainly traditional materials. Erection of the houses was done either by a family on its own which took 2-3 days, or in a group of 5-6 families who worked together. This took 1-2 days. When people could not build because of age, frailty, etc. volunteers and a youth group built the house. If someone had a job, he employed a fundi to build his house in 1-2 days at a (labour) cost of KShs.100/- to 200/-. The materials were provided by the organizers on a daily basis upon completion of a phase. The materials were guarded by the people concerned. A few toilet blocks with septic tanks were built by them too.

The houses were plastered at a later stage. Occupants prepared for the plastering themselves by cleaning and repairing the mud-and-wattle walls. They brought the stones which they found lying about for pavement round the house. The occupants contributed KShs. 1400/- for the plastering and Undugu subsidized the rest and provided the fundi, as this technique of plastering (a 12mm layer) requires special skill (it also saves cement). For the walls, cement is mixed with sand, for the floors it is mixed with gravel. For more details see: Undugu [1986a, p. 3].

11.A Review of recommended measures by implementer

Self-help builders
reduce chance for eviction by organizing in communities
delay start of construction till land is legalized, if possible
before starting, find out what codes are applicable
declare project as temporary, as this reduces bylaws requirements
try to build in dry periods
organize jointly the use of skilled labourers
apply simple building methods
apply other building method reducing dependency on infrastructure
apply another order of construction for bad weather
check on the materials delivered on site
set up system of watching of materials
reduce amount of purchase of materials in one time if possible
arrange proper storage of materials, in house or nearby
use alternative materials if others are unavailable
use alternative materials if they are cheaper
better estimation for funds needed
arrange if possible fixed price contracts for materials
early purchasing of materials

Fundi/Contractors
try to build in dry periods
apply other building method reducing dependency on infrastructure
apply another order of construction for bad weather
use alternative materials if others are unavailable
use alternative materials if they are cheaper
fundis start with on the job training of unskilled labour

Consultants.
improve design as to ensure an optimum plot use
improve design as to ensure more compact housing
improve designs to ensure less materials used
specify those materials which are cheap and still less sensitive to frequent price changes.
promote/ design for simple building methods
promote design with nearby materials
design allowing for alternative materials if available
design allowing for cheaper materials
QS to open up 'shops' to assist with estimation of funds needed
develop cheaper building projects

NGOs
reduce chance for eviction by organizing in bigger communities
before starting, find out what codes are applicable
declare project as temporary, as this reduces bylaws requirements
open up materials yards or shops during building
open up water kiosks during construction
promote the use of low cost materials
stimulate the setup of materials production units
provide assistance in estimating courses for the self-help builder
provide for assistance in acquiring funds
experiment with credit facilities

set up housing projects with gainful employment
develop employment creating programmes
stimulate technical training
stimulate training on the job

Semi-Government
research in design into more compact housing
research in design as to ensure an optimum plot use
improve designs to ensure less materials used
courses for low cost housing on materials, costs, detailing, maintenance develop project with materials yards nearby
develop project with water provision nearby
research on designs for simple building methods
courses on low cost housing design
research on use of nearby materials
research on another order of construction
research on all-weather techniques.
develop a simple registration system for delivery of materials
research and development of low cost materials/ structures research the potentialities for self help production of materials
research into estimating methods, prepare manuals
research institutes, banks to provide assistance in terms of money lenders
research and develop possibilities in reducing cost of projects
banks to ease access of credit facilities
banks a.o. to do research into other credit facilities
develop employment creating programmes

Government
rethink on the optimum sizes and shapes of the plots, adapt the existing plans accordingly and make new long-term land-use and division plans.
relaxation of the building bylaws should be encouraged.
enforce legislation of the new proposed building bylaws.
simplify the land legislation procedures and provide for early title deeds
provide for a master plan for roads and detailed plans.
promote the use of low cost materials
stimulate low cost materials production in general
stimulate self-help production of materials
set up system for control of materials production/ flow
improve the price control systems
stimulate competition
stabilize the prices of building materials
stimulate research and development of low costing building projects
stimulate ease of access to credit facilities
allow for other credit facilities
set up a security fund in order to ease access for loans.
stimulate projects with gainful employment
develop employment creating programmes
stimulate technical training schools
stimulate training on the job.
improve education level of civil servants to improve skills
give courses to civil servants improving their skills
improve payment as to improve entrance level of servants
do efforts to change mentality of employees.
stimulate a general change mentality of people

11.B Check of Kynyago project against proposed measures

	measure	measures	ST	LT	remarks on check
	1. PLANNING AND DESIGN				
M 1	reduce number design, materials sensitive to price changes		x		100% of plot is used
M 2	use less materials by better design		x		design satisfied
M 3	promote and design compact housing for better plot use		x		simple materials used
M 4	improve sizes and shapes of plots, when possible			x	
	2. LAND & LEGISLATION				
M 5	group organization reduces chance of eviction		x		organized by Undugu
M 6	do not start before land is legalized		x		T.O.L. obtained
M 7	do not start building before agreement on bylaws		x		NA 2)
M 8	declare project as temporary, so bylaws are not applicable		x		declared like that
M 9	relaxation of the bylaws for materials, etc.		x		NA
M 10	revise bylaws to promote use of cheaper materials			x	
M 11	speed up legislation procedures			x	
	3. INFRASTRUCTURE				
M 12	build and preferably complete house in dry period		x		done in very short period
M 13	provide for materials yards nearby during project		x		materials bought in one lot
M 14	provide for water kiosks near project		x		provided
M 15	joint use of skilled labourers by more builders		x		hired plasterers via Undugu
M 16	provide for (permanent) roads in project areas			x	
	4. TECHNIQUES				
M 17	reduce dependence on skills by simplier building methods		x		very simple, almost traditional
M 18	reduce dependence on infrastructure thro' other bldg. methods		x		NA
M 19	reduce work in the open air by other sequence of construction		x		normal order no problem
M 20	develop all-weather construction techniques			x	
	5. MATERIALS				
M 21	checking on materials' deliveries		x		done by advisor
M 22	watching the materials, equipment		x		done by people
M 23	proper storage		x		done in house
M 24	reduce dependence on availability by using alternatives		x		
M 25	use alternative cheaper materials if available		x		
M 26	research and development of low-cost materials			x	
M 27	promotion of use of low-cost materials			x	
M 28	stimulate materials production in general			x	
M 29	stimulate production of materials by builders			x	
M 30	improve control of materials production and flow			x	
	6. FINANCE				
M 31	better estimates of the funds required		x		Undugu estimated
M 32	provide for assistance in estimating		x		Undugu estimated
M 33	provide for assistance in acquiring funds		x		Undugu provided loans
M 34	arrange for fixed prices for materials' deliveries		x		NA
M 35	early purchasing of materials		x		purchase in one lot, at start
M 36	take action to control and stabilize prices			x	
M 37	stimulate cheaper building projects			x	
M 38	ease credit terms			x	
M 39	developand arrange for other credit facilities			x	
M 40	create a security fund as form of collateral for loans			x	
	7. MISCELLANEOUS				
M 41	improve gainful employment through national programmes			x	
M 42	improve employment thro' income generating bldg. projects			x	done by Undugu
M 43	improve number of skilled labour by schooling and training			x	
M 44	improve quality civil servants by more services			x	
M 45	general change in mentality to reduce theft			x	community feeling improved

1) ST:short-term, LT:long-term 2) Not applicable

11.C Method, Summary of stepwise procedure

The following procedure is advised for application of the method:

- Carry out a literature study, document study and eventually hold interviews on local productivity factors, the building process in general and self-help in particular, as well as on the participants involved.
- Update the framework and the analysis sheets.
- Establish the actors active in that country in the field of self-help.
- Define the categories and sample 'size ' of the respondents.
- Prepare the field survey documents, instructions, etc.
- Update the instrument.
- Carry out a pretest and improve the instrument.
- Carry out the survey.
- Analyse the data and formulate the results.
- Update the framework again.
- Update the analysis sheets.
- Update the instrument.
- Select the main impairing and enhancing productivity factors.
- Collect measures from the impact sheets.
- Formulate policies for implementation of the measures.

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LIST OF ABBREVIATIONS

APS	Agricultural production survey
CB	Contractor-built
cgi	galvanized corrugated iron
COTU	Central Organization of Trade Unions
GDP	Gross domestic product
GDPafc	Gross domestic product at factor costs
GNP	Gross national product
HFCK	Housing Finance Corporation of Kenya
HPD	Housing planning department
HRDU	Housing Research and Development Unit, Nairobi University
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IPF	Impairing productivity-factor
KShs	Kenya Shillings
MFPfactor	Multiple-factor-productivity factor
MOE	Ministry of Energy
MOLH	Ministry of Lands and Housing
MOLG	Ministry of Local Government
MOPW	Ministry of Public Works
MOW	Ministry of Works
MOWD	Ministry of Water Development
NACHU	National Cooperative Housing Union
NCC	National Construction Corporation
NCCK	National Christian Council of Kenya
NGO	Non-Governmental Organization
NHC	National Housing Corporation
NWSQ	New squatter unit
QS	Quantity surveyor
RGFCF	Residential gross fixed capital formation
SFP	Single-factor productivity
SFPfactor	Single-factor-productivity factor
SHB	Self-help built
SHM	Self-help management
SQSL	Squatter upgrading and slum improvement
S&S	sites and services
TFP	Total-factor productivity
TOL	Temporary occupation licence
TUE	The Urban Edge
UHS'83	Urban Housing Survey 1983
UNCHS	United Nations Centre for Human Settlements
USK	Undugu Society of Kenya
VIP	Ventilated improved pitlatrine

STELLINGEN

behorende bij het proefschrift

SELF-HELP BUILDING PRODUCTIVITY
a method for improving house building by low-income groups
applied to Kenya 1990-2000

van

Peter Alex Erkelens

18 juni 1991

1

De grote armoede in de krottenwijken en het hoge consumptieniveau van de bevoorrechte minderheden zijn de voornaamste oorzaken van de milieuvervuiling in ontwikkelingslanden.

Herrera et al., Bariloche report, 1978, p. 51.

2

De zogenaamde ontwikkeling door industrialisatie in derde-wereldlanden leidt ondermeer tot trek naar de steden. Dit heeft een stelselmatige onderontwikkeling van de stedelijke huisvesting tot gevolg.

3

Woningbouw met geprefabriceerde elementen levert geen belangrijke bijdrage aan de oplossing van het huisvestingsprobleem in ontwikkelingslanden.

Zie ook Kenya, Ministry of Housing and Social Services, intern rapport 1980.

4

Onderhoud is een verwaarloosd aspect bij de volkshuisvesting in het bijzonder in ontwikkelingslanden. Bij het instandhouden van de woningvoorraad verdient het aanbeveling om voor de dragende structuur en buitenafwerking materialen en constructies toe te passen die weinig onderhoud behoeven. Meer onderzoek dient daartoe te worden uitgevoerd.

Zie ook Miles, D. and Syagga P.M., Building Maintenance, 1987, p. 20.

5

Evenals het implanteren van organen, kan het invoeren van nieuwe technieken afstotingsverschijnselen veroorzaken. Beide behoeven speciale maatregelen voor acceptatie.

Zie ook: Transfer of Technology, CIB W 65, Dublin Conference, 1985.

6

Zelfbouw en interlandelijke adoptie van kinderen hebben met elkaar gemeen dat ze het totale probleem niet oplossen, maar voor betrokkenen een weldaad kunnen zijn.

7

Zelfbouw levert een belangrijke bijdrage aan de oplossing van het woningbouwvraagstuk in ontwikkelingslanden. Deze aanpak dient te worden ondersteund door het beschikbaar stellen van grond, minimale infrastructuur en goedkope financieringen.

Dijkgraaf C., Onze Wereld, nov. 1986, p. 12; dit proefschrift, hoofdstuk 5.

8

In veel geïndustrialiseerde landen treedt de overheid op als volkshuisvester. In ontwikkelingslanden moet de overheid zich beperken tot het scheppen van voorwaarden voor volkshuisvesting, wegens de beperkte middelen.

Habitat News, Vol. 12, nr. 1, August 1990, p. 25; dit proefschrift, hoofdstuk 11.

9

Ontwikkelingslanden moeten eerst de kwantitatieve en pas later de kwalitatieve woningnood lenigen. De overheid dient haar kwalitatieve eisen dan ook niet te hoog te stellen.

Dit proefschrift, hoofdstuk 5.

10

De term produktiviteitsverhoging wordt veel gebruikt en welhaast evenveel misbruikt; vaak wordt produktieverhoging bedoeld. Dit betekent evenwel niet dat de term gemist kan worden.

Sikkel L.P., Uitvoeringstechniek blijft mensenwerk, 1988, p. 16; dit proefschrift, hoofdstuk 7.

11

In Kenya verrichten de vrouwen naast hun huishoudelijke werk heel vaak bouwactiviteiten. Grote groepen mannen zijn door de veranderingen in de samenleving beroofd van een groot gedeelte van hun traditionele bezigheden. Indien zij de verzorgende taken zouden overnemen, mag worden verwacht dat de produktie aan woningen aanzienlijk zal toenemen: 'Laat vrouwen bouwen'.

12

Een geluidscherm is het meest effectief indien het is geplaatst direct naast de geluidsbron. Dit betekent dat auto's zo dicht mogelijk langs zo'n scherm moeten rijden. De huidige vluchtstroken langs autosnelwegen moeten daarom worden omgebouwd tot rijstroken.