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**DOES TITLING OF RURAL LAND HAVE AN IMPACT ON ITS
PRICE ?**

A CASE STUDY IN KENYA

BY

PATRICK KYAKA KIMEU

**Main Supervisor: Christian Paresi
Secondary Supervisor: A. M. Tuladhar**

Degree Assessment Board:

**Professor Ir. Mr. J. Henssen, Chairman
Professor Dr. M. J. M. Bogaerts, External Examiner
Christian Paresi, Main Supervisor
A. M Tuladhar, Secondary Supervisor**

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Thesis submitted to the International Institute of Aerospace Survey and Earth Sciences (ITC) in partial fulfilment of the requirements for the award of the Degree of Master of Science (M.Sc) in Geographical Information Systems for Cadastral Applications

**Enschede, The Netherlands
July, 1995**

The contents of this thesis do not represent the official opinion of either the supervisors or the Institute

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DISCLAIMER

This document describes work undertaken as part of a programme of study at the International Institute for Aerospace Survey and Earth Sciences. All views and opinions expressed therein remain the sole responsibility of the author, and do not necessarily represent those of the institute.

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Chairman of the Board, ITC
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Abstract

Conventionally, from Western conceptual glasses, secure property rights are taken as an inducement for investment in real property and are presumed to result in greater agricultural productivity and rural land price. This ideology has been prescribed to developing countries in anticipation that it is the panacea for the shortcomings associated with their indigenous land tenure systems. By subscribing to this ideology, developing countries have disregarded their already existing indigenous land tenure systems and have, subsequently hastened the demise of these indigenous systems by overwriting them with the 'Modern' land tenure systems. Strictly, these indigenous systems should not be overlooked as has been intuitively the case since the influence of other factors on productivity and land price has been 'latent' in pro-titling arguments.

In order to look at the impact of titling, 86 land prices/acre of rural land encompassing 31 farmers with-title and 55 farmers without-title, in geographic proximity and within fixed agro-ecological constraints were compared. The mean rural land prices/acre were compared for both titled and untitled land close (0 - 1 km) and remote (1 - 2 km) from some physical infrastructure (main road and water). Also compared is the mean rural land price/acre for land close (0-2.5 km) and remote ($2\frac{1}{2}$ - 5 km) from the market centres. In addition, the mean rural land price/acre of irrigated titled land was compared with that of irrigated untitled land. Multiple regression analysis was carried out encompassing these factors, in addition, to the status and size of land. As the actual values on land transactions were not available, pseudo land prices per/acre were obtained by interviewing proprietors on how much they were willing to pay for a unit acreage of land.

The results indicate that firstly, titled irrigated rural land has a higher mean land price/per acre (hence higher agricultural productivity/potential) than an identical tract of untitled rural land. Secondly, titled rural land close to some physical infrastructure has a higher mean land price/per acre (hence higher agricultural productivity/potential) than an identical tract of untitled rural land. Thirdly, titled remote rural land has generally the same mean price per acre as untitled rural land, hence the agricultural productivity is expected to be the same. Regression analysis results confirm that titling and other factors influence the price of land. The results further indicate that titling of rural land has not resulted in increased investment on land in terms of undertaking more improvement (eg. planting trees) or use of variable inputs [eg. fertilizers]. In addition, the increased security of tenure from titling of land has not been reflected in increased credit undertakings.

Apparently, the results are contrary to the expectations and may lead to several implications for the undertaking of titling programmes.

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Dedication

To my Late mother, may God rest her soul.

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CHAPTER ONE

1. INTRODUCTION

"The Kenyan state has overplayed the value of individual freehold tenure and title registration for agricultural development. Some expansion of small-scale commercial agriculture in central Kenya has occurred independently of formal land privatization."

Angelique Haugerud, 1989.

1.1 Rationale

Realization of agricultural productivity has closely been associated with the needs for more inputs and new technology in farming. The use of these inputs and new technology, in most cases, is not affordable for most farmers. Therefore, some form of financing is essential. Such financing requires security to insure payment. Since land is an attractive collateral, it is without doubt that titling of land has the potential in order to provide security in this respect.

In a similar vein, proponents of formal land tenure, have castigated these traditional land tenure systems, also referred as customary land tenure¹ [Simpson, 1976], using constraints to agricultural development as the yardstick. They have further prescribed a subscription to formal land tenure systems as the panacea for the shortcomings associated with these traditional land tenure systems.

African governments [Kenya, Botswana, Zimbabwe, Ghana amongst others] in disfavour of their respective traditional land tenure systems have adopted the neo-classical model [Barrows and Roth, 1990] based on the western framework of property regime. In doing so, the governments have disregarded the traditional land tenure systems by overwriting them with the western framework of property regime in adjudicated areas.

The perpetration of this 'state-facilitated' model and hastening the demise of these traditional land tenure systems raises several pertinent questions.

Firstly, is titling of land the limiting factor to agricultural development ?

Secondly, is the neo-classical theory embedded in the West European and North American histories appropriate to demonstrate the effectiveness of titling of land on African land tenure ?

Against this background, the gradual transition from traditional land tenure systems to the 'Official' or 'Modern' land tenure needs to be re-evaluated. One of the problems to be looked at entails evaluating the impact of titling at the micro-level.

1.2 Research Problem

The institution of land tenure has been on the core agenda in most government policies especially in sub-Saharan Africa. These governments have invested scarce fiscal resources in land registration systems derived from the western framework of the property regime. These

¹ Customary Land Tenure is also referred to as indigenous land tenure systems [eg. Place and Hazell, 1993]; Communal Land tenure [eg. Barrows and Roth, 1990].

systems have been presumed to generate benefits both to the government and the people.

Whilst massive programs involving land registration have been going on, analysis of these presumed benefits have scarcely been carried out. A re-assessment of the benefits associated with adopting the neo-classical model is a prerequisite.

The research problem entails to investigate whether a relationship exists between titling of land and the price of land, as a proxy for agricultural production, and analyze the economic feasibility of titling for the individual farmer.

The conceptual framework to be tested is adopted from Feder et. al. [1987] who compared the agricultural productivity / land price, for titled areas vis-a-vis untitled areas in a region of Thailand.

The two main hypotheses to be tested are:

- Registration of land increases the price of land.
- Registration of land results in additional investment on land.

Despite many studies have questioned Feder's framework and hypotheses [Haugerud, 1989; Okoth-Ogendo, 1976; Lawrence, 1984, Gershenberg, 1971; Bakema, 1994; English et al., 1994; and others]. Another attempt is made in this study because I want to check how these two hypotheses can be confirmed in the Kenyan context and because I am intrigued by these different schools of thought.

1.3 Prior Work

Feder's [1988] study in rural Thailand demonstrated that titling of land guarantees high returns. De Soto [1994], indicates that land titling was reflected in increased investment and higher income in Peru and Costa Rica respectively.

The findings seem to be contrary as indicated by studies elsewhere [eg. Place and Hazell, 1993, Bruce, 1993; Okoth-Ogendo, 1993; Luning 1984 - elsewhere 1994, and others].

In the African context; different studies do not seem to offer enough evidence to support Feder's [1988] findings [eg. Atwood, 1990; Migot-Adholla et al., 1991 and others].

Nevertheless, studies carried out in Kenya [Haugerud, 1989; Okoth-Ogendo, 1976; Lawrence, 1984; Gershenberg, 1971; Barrows and Roth, 1990; English et al., 1994 and others] also offer no evidence to confirm the convincing arguments advanced by pro-titling advocates.

1.4 Research Objectives

■ Main objectives

- (1) To investigate the influence of titling on the price of land. [To investigate whether titling results in increase in the price of land).

- (2) To assess the economic feasibility of titling to the farmer. [To investigate whether the farmer would opt for titling process considering the benefits he/she is (has) accrued]

■ Secondary objectives

- (3) To investigate rights, possible benefits and limitations to the individuals for land held under customary tenure and statutory tenure.
- (4) To carry out a review of the conversion process with a particular focus on adjudication and first registration procedures.

■ Research questions

1. What are the rights, possible benefits and limitations to the individuals for land held under customary tenure and statutory tenure.
2. What are the main factors that influence the price of land ?
3. What are the costs (to the individuals) associated with the conversion of land from customary to statutory tenure ? (in terms of adjudication, surveying and registration)
4. How is land converted from Customary Land Tenure to Statutory Land Tenure ?
5. What is the economic feasibility of conversion to the farmers associated with the titling of land ?

The objectives and research questions have been addressed in the following sections in the thesis [Table 1.1].

Table 1.1 shows different sections addressing the objectives and research questions in the study.

Main Objective	Secondary Objective	Research Questions	location in the study
(1)		(2) + (5)	§ 5.4.3.1.1, § 6.2.2
(2)		(3) + (5)	§ 5.4.3.3 § 6.3.3.3
	(3)	(1)	Chapter 2
	(4)	(4)	Chapter 3

1.5 Scope of the Research

The various rights, benefits and limitations associated with the two tenure domains were investigated through farmers with interviews sandwiched by a literature review and office

verification. The major constraints associated with these different tenure systems were identified.

The formal interviews with senior government officers in the Ministry of Lands (Kenya) enabled understanding of the processes involved in the conversion from informal to formal land tenure. Further, an appraisal of land transaction procedures was carried out and the problems associated with adjudication investigated.

The fieldwork survey comprised of a reconnaissance survey followed by a formal survey. 86 farmers were interviewed operating in geographic proximity within similar agro-climatic environment for two adjacent study sites encompassing a titled and a non-titled area.

Prior to carrying out the field survey, the study area was carefully selected so that it satisfied the same climatic conditions and hydrological conditions, also referred to as Agro-Ecological Zone² [Jaetzold et. al., 1982]. The field work survey also identified the different factors that influence the price of land in that region. The classification criteria for proximity to the main road, the water canal and market centres was generated via a *GIS* using *Ilwis GIS* package. Subsequently, the contribution of titling on price of land was established through calibration of a multiple regression model using *SPSS* statistical package interfaced with *Dbase IV*. General analysis was carried out via bar-graphs generated in *Quattro-Pro* spreadsheet package.

The actual costs paid by the individuals were derived from the farmer interviews. An attempt to highlight possible costs parameters has been carried out through simulation of a cost model. A benefit/cost analysis approach has been demonstrated based on the simulated costs.

The study approach was limited in several respects. The prices of land were not the actual prices but pseudo observations based on interviewing farmers on how much they were willing to sell/buy a unit acreage of land. In addition, the observed price of land has been used as a proxy for agricultural production. Further the distances to the main road, water and market were assumed to be linear functions in order to carry out the analysis. Notwithstanding, the linear multiple regression analysis model used did not seem to provide a 'good fit' despite the fact that statistical linearity diagnostics (§ 6.3.1) were carried out. Also, the amount of data collected was limited and this had posed some constraints in the various phases of the analysis.

1.6 Organization of the Report

The following chapter discusses land tenure systems in Kenya and highlights the merits and limitations associated with customary and statutory land tenure systems.

Chapter three outlines the procedure involved in rural Land Registration in Kenya, with particular emphasis to adjudication process. Subsequently, the role of different institutions in

² Agro-Ecological Zones (AEZs) are broad zones or regions which are relatively homogeneous in terms of climate, landform and soils and hence offering equal crop production possibilities. [FAO definition, 1978].

the adjudication process has been discussed.

In chapter four, Feder's [1988] arguments, and other studies related to his findings have been outlined. Outlined also is the location of the study area.

Chapter five presents the methodology adopted in the study in different phases; i.e pre-fieldwork, fieldwork and post-fieldwork. Presented also are the tools of analysis used in the study.

Chapter six is devoted to investigating the influence of titling on the price of land. The benefits associated with titling have also been investigated with particular reference to a study site in Kenya.

The conclusions based on this study and recommendations made from the research are summarized in chapter seven.

CHAPTER TWO

2. LAND TENURE SYSTEMS IN KENYA

"First it was the power of the crown of England to alienate land in the 'protectorate' ... Then when that had been sorted out in English jurisprudence, the issue turned out to be a question of settler ownership vis-a-vis 'native' rights. It was said that African rights were in the nature of usufruct only meaning in, this context that the right or interest lasted as long as the land was in use...Vacant land was considered held by the territorial sovereign, then in being, the colonial power, who was free to grant it."

[Okoth-Ogendo, 1975]

2.1 Introduction

Presented herein is an overview of the different land tenure systems in Kenya. The different methods in which interests in land are acquired under both Customary and Statutory Land Tenure systems have been outlined. An overview of both interests in land on these different systems has been considered. In particular, the interests in customary land tenure has been considered from a generalised perspective because these vary not only from community to community but even within ethnic groups as opposed to the interest under statutory tenure.

A brief background on Kenyan history vis-a-vis these land tenure systems is also the subject of the section.

2.2 Background

The beginning of the colonial era at the end of the 19th century ushered in Kenya a new concept of land ownership. The indigenous people were considered as incapable of holding interests in land. In 1915, the land in Kenya was declared Crown land¹.

Boundaries of all land occupied by Africans were defined and gazetted in 1926. In 1930, these were declared as 'Native Reserves' for 'the use and the benefit of the natives of the colony forever'.

In 1963 (independence) all land categorized as Native Lands, Reserves (Temporary reserves or Leasehold Areas) were declared to be Trust Lands. The Crown Land at independence became Government Land and defined thus as "All land owned by the government for her own purpose and which includes utilised and unalienated government land reserved for future use by the Government itself or may be available to the general public for various uses". The land is administered under the Government Land Act [Cap, 280].

Nevertheless, the consolidation and adjudication process which was started in 1954/1955 in Central Province and which continues to date in other parts of Kenya had created a category of land called Private Land.

Trust Land (also referred to as the Native Lands unit or Native Reserves or as special areas) is held under the trusteeship of the various county councils under the constitution of Kenya

¹ Crown Land was defined as "all public land subject to the control of His Majesty by virtue of his Majesty's protectorate and all kind which shall have been acquired for public service or otherwise, however, and shall include all land occupied by the native tribes of the protectorate and all land reserved for any tribe".

for the benefit of the residents of Kenya. The residents occupy the land under their customary laws and rights but have no registered interest in it.

The Trust Land Act [Cap. 288] governs the administration of Trust Land. The Commissioner of Lands administers the land as an agent of the county councils. Trust Land is diminishing as a result of land adjudication and consolidation programmes under the Registered Land Act [Cap. 300].

2.3 Customary Land Tenure

2.3.1 Definition:

Customary Land Tenure is defined as "the right to use or dispose of use-rights over land which lies neither on the exercise of brute force, nor on the evidence guaranteed by the Government statute, but on the fact that they are considered legitimate by the community, the rules governing acquisition and transmission of these rights being usually explicit and generally known though not formally recorded in writing."

Simpson S.R, 1976

2.3.2 The Concept of land ownership

The ownership of land under the traditional land tenure system is made up of a complex of relationships. A general concept of communal ownership is that land is owned and controlled by the clans. In some communities land is believed to be owned by God while its utilization belongs to the people who occupy it and use it collectively [Podedworny, 1971]. In other communities, land is looked upon as an element such as air, water, and fire except that it has ability of plant growth. Access to land tends to be specific to functions [Nyadimo, 1990]. Land is also perceived as a place for burial and the sacred inheritance of ancestors entrusted to the care of the great family of which many are dead, few are living and countless are yet unborn. Land is also perceived as an expression of territorial sovereignty. The unwritten nature of the law results in difficulties on its application.

2.3.3 Creation of rights under the Customary Tenure

Interests in land can be created on one of the four ways namely

- First occupancy
- Purchase
- Conquest
- Inheritance

(a) First occupancy: In this method of creating interests in land, land is owned by the individual who first cleared it. Ownership of land implies that he has powers to distribute use rights to his family members.

(b) Purchase: This is another way of acquiring interests in land. However purchase of land is not a one to one relationship presumed from the literal interpretation of the word 'sell'. It involves a network of relations without which a transaction is considered not binding by the community. This is because land is viewed as family land, clan and people property.

(c) Conquest: Acquisition of land by this procedure used to take place long time. It was

based on a tribal war between two tribes and not an individual affair. Nowadays, this method of land acquisition is obsolete.

(d) Inheritance: This happens after the demise of the father. The male children inherit the property of the father.

Marriage, friendship and birth are also ways in which rights/interests to land could be obtained. In a monogamous marriage, land was generally divided in equal shares amongst the sons of the family, whilst the last son's share was included in the widows fields which she was to cultivate until her death.

In a polygamous marriage, the size of land each co-wife had depended on her marital seniority, with the first wife receiving the largest share. Upon demise of the husband, the widows become trustees of the land and in effect play the late husband's role in allocating land and distributing the various rights to land to their sons in equal shares.

2.3.4 Rights in land under customary tenure

Ownership of land in the African context under the traditional land tenure system is contrary to the European standpoint; there is no exclusive right of ownership. In some communities the rights are hierarchical when individuals have various rights to the same piece of land. In other communities, chiefs have rights and obligations of allocating land and controlling its utilization (eg. some parts of Zambia). An individual who is a subject right of ownership has rights of

- (a) Pledging the land on security.
- (b) Harvesting crops for debt.
- (c) Allocating the land to third parties for temporary utilization without the family's permission.

An individual has no powers of giving up the land permanently to a third party. Descendants on taking land from their parents do not become absolute owners, since title of ownership belongs to the family only or to the group. However, individual interests are taken care of (in some instances) and given priorities in some communities.

The *bundle of rights* under customary tenure can be classified to be made up of two interrelated aspects: *use rights and disposal rights* [Gershenberg, 1971].

(i) Use rights

Land can be used in several ways as given below:

- (a) Cultivation: for planting of crops.
- (b) Grazing: for cattle, sheep etc.
- (c) Firewood collecting: for lighting fire.
- (d) Fetch water: for drinking, cooking purposes.
- (e) Fishing.
- (f) Settlement.

- (g) Hunting.
- (h) Herding.
- (i) Right to trees.
- (j) Seasonal rights (i.e during wet and dry season).
- (k) Picking fruits.

In some communities, individuals have much wider rights as concerns land, *eg. plant trees and even construct buildings*. An individual can also give or sell the land allotted to him under optional conditions and prohibit the access by third parties.

However, in the customary set up, land involved not just the owner and his household members but a wide network of relationships. Thus although an individual may own and cultivate land, nevertheless, it is recognized that the members of the community could have access to the uncultivated land. The issue of 'trespassing' on these other members of the community did not exist. The distribution of use rights was vested in men, and women as trustees during widowhood.

Women rights to land is determined by their husbands, brothers, fathers or sons in some communities, since clearing and preparing land for cultivation was traditionally a man's job. In other communities women only possess decisive rights to domestic gardens and produce from them (eg. Ghana, Zambia).

The guarantee to use rights by the individual depends on the following factors:

- Obedience to various customs in the tribal community.
- Type of soil fertility.
- Ecological factors.
- Frequency of people moving from place to place.

(ii) Disposal rights

The ultimate source of disposal rights was vested in the society. Land belongs to the society and ownership finally devolves to individual family head. Disposal rights are exercised by males of the society mostly and inherited through the male line. Notwithstanding the fact that men have control through exertion of these rights, they have no unrestricted powers over land.

The coexistence of these rights (i.e use rights and disposal) have resulted in communal land ownership through social institutions eg. family or lineage (ancestry).

Disposal rights are vested on tribe members living within a defined area. They are of the following two kinds for a tribe:

- (a) Consists of family groups derived from a common ancestor either of patrilineal or matrilineal.
- (b) Can also be a group of territorial communities inhabiting one or more villages, whose interests are represented by tribal chiefs, elders and/or various types of councils.

Each member of the tribe has a right to the land. Land is owned by the group though its use is individual. The range of rights of/and individual limitations and types of obligations depend on the *status* and the *importance of the individual*.

2.3.5 Transactions in land under Customary Tenure

Several transactions are feasible on customary land. These include the following:

- (1) Granting of land for one year with a gift after harvest.
- (2) The same as (1) above plus a fixed sum of money in addition to harvest gift.
- (3) Granting of land for an indefinite 'term' with gifts after every harvest.
- (4) The same as (3) plus a fixed sum of money in addition to harvest gift.
- (5) A defined land granting against a fixed sum.

2.3.6 Customary Land Tenure - merits

- (1) Customary Land Tenure assures the right of utilising a given piece of land to each member of the community and thus assures survival.
- (2) It prevents land speculation on a broad scale and constitutes a basis and condition for eventual land nationalisation and also possible creation of cooperative and even classical collective form of farming.

2.3.7 Customary Land Tenure - negative aspects

Customary Land tenure have been viewed to impede agricultural development by amongst others;

- (a) Failure to provide security of tenure.
- (b) Discouraging conservation and improvement of natural resources.
- (c) Failing to encourage credit and investment necessary for agricultural development.
- (d) Causing uneconomic fragmentation of the land and thus poor utilisation of the land.

[Gershenberg, 1971].

Digression into section § 2.4.5 on the benefits of cadastre and land registration implies that its absence could not realise the stated benefits. Lack of these benefits in some cases should be viewed as limitations, in retrospect. However this should not be generalised in all cases, because there is a possibility of neutral cases where it is a benefit for cadastre and not necessarily a negative aspect for Customary Land Tenure.

2.3.8 Customary Land Tenure - Other Aspects

(i) Absence of freehold tenure versus security of tenure

Although the widely accepted notion is that freehold tenure is a prerequisite to security of tenure, Uchendu [1968] in his words stated that

'In traditional African economies, the security of rights in land is guaranteed and protected by the very principle under which the initial rights were acquired.As long as the social relations which give rights in land are maintained, the question of insecurity in land seldom becomes a live issue'

Previous discussion on the transmission of these rights through inheritance implies that there exists as much incentive to improve the land and work on it efficiently under customary land law as any other individualistic freehold tenure system. The basis of critics arguments (i.e customary tenure arrangements discourage efficient use of land resource) according to Gershenberg (1971) regarding shifting cultivation, is inappropriate. His argument is that shifting cultivation is not related to land law but to the relative abundance of land and relative poverty of the soils as well as lack of knowledge, regarding use of fertilisers. Apart from pointing out that there are many places in Africa operating under customary tenure where shifting cultivation is not found, he also points that nothing in customary land tenure law acts to inhibit transformation of shifting cultivation to a more settled form of agriculture. Further he concludes that the requirement regarding land use invalidates the contention that customary land law necessarily leads to agricultural stagnation.

(ii) Credit and tenure arrangements

Different schools of thought have dismissed customary land tenure as an obstacle to the flow of agricultural credit and hence constituted an African agricultural progress and the flow of credit to the agricultural sector.

Regarding credit for agricultural progress, the argument has been watered down in cases where development has taken place with comparatively little or no credit (eg. planting of coffee in Kenya's Nyeri district in early fifties and potatoes in Kenya's Elgeyo-Marakwet district). Planting of cocoa in Ghana is also another aspect where advancement of credit has been minimal [Gershenberg, 1971].

The argument relating credit with land use is a common adage based on arguments that financial institutions require some form of security before they can make advances which are based on title as security. Some studies show that such anticipated credit has failed to take place. Reasons include amongst others the illiquid nature of landed asset even where farmers have clear titles. Nevertheless, other studies indicate that although a title is a prerequisite to credit the social status of a person and his liquidity in the monetary system determines access to the credit [Ogendo, 1976]. Although the primary goal of the creditor is repayment of loan, credit can best be extended to cooperatives (marketing or farming) in which arrangements exist for all the members responsible for repayment of the loan. This would ensure firstly, that the loan is used for the indicated purpose. Secondly, individuals receiving the loans could be pressurized to insure their payment. This cooperative approach seems to be feasible with Customary Land Tenure system.

(iii) Tenure and economies of scale

Customary Land Tenure has been associated with unnecessary fragmentation in places where population has been increasing rapidly. However, rural-urban migration patterns in search of alternative employment opportunities has been observed. Besides, availability of lease and transfer possibilities on land are options that are open to producers who need an amount of

land required for an economic unit. Against this scenario, fragmentation does not inhibit progressive producers. Furthermore, fragmentation has been attributed to ecological factors, in instances where soils were heterogeneous and not necessarily because of customary land law [Gershenberg, 1971].

For large scale holdings, agricultural productivity is simply not a function of extensive, continuous land area but of other complementary factors, i.e managerial know-how, dedication and other factors of agricultural production (technology, extension services etc). Land fragmentation agricultural situation is a phenomena found in areas where inheritance law (requiring heirs to have approximately equal shares) prevails rather than in alteration of customary law as a whole. Besides any change in inheritance law must also suggest a solution to dispossession that is bound to follow.

2.4 Statutory Land Tenure

This refers to land owned privately in freehold or leasehold tenure after registration and issue of title following Government or Trust² land allocation or as a result of land consolidation and/or resettlement program.

The rights and interests under customary tenure is the subject of the ensuing discussion.

2.4.1. Legal interests in land in Kenya

Under the English law, land is owned by the crown and people hold interests on land for use. These interests are referred to as 'Estates'. Tenure is the relationship between an Estate holder and the crown.

Three main types on interests in land are

- (a) Estates
- (b) Encumbrances
- (c) Servitudes

2.4.1.1 Estates in Land

Estates refer to interests held by individuals or group of persons for a period of time. Two categories of estates are freehold and leasehold.

I. Freehold estate

This is referred to as 'Absolute Proprietorship' under the Registered Land Act (RLA) or 'Fee simple' under the Registered Titles Act (RTA). Freehold estates are referred to as primary interest in land [Wanjala, 1990], and are the greatest interests a person may hold in land. There are conditional freeholds which restrict the use for say agricultural or ranching purposes.

² Trust land refers to land held under trusteeship by various county councils under the constitution of Kenya for the benefit of people who are ordinarily resident on that land. The residents occupy the land under their customary laws and rights but have no registered interests in it. This land was before independence known as the Native Lands Unit or Native reserves or as special areas.

II. Leasehold Estates

These are restricted in time duration which must be stated in writing giving rise to the interest. They are also referred to as statutory interest in land. The interest can be between individuals, Government and individuals (Government as the lessor or Government as the lessee if it does not opt for compulsory acquisition).

Under leasehold interest, a holder can

- (a) Transfer land to another person.
- (b) Mortgage it or charge it in return for a loan.
- (c) Create another lease (sub-lease).

(a) Categories of leases

Leases are governed by provisions of Registration of Titles Act (RTA) [1915] and Registration of lands Act (RLA) [1963].

- (i) *Fixed common lease*: where the parties (landlord and tenant) actually state in the agreement the particular period for which the lease will be in existence.
- (ii) *Periodic lease or tenancy*: that runs periodically (month to month; half-year to half-year) from one period to another. The term is automatically renewed on each expiry date unless one party gives notice to the other.
- (iii) *Lease or tenancy at will*. This arises when a landlord permits a tenant to occupy the land on condition that the relationship can be terminated by either party at any time.
- (iv) *Service lease or tenancy*. In this type of tenancy, the landlord as the employer of the tenant includes provision of the house in the employees contract.
- (v) *Lease or tenancy at sufferance*. Arises after expiry of a fixed periodic lease in which case the tenant pays rent and the landlord accepts it. The landlord does not expressly forbid the tenant.

(b) Controlled or Statutory leases

These arise as in the situation discussed in the preceding section (governed by RLA or RTA) but are however controlled by the government. Controlled tenancies are governed by

- Landlord and Tenant Act (governing business premises, such as shop, hotel or catering establishment which has a lease of not more than 5 years or which has not been reduced into writing).
- The Rent Restriction Act (governing residential premises, where the tenant pays a rent of not more than ksh 2500/- per month).

The government controls these leases through special courts (tribunals), and thus the landlord is restricted in doing some things the tribunal's consent.

(c) The license

This is a permission granted to someone else to enter upon his land and do something or perform an act on the said land. Only the entry is lawful and no interests are passed (eg.

lease).

2.4.1.2 Encumbrances

These burden the land of interests holders and they arise in situation where the interest holder offers his land as security for money lent.

The RLA and the Indian Transfer of Property Act (ITPA) [1882] laws govern transactions between landowners and lenders.

Temporary restraints

These are not encumbrances in the strict sense but they restrict the ability of the title holder to deal with his land. Three categories of temporary restraints are caution or caveat, inhibitions and restrictions.

(a) Caution or caveat: This is an instrument which is lodged with the registrar of land by the person claiming interest in land forbidding the registration or transfer of any given piece of land. The caution (registered under RLA) or caveat (registered under RTA) prevents transfer of land unless withdrawn with prior consent of caveator or cautioner.

(b) Inhibition: This is a court order preventing (for a particular time or until the occurrence of a certain event) the registration of any dealing with any land, lease or mortgage. The registrar registers the copy of such an inhibition in the appropriate register.

(c) Restriction: This is a Registrar's order which is made by the court prohibiting or restricting dealings in any particular land in order to prevent any fraud or improper dealing with the land. Interested persons can also apply for a restriction.

2.4.1.3 Servitudes

These are rights that a person may acquire over a piece of land and are of three categories viz. easements, profits and restrictive covenants.

(a) Easements: These are arrangements that allow a land owner to use an adjoining piece of land for the benefit of his land (eg. right of way). The land which benefits from an easement is called the *dominant tenement*, while the one over which the right is established is called *servient tenement*. Two pieces of land must be adjoining for an easement to occur. Easement are not meant to prevent the owner of a servient tenement from ever using his land.

(b) Profits: These are also referred to '*Profit a prendre*' [Wanjala, 1990]. A '*profit a prendre*' right allows someone to go over another persons land and take something (eg. soil, fish, etc) from the land for his own benefit. The rights are independent on the existence of a piece of land adjacent, or indeed an owner of any land at all.

(c) Restrictive covenants: A restrictive covenant is an agreement under seal between two owners whereby one of the owners (*covenantor*) promises the other (*covenantee*) that he will not do certain things on his land. For instance, *covenantor* promising the *covenantee* that he will not keep in his land pigs which could affect poultry in *covenantee's* land. Restrictive

covenants bind third parties if land is sold.

2.4.2 Equitable rights in land

These are rights recognized in law that are not legal rights, yet protected by the law in the event of dispute. For instance when an interest holder leaves the land to another person as a *trustee* upon his death to his children.

2.4.3 Group interests in land

These arise when two or more persons are entitled to the same piece of land. They are sometimes referred to as '*co-ownerships*', '*concurrent interests*' or '*interests in community*'. Two types of group interests are *joint tenancies* and *tenancies in common*. The context of the word tenancy of group interests means '*ownership*' or '*holding of an interest in land*'.

(i) Joint Tenancies: Two or more persons must enjoy interests in land as one single owner for a joint tenancy to exist. Several requirements must be satisfied under the joint tenancies

(a) Unity of possession: This means that each joint tenant is as much entitled to possession of any part of land as the other.

(b) Unity of Interest: This means that the interests of each joint tenant must be the same in extent, nature and duration in the theoretical eyes of the law.

(c) Unity of title: This means that each joint tenant must claim his title to the land under the same instrument of registration.

(d) Unity of time: The interest of each joint tenant must vest in him at the same time as that of the others.

Apart from these four unities is the *right of survivorship* which means that on the death of one joint tenant, his interest to land passes to the other joint tenants until there is one survivor who will hold the land as absolute owner.

(ii) Tenancies in common: Tenants in common have a distinct share property which has not yet been subdivided among the cotenants. The interests of tenants in common are separate, the only thing that brings them together into co-ownership is that they have shares in single property which has not been divided among them. There is no right of survivorship, as in joint tenancy, the size of the tenants share is fixed and upon death, his interests passes under his will as through the rules of intestate succession. The only unity is one of the four unities i.e unity of possession. Tenancy in common is a special group interest recognized by various laws.

2.4.4 Special categories of Group Interests

Tenancies in common comprise group interests under this category, eg land group representatives, land cooperative societies, sectional properties amongst others.

(i) The Land Group Representatives: Land Adjudication Act provides for group holding of land (as absolute proprietors), on behalf of the tribe or clan. The group must be between 3 to 10 people [eg. group ranches in Kajiado].

(ii) Land Cooperative Societies: The Cooperative Societies Act (Cap 490 of the laws of Kenya), caters for groups whose objective is to acquire and own land [eg. farming cooperative], commonly referred to as 'Land buying companies'[Wanjala, 1990]. Individual members own shares in the land which they can transfer or dispose of in conformity with the Cooperative Societies Act.

(iii) Sectional properties: The Sectional Properties Act (1987) governs group ownership related to ownership of units related to buildings (eg. flats) and highrise apartments. It is also referred to as 'horizontal ownership' by some land lawyers [Wanjala, 1990]. The common property of the building or highrise apartment is owned by the group. The 'sectional plan' is registered in the name of the cooperation with the members having absolute or freehold title in their individual units, in undivided shares in common property.

(iv) Settlement schemes

This mode of land ownership is not a **group ownership**. It stems from the effort of the government of Kenya, to settle down thousands of people who had been displaced during the colonial period. The ownership of land in the settlement scheme was vested in the settlement fund trust, which offered land in lots to the prospective settlers at a token fee. No freehold title is granted to the settler, unless and until he has complied with the terms and conditions of the letter of allotment.

2.4.5 Benefits of Land Registration³

(i) To the individual

- (1) Increased security with respect to the rightful claimants and third parties thus resulting in greater willingness of an owner/tenant to invest more money and labour in the land and in the longer term.
- (2) Cheaper long term credit (eg. mortgage) can be developed which results in increased land development and an improved land market in urban areas. In rural areas credit availability promotes long term farm planning, better cropping patterns, long term crops and soil conservation practises in addition to enabling farmers to purchase efficiency improving equipment. Hence, significant measures in productivity, revenues or income, and the value of land.
- (3) Land transactions become easier, cheaper, faster and safer as opposed to conveyancing.
- (4) Increased security results in decrease of title and boundary disputes and related litigations, hence reduction in costs for both government and citizen.

(ii) To the Government

³ Land Registration in this context should be taken to mean Land Titling.

- (1) *Better information base for planning and administration.* Cadastre provides accurate information about ownership structure and existing rights in land for planning activities eg. irrigation and other infrastructural measures. The cadastre is invaluable in the administration of schemes concerning seeds, fertilisers, credit etc. The collected basic data can be used as a basis of large scale maps.
- (2) *Better possibility to finance development.* Since development of land requires more resources than the owners command themselves or borrow from cooperative societies. On the other hand, because most financial institutions insist on plans of good title before giving mortgages and loans, or require for special insurance to be taken [Larsson, 1991]. Further, since short term credit for cooperative societies rarely suffices the farmers needs whilst private money lenders exacerbate the credit possibilities by demanding high unreasonable interest rates, the aspect of credit is quite critical, indeed one of the main reasons behind land registration.
- (3) *Easier action implementation.* Precise information about land rights (existing and other rights) facilitate implementation of development plans (eg. agrarian reforms, land reforms, etc). Larsson (1991) however notes that unavailability of information about land tenure in most countries (particularly third world) is not uncommon, which factor he attributes to weak political support and enforcement mechanisms.
- (4) *Better guidance and control.* The cadastre provides a mechanism to guide development. For instance, permit subdivision of parcel into uneconomical units may be controlled via a cadastre. Other controls may include transfers following a certain control eg. Land Control Board in Kenya, which validates transactions (transfers, leases, mortgages, partitions & subdivision) by granting consent to the parties once it is satisfied that there is no unfairness to either of the transacting parties.
- (5) *Improved basis for land assessment and taxation.* A cadastre increases revenue by making taxation coverage complete. Moreso, it can produce a fairer system of land taxation based on land acreage. The system is efficient because of existing proper records of land units and their responsible owners.
- (6) *Execution of Government tasks.* A cadastre is a useful tool for the execution of other government tasks. For instance, valuation, statistics of buildings, cooperations, populations, elections, food production and distribution, a concept referred to by Henssen (1992) as Multi-Purpose Cadastre.
- (7) *Basis for Land Information Management.* A parcel based land recording system, including cadastral maps can be a basis of an extensive land information system using parcel key as identifier.

2.4.6 Drawbacks of Land Registration

2.4.6.1 Drawbacks as perceived by individuals

- (a) Individualization would involve fundamental changes in African society some of which may be undesirable socio-political responses such as landlessness and maldistribution of resources.
- (b) Indebtedness to rural people for taking agricultural credit and subsequently mismanaging it.
- (c) Land speculation and absentee landlordism.
- (d) Social injustice and land accumulation in the few hands of the most elite people in the society.
- (e) Land disputes (see § 2.4.6.3 for reasons).

2.4.6.2 Other limitations on Land Registration

- (1) *Multiple ownership*: Registration has not been able to cope adequately with the ownership of proportional shares nor with extended family ownership. Though Simpson [1976] pointed out that appointment of trustees who rather than the communal land owners would be registered for the purposes of dealing with land, strictly, the land belonged to all members of the lineage or clan but it was impractical for all of them to be registered, in the certificate, let alone keeping the records up-to-date. It is however anticipated that computerisation will take care of this.
- (2) *Strata title*: Although strata title have been catered for by Sectional Properties Act 1987, Registration of titles creates difficulties in the registration of ownership of common items eg. freehold in blocks of highrise apartments.
- (3) *Multiplicity of parcels*: Considering a case where a farmer holds multiple parcels, although the conventional wisdom was to discourage fragmentation. In some cases farmers hold multiple parcels to take advantage of agro-ecological and climatic conditions to reduce risks of crop failure. Issuing separate titles is a solution, although in Kenya consolidation was geared towards concentrating interests of farmers.
- (4) *Completeness of Register*: Registration of land has not been able to cope adequately with the complex form of tenure that traditionally exist in most developing countries. According to Coldham [1976], registration of land confers on some persons more extensive rights than they previously enjoyed. Subsequently it deprives of others their customary rights. The introduction of title registration has tended to ignore subtleties of Customary Land Tenure giving rise to informal dealings in land taking place outside the register. The registration of title is often out of sympathy with the custom and tradition. In some cases, the system of Customary Land Tenure has continued to exist even after introduction of Registration.
- (5) *Monitoring of land*: Registration of title is limited in several respects. It has been 'title based' and not 'land-based' [UNCHS, report, 1990]. By design it has failed amongst

others to

- Reveal the behaviour of property markets.
- Monitor fluctuations in land prices.
- Determine existing use of land.

It has ignored important attributes of land (eg. land use).

2.4.6.3 Land disputes

(i) Registered owners and other claimants

Disputes arise between registered owners and other persons claiming interests in land. The registration under RLA provides that once a person is registered under it as the owner of a freehold estate, his ownership cannot be challenged by anyone and that his ownership is subject to the powers of the state and the overriding interests (i.e English⁴ system of land ownership). Registration replaces customary law with English law.

Lack of understanding on the consequences of registration on the majority of the people has been the cause of dispute. For instance, an individual being registered as the owner of family land (this happened especially during the state of emergency period in 1952). The effect of registration has created friction and challenger argue that family members should not be denied use of land on which they have lived since time immemorial. Incases where the registered owners have sought to evict them, their attempts have been challenged in a court of law. Claims against registration include

- (i) Registration was never meant to disinherit them from their ancestral land, and they have further argued that under customary law they are entitled to occupy and use the land.
- (ii) Further arguments are that registered owners were meant to hold the land as trustees on behalf of those not registered and not give them absolute powers.
- (iii) Also argued, is that although registered owners are the legal owners in the eyes of the law, the unregistered ones have *equitable interests in the land* since they have been living on it and cultivated it for a long time.

Conversely, registered owners have argued that they are indefeasible and any claims to land have no basis and therefore argued for the dismissal of such claims.

Although the law is clear, and as evidenced by the Kenyan courts (High court and Court of appeal), customary rights have not vanquished by registration of land. In some cases the courts ruling have been for the registered owners, while in other cases, circumstances under which registration was carried out to establish whether the owner was absolute or merely a 'guarantor' of title (eg. family land). Subsequently, the concept of 'customary trust' has evolved under circumstances where the eldest son is registered on behalf of his younger brothers in the family. In other cases, the court has ruled in favour of equitable interests if

⁴ The law used in Kenya is English law, imported from Britain in 1919.

unregistered claimants have been in occupation of registered land and cultivated it for a long time.

(ii) Disputes related to transfer of land

Disputes of this type arise when an owner sells his land and denies having ever transferred his land. The Land Control Board operating under the provisions of Land Control Act (cap 302, laws of Kenya) sanctions all transfers. The Act provides that any transfer must be considered by the relevant board within which the land being sold is situated. The size, the person to whom the land is being sold, the price and reasons for selling land must be stated. The Board ensures that consent is not granted if the land is to be subdivided into uneconomical units or if the seller is to become landless after the sale. Other controls by the board include discouraging land speculation, keeping control of the market value of land and fairness on both the transacting parties. Appeals on board decisions are forwarded to Provincial Land Control Board.

Disputes arise when people consider these 'checks' as time consuming or intentionally avoid them and later some people who had sold their land still claim ownership of the land. The courts of law have ruled that transfers without the permission of Land Control Board have no effect in the eyes of the law, notwithstanding the situation, where there was a written agreement between both parties to the effect.

(iii) Disputes arising from adverse possession

If a person enters a piece of land and stays on it, the registered owner can have him ejected as a trespasser. However if he takes too long to file a case for his ejection, his rights and action will be limited by time. A registered owner will lose his land if he allows an adverse possessor to use the land for twelve continuous years, once the adverse possessor is able to prove that he entered the land adversely (i.e without legal title); the registered owner was aware of it; his stay was peaceful and uninterrupted, and moreso continuous for twelve years upon entry on the land.

(iv) Disputes related to succession

Family members sometimes make conflicting claims about how much land they are entitled to, upon demise of an owner of land intestate (i.e without making a will). Disputes arise because the entitlement claims (within heirs, or rightful heirs and other people) are conflicting and must be resolved by the court.

(v) Disputes between private persons and the state

Other types of disputes can arise between private persons and the state. The Government can compulsorily acquire someone's land if the said land is needed for use by public body or for public purposes eg. construction of buildings, roads, hospitals or army barracks. Where land is acquired for public benefit, full compensation must be paid promptly to all the parties interested in the land.

Disputes normally arise with due regard to the purpose for which the land was acquired and this is related to the compensation payable to the person whose land is acquired. Issues that could lead to dispute between the government and the individual are

- (i) Promptness of compensation.
- (ii) The amount of compensation.

(i) Promptness: Persons who have lost their land through compulsory acquisition must be compensated in good time to enable them make arrangements that have been necessitated by the dispute.

(ii) Amount of compensation: This is determined by the Market value⁵ of the land. Other factors are however taken into account and these include

- (i) Damage sustained by a person whose land is acquired and where such land is severed from his other lands.
- (ii) The damage sustained or likely to be sustained by a person whose land is acquired if acquisition results in injuring his other property.
- (iii) The expenses incurred by a person where land is acquired if acquisition causes him to change residence or place of business.
- (iv) The damage that occurs as a result of publication in the gazette of the intention to acquire the land if the notice reduces the profits from the land and from the time of its publication to the time of its acquisition.

Any appeals are forwarded to the high court.

2.5 Concluding Remarks

Kenya operates under a dual system of land tenure i.e Traditional Land Tenure based on the customary law and the more Modern but still incomplete registration of titles.

The merits and demerits of these different tenure systems have been outlined. It is apparent that neither of the two systems is complete in itself in view of the different limitations associated with each system. The fact that customary law still applies even after land has been registered implies that the interface between title registration and the indigenous system of land tenure is quite limited. The Registration of title has failed to translate all the bundle of rights under customary tenure into a language of leases, licenses etc.

⁵ Market value has been defined as the price a willing seller might be expected to obtain from a willing buyer.

CHAPTER THREE

3. RURAL LAND REGISTRATION IN KENYA

3.1 Background

This chapter gives an overview of the procedures involved in the adjudication, surveying and registration processes.

The adjudication process has been discussed together with institutions that are directly related to the process. The surveying process has given an overview of the factors that are considered in photogrammetric flight planning before the aerial photographs are produced. This has been followed by a simplified process that may be encountered in the preparation of the Preliminary Index Diagrams (PIDs).

The registration process has outlined the different processes that are involved in the transfer of land, in addition to briefly outlining how subdivision of land has been carried out.

3.2 Land Adjudication

3.2.1 Land adjudication process

The following are the steps as may be encountered in land adjudication process

- (a) The Land Adjudication and Settlement Officer (DLASO) declares an area an adjudication section by publishing a public notice defining the boundaries of the area (using physical features) and stating the interests in land will be ascertained and recorded under the provisions of the Land Adjudication Act (L.A.A) [Cap 284].

The consolidation procedure is still being applied in Taita/Taveta, Meru and Baringo districts in Kenya where work was originally started under the provisions of Land Consolidation Act [Cap 293].

- (b) The Land Adjudication Officer requests the Survey of Kenya to provide photo-enlargements which cover the registration section. The Survey of Kenya plans the coverage by determining the number of sheets covering the area and produces relevant photo enlargements.
- (c) The Land Adjudication Officer with assistants from Survey of Kenya's adjudication section (and adjudication committee) identifies boundaries and these boundaries are transferred to the photo-enlargements. During this time, any interested parties in land, forward their claims to the recording officer. The Land Adjudication Officer files a public notice barring any person from instituting and any court from entertaining proceedings (unless with prior consent in writing of the Adjudication Officer) concerning an interest in land within the adjudication section; until the adjudication register¹ for that adjudication section has been finalised in all respects under section 29 (3) of the Land Adjudication Act [Cap 284].

¹ The adjudication register is a record of people as owners of specific pieces of land in an adjudication area.

In certain circumstances the Adjudication Officer may consider it reasonable that the court case shall be continued, or instituted, notwithstanding the provision of section 30 of the Land Adjudication Act. If consent is refused, an aggrieved person may within 28 days after refusal appeal to the Minister, in-charge of lands, whose decision is final.

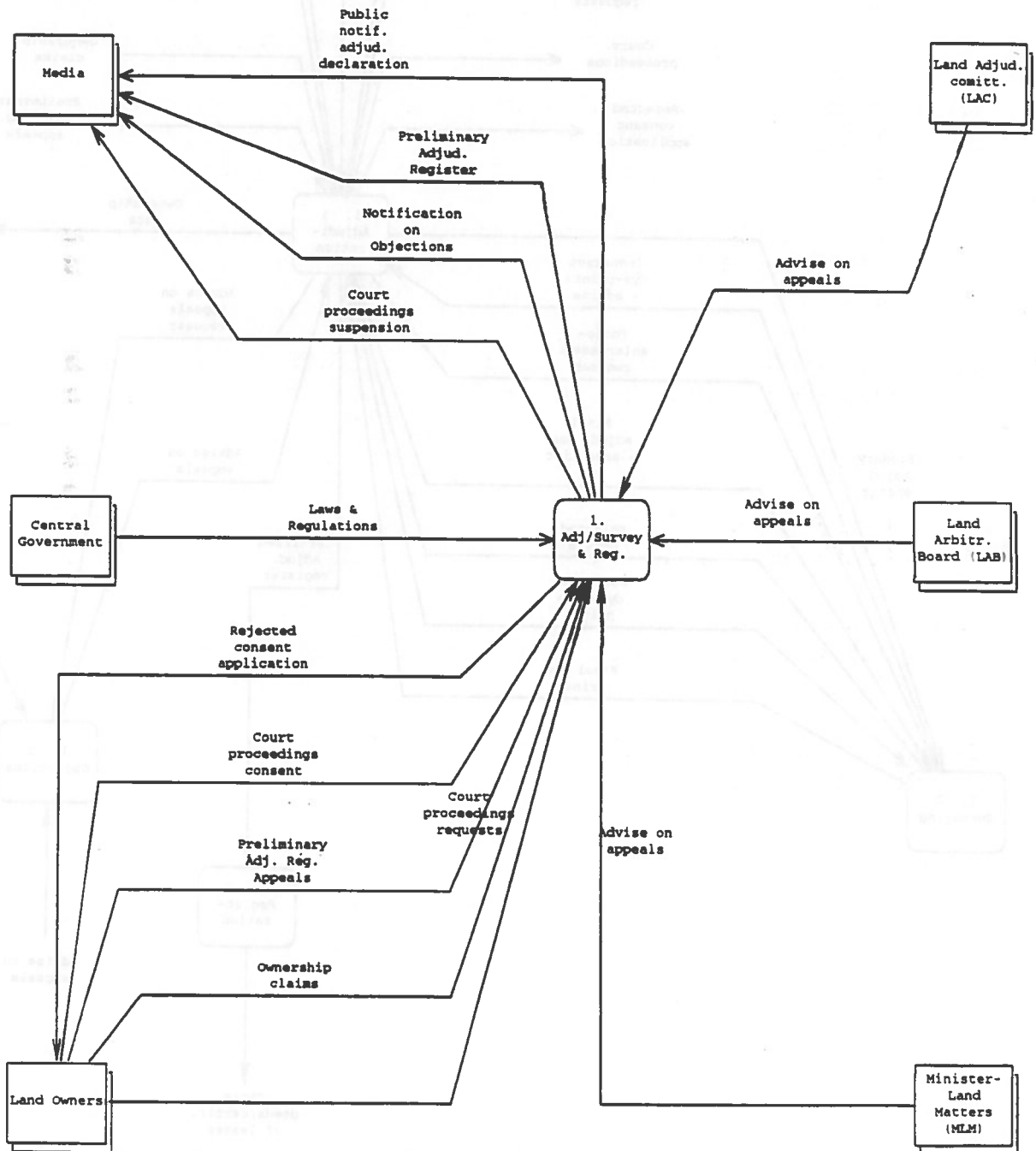
- (d) When the exercise is complete and there are no objections, then the first stage of adjudication is completed. The photographs are sent to the district survey office for random checking (eg. to ensure parcel numbers are not duplicated, polygons are complete, etc) for onward transmission to the Main Office (Headquarters)
- (e) The photographs are checked for documentation (eg. numbering, omissions and duplications). Once the photographs are found to be Okay they are used for preparation of Preliminary Index Diagrams (PID) or Registry Index Maps (RIM).
- (f) In case the mistakes are identified on the dyeline prints, copies are sent to the Land Adjudication Officer for corrections and verifications plus covering letter explaining the same.
- (g) Once verified, Dye line prints are prepared for all RIM/PIDs covering the area and these are forwarded to the Director-Land Adjudication and Settlement (DLAS).
- (h) The Director- Land Adjudication and Settlement (DLAS) checks them for consistency, completeness and correctness. Once satisfied the documents are forwarded to the Chief Land Registrar (CLR) for registration who then forwards them to the relevant District Land Registrar (DLR) for registration and issuance of title deeds.
- (i) In case of mistakes, they are referred back to the Survey of Kenya (Main Office) which may liaise with the district office (District Surveyor) if unable to solve the problem.

NB. Ground methods (plane table and chain surveying) are used in some areas where the parcels are too small.

These procedures, processes and data flows are reflected in the context and top level diagrams shown below. Figure 3.1 below shows the different parties served by the adjudication/surveying and registration processes.

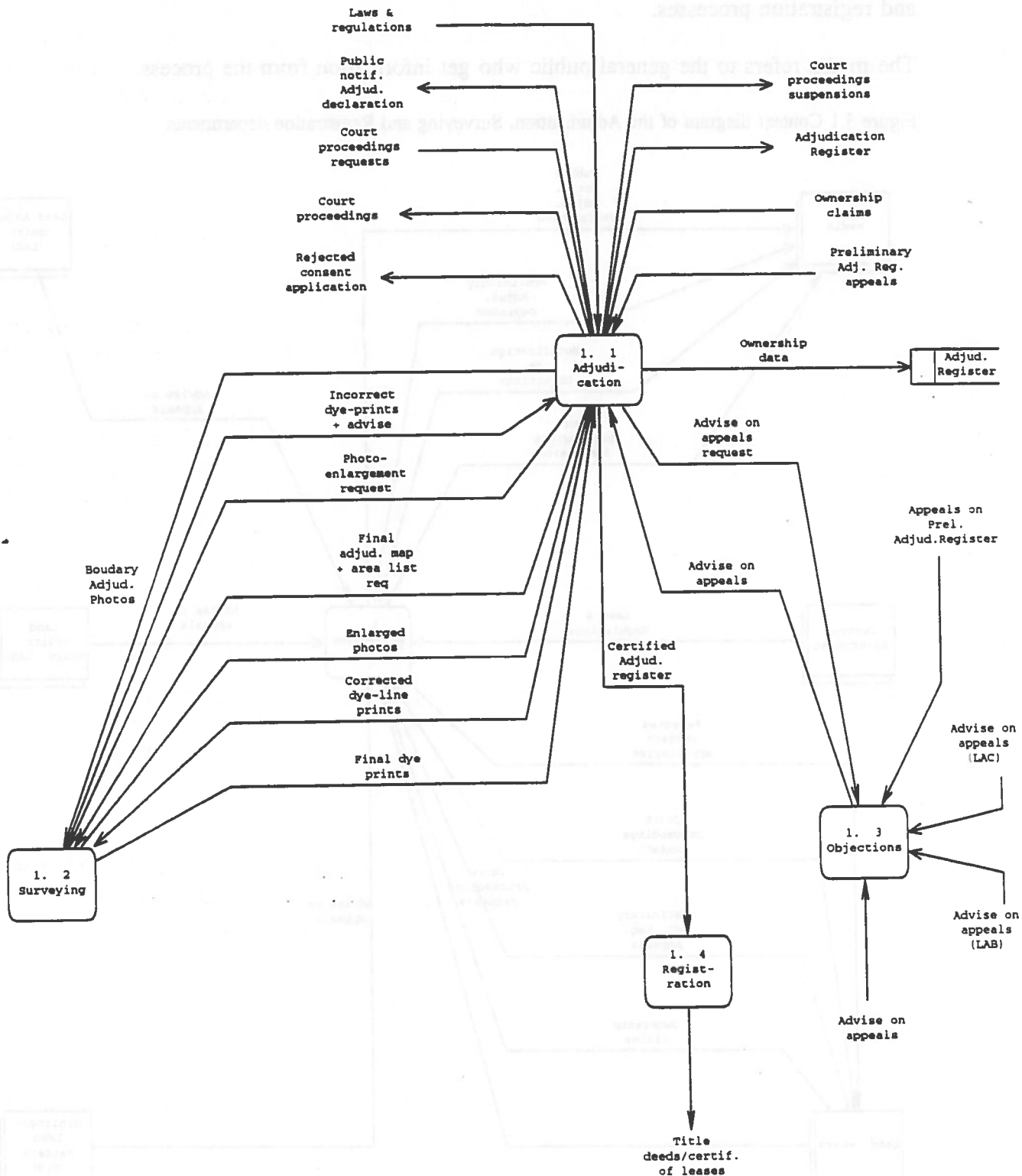
The media refers to the general public who get information from the process.

Figure 3.1 Context diagram of the Adjudication, Surveying and Registration departments



Source: Author 1995

Figure 3.2 Top level diagram of the Adjudication, Surveying and Registration departments



Source: Author 1995

3.2.2 Adjudication Tribunals

(a) Land Adjudication Committee (LAC)

In a declared land adjudication section, land owners have to elect at least ten elders within the adjudication section to be members of the Land Adjudication Committee². In turn the committee elects chairman and the vice. For legal purposes the committee must be appointed in writing by the Land Adjudication and Settlement Officer under section 6 (1) of the Land Adjudication Act [L.A.A].

The committee forms the first adjudication tribunal in the area, charged with the duty of hearing and deciding upon land disputes brought before it during the demarcation process.

(b) Land Arbitration Board (LAB)

The Land Arbitration Board is the second level adjudication tribunal that takes care of any party that is dissatisfied with the decision of the LAC. The dissatisfied parties appeal to this LAB.

The LAB is composed of 25 members who come from the particular district and are appointed by the Provisional Commissioner. From the 25 members, the Land Adjudication and Settlement Officer (DLASO) appoints not less than five members to hear and determine any appeals filed by the parties aggrieved by the decision of the Land Adjudication Committee (LAC) or any matter that is referred to the Arbitration Board by the committee under section 21 (1) of the Land Adjudication Act. Any person who considers the adjudication register incomplete or incorrect in any respect (affecting him) may object within sixty days (60) after it has been notified that the register is completed.

(c) Land Adjudication Officer

The Land Adjudication Officer is empowered in his capacity to act as a judge. The Land Adjudication Officer is appointed by Public notice in the **Kenya Gazette** and he appoints in writing the demarcation officer, Survey Officer and Recording Officer for demarcating, surveying and recording interests within an adjudication section.

(d) Minister for Land Matters

Parties aggrieved by the decision of the Land adjudication and Settlement Officer have the right to appeal to the minister responsible for lands. The Minister for lands is the fourth and final³ adjudication tribunal. In order to speed up the process, the Minister has appointed, by

² The Land Adjudication Committee must be composed of people of integrity. In cases where there are complaints of committees that are biased, then a baraza (public meeting) is called and the committee re-elected.

³ The Minister is the final tribunal under the Land Adjudication Act. However under the Land Consolidation Act, the decision of the Land Adjudication Officer is final; Any further appeals are referred to the court of law.

a notice in the **Kenya Gazette** all the sitting District Commissioners⁴ to hear and determine land appeal cases in their respective districts.

3.2.3 Adjudication Register and Objections

(a) Publication of Adjudication Register

- (i) This is done when all the processes of demarcation, recording and surveying have been completed and all the cases before the adjudication committee and arbitration board have been heard and decided. A copy of adjudication register is sent to the Director- Land Adjudication and settlement (DLAS) by the District Land Adjudication and Settlement Officer (DLASO). The original adjudication register is displayed for inspection at a convenient place within the adjudication section.
- (ii) The Land Adjudication and Settlement Officer also gives notice that the adjudication register has been completed and may be inspected at a given place for a period of sixty-days (60) from the date of notice.

(a) Filing and hearing of objections

Any person who feels that the register is incorrect or incomplete in any respect may lodge his written objection to the District Land and Adjudication and Settlement Officer (DLASO) during the sixty day notice. The objections are determined by (DLASO)

3.2.4 Adjudication Register submission to DLAS

- (a) Once objections have been heard and determined and decisions thereon implemented, both on the ground and on the original adjudication register, the maps are sent to the Director of Surveys (DOS) for printing and computation of acreage.
- (b) After publication of maps, the original adjudication register together with particulars of all objection decisions are forwarded by the District Land Adjudication and Settlement Officer (DLASO) to the Director- Land Adjudication and settlement (DLAS).
- (c) The Director- Land Adjudication and Settlement (DLAS) alters the copy he received to bring it in line with the original and certifies on both that the register had become final, subject to outstanding appeals to the minister.

3.2.5 Adjudication Register submission to the CLR

The DLAS then sends the certified original register to the Chief Land Registrar for registration. Based on this register, the Chief Land Registrar prepares registers of titles under the Registered Land Act [Cap 300].

⁴ Because District Commissioners (DCs) are very busy the minister may appoint special district commissioners. These are administrative officers who were DCs or PCs and are currently serving in the main office as under secretaries, deputy secretaries and assistant secretaries.

The registration vest in the proprietor the absolute ownership of parcels of land registered in their names. After registration has been effected, Customary law ceases to apply to land in registered areas.

3.3 Surveying

Before considering the processes carried out in the office, an overview of what is entailed in the field during the photography has been done in terms of the considerations that would practically be encountered.

3.3.1 Photogrammetric Project planning

The photogrammetric project involving acquisition of aerial photographs involves three phases

- (1) Development of a flight plan which must be followed when taking aerial photographs to be used in the project.
- (2) Planning the ground control and executing the necessary field surveys to satisfy accuracy requirements of the project.
- (3) Estimating the costs.

The important factors to be taken into consideration when planning a photo flight are

- The purpose of the photography (camera type, overlap)
- Photographic scale
- Allowable scale variation
- Relief displacement
- Photographic tilt
- Crab and drift
- Flying height
- Direction of orientation of photography

[Moffit, 1980]

Purpose of photography: This determines the direction at which the flight line should be taken. The nature of topography should also be taken into consideration in terms of overlap. If the terrain is fairly rugged higher overlap would be required than for normal terrain in order to minimise the effects of relief displacement. For instance, photogrammetric triangulation will be governed by topographic mapping considerations.

Photographic scale: Photographic scale for general interpretation will be different than for topographic maps, since the latter depends on the type of stereo-plotter to be used and on the level of details whilst the former is specified by the user.

Allowable scale variation: The scale variation between photographs is caused by ground elevation. This is critical in low altitude photographs and may cause gaps within flight strips. In the case of shorter distance between the flight strips this can be taken care of by the viewfinder of the camera.

Relief displacement: This affects the construction of the mosaics. Large relief displacements may make it difficult or impossible to form a continuous uninterrupted picture.

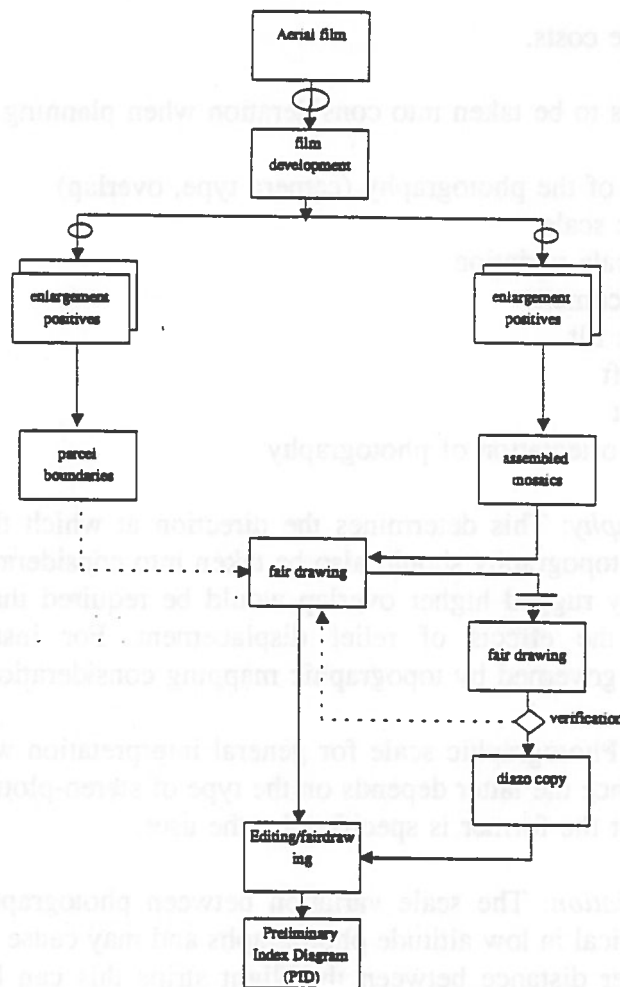
Tilt on photographs: They y-tilt causes overlap to increase or decrease whilst the x-tilt will cause sidelap to increase or decrease.

Crab and Drift: Crab designates the angle between the flight line and the edge of the photograph in the direction of flight. The effect of crab is to reduce the effective width of the coverage. Drift is caused by the failure of the aircraft to stay on the predetermined flight line. For instance an aircraft may drift 200 feet to one side and 200 feet to the other.

Flying height: The selection of the flying height is dependent on interrelated factors eg. desired scale, relief displacement, tilt and camera type. Other factors are the limitations of the photogrammetric equipment used to compile topographic maps from aerial photography, etc.

3.3.2 Production of Preliminary Index Diagrams (PIDs)

Figure 3.3 showing simplified process involved in the preparation of PIDs in Kenya



Source: author fieldwork dec 1994 -feb 1995, Symbology adopted after Van de Steen (ITC)

The office operations involved in the processing of the photography to produce Preliminary Index Diagram are shown [Figure 3.3]. It was not possible to obtain data on the different processes involved in the production of the Preliminary Index Diagram because of the time constraint and what is shown in the Figure is a simplified simulated process that may be involved the production of the same.

3.4 Registration Process

3.4.1 Transfer of land

The following procedure is encountered in the transfer of land once it has been registered (titled).

- (1) The legal owner collects his title deed or search certificate confirming that he is the owner of the piece of land, in the case where he has not yet done so.
- (2) The owner applies to the respective Land Control Board for consent to transfer his land [cf. formI appendix C1).
- (3) The Land Control Board, which sits once a month to consider applications, is composed of 12 members of whom the following parties must be present.
 - The District commissioner as the chairman (District Officer acts on his behalf).
 - The Agricultural officer (representing the agricultural department).
 - Land Adjudication officer (representing the Adjudication and Settlement Department).
 - Local authorities nominated councillor to represent the local authority.
 - Other members from various locations in that division who are conversant with the information on the particular piece of land in terms of ownership and any objections or appeals.
- (4) If the Board is satisfied with the application it issues a letter of consent to transfer land. Otherwise if the consent is refused by the Board, a letter rejecting the consent is given by the Land Control Board. At this stage, the applicants are given 30 days to appeal to the Provincial Land control Board (whose chairman is the Provincial Commissioner for that region). The parties under the Provincial Commissioner's office are
 - Provincial Land Adjudication Board (whose chairman is the provincial commissioner for that region).
 - The Provincial Land Adjudication officer.

-The Provincial Land Agricultural officer.

-Nominees from the districts

NB. Should the appeal be rejected at this stage then it is referred to the court of law. Otherwise if the appeal is not rejected a letter is issued to that effect.

- (5) After issuance of the letter of consent, the transacting parties apply to the District Land Registry to have the transfer documents prepared. These documents can be prepared by either the District Land Registrar or by lawyers (notary) at their office. Form RLI [appendix C2], is used in this case.
- (6) The documents are presented to the Land Registry department for payment of necessary fees which include
 - Stamp duty charged @ 4% of the purchase for urban land and @ 2% of the price for agricultural land.
 - Registration fees @ Kshs 250/- if property value > kshs 20,000/- and Kshs 125/- if the property value is < kshs 20,000/-.
 - Title deed fees Kshs 125/- at a flat rate, irrespective of the property value.
- (7) After payment of the fees, the documents are officially accepted and booked in a book called the *Presentation Book* which include the following details,
 - Number (index number).
 - Nature of document.
 - Person from whom right is transferred or transmitted.
 - Person to whom right is being transferred.
 - Amount paid.
 - Description of the property (Title number and location).
- (8) Reference is made to the *Green Card* which contains current information on ownership status. In case a caution had been put on the register against transfer of ownership, the transfer documents are rejected with reasons. Caution may result from loans eg. financing by bank. The owner must resolve the problem with the cautioner. Meanwhile, the register is flagged (marked with a tag) indicating that the owner has been referred.
 - If the owner does not agree with the cautioner, the transfer cannot be effected and the matter is referred to the court of law.
 - If the owner agrees with the cautioner, then the transfer is effected; otherwise if there is still disagreement the matter is referred to the court of Appeal. At this stage the decision of the court of Appeal is final.

NB. The District Land Registrar has powers of summoning the dis-agreeing parties before they seek redress in court and try and make them agree.

- (9) The document is registered under the new name of the new buyer.
- (10) The Title Deed documents are issued to the buyer.

3.4.2 Subdivision of land

- (1) The owner of land applies to the land control board for consent to have his land subdivided. The board which sits once a month is composed of twelve members as explained in § 3.4.1 (3).
- (2) Once the application has been approved, the applicant pays to the Survey office the necessary fee. The survey fees are normally standardised and are charged at the rate of Kshs 2000 \sqrt{H} , where H is the area in Hectares⁵. Alternatively the applicant can engage a private surveyor to do the survey.
- (3) Once a survey (referred to a mutation survey) has been carried out, new numbers are allocated for the plot. If the applicant had used a private surveyor, then the mutation forms must be handed to the relevant survey office for numbering of the plots.
- (4) The owner pays registration fees for the new numbers.
- (5) New title deeds are issued for the new numbers.

3.5 Concluding remarks

The chapter has attempted to give an overview of the process involved in the Adjudication, Surveying and Registration in Kenya since this are the core processes involved in converting land from Customary Land Tenure to Statutory Land Tenure.

It was not possible to obtain data directly on surveying process, and hence the presented overview has been based more on what would be expected from a Survey Department. The process presented for the preparation of the PIDs is quite simplified.

Some focus on the maintenance of the register in terms of transfer of land and subdivision have been highlighted.

⁵ 1 Hectare = 10,000m².

CHAPTER FOUR

4. LAND REGISTRATION FROM AN ECONOMIC PERSPECTIVE

"The notion that tenure reform is the panacea for Africa's agrarian ills is an old idea that ignores critical social dynamics that strongly influence how productive resources are acquired, utilized, contested or mobilized. The tendency of colonial apologists to project their own (European) models and concepts of land tenure on African societies has hindered our understanding of development and change in this area...Ethnocentric and ideological biases and their attendant political agendas distort much of the literature"

Bassett, 1993.

4.1 Introduction

Outlined in this chapter is the different literature on pro-titling and contra-titling of rural land. In particular, Feder's [1988] arguments for land titling have been briefly reviewed followed by the different approaches to test the model. The review of different literature on rural land titling is quite intriguing and raises doubts as to whether titling of rural land is the panacea for increased agricultural productivity development.

The research hypothesis and methodology to be adopted has been briefly outlined together with study area.

4.2 Feder's Model

Feder [1988] postulated that increased agricultural technologies to cope up with increasing population requires investment of both capital and effort, where investment would greatly be discouraged by lack of ownership security. He added that reduced investment incentive would result in lower capital accumulation since current consumption would be preferred. Lower capital accumulation would result in reduction in demand for variable inputs which are complementary to capital accumulation and hence a reduction in output per unit of land.

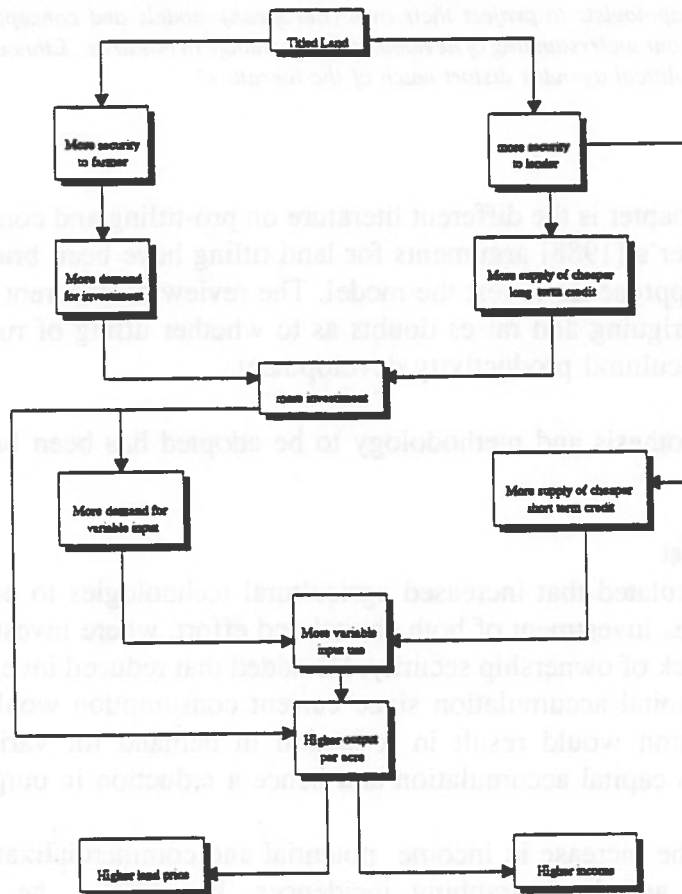
Feder attributed the increase in income potential and commercialization of land to increase in land disputes and land grabbing incidences. In addition, he linked increased land transactions (eg. sales & rentals), in which ownership and entitlement to transfer rights are essential prerequisites to increased development. Feder [1988] conceded that absence of certainty over ownership of land is a critical factor when closely unrelated parties have to transact in land. He regarded any attempts to resolve these uncertainties to increase the scope and price of land transactions. Based on these arguments, Feder asserted that such security is only guaranteed when it is backed not only by the custom, but by a state enforced legal system.

With respect to formalized credit markets, Feder [1988] highlighted the lack of detailed information about the borrower as a limiting factor in the administration and implementation of credit programs and he envisaged that a secure title was the only easier way to access credit. In his model he considered informalized credit markets and although these markets did not prejudice farmers with insecure titles, he typified the credit as expensive and confined mostly to short term loans of relatively small magnitude. The ramifications of these would result in lower investment and inputs use for farmers with insecure title.

Based on these arguments, he presumed title and tenure insecurity to cause lower farmer

productivity because of reduced investment incentives and limited credit. Feder [1987] hypothesized the market value¹ of insecurely owned land to be less than that for an identical tract that is securely held [Figure 4.1].

Figure 4.1 showing Ownership security and farm productivity



Source: Feder et al [1987]

4.3 Approaches to test Feder’s model.

Different approaches can be used to test the model. However such approaches must consider farmers operating in geographic proximity within similar agro-climatic environment. Further, ensuring the same terrain and infrastructural facilities is a prerequisite, as much as is random sampling , to eliminate and minimize biasness.

Farmer characteristics need to be considered and incorporated in the model.

The model may be tested by comparing titled versus untitled land by looking at

- Capital stock per unit of land owned.

¹ The value of land reflects the stream of net incomes which it generates over a long horizon.

- Probability of improving land by bunding.
- Probability of improving land by stump clearing.
- Labour days per unit of cropped land.
- Draft power expense per unit of cropped land.
- Other input expenses per unit of cropped land.
- Value of agricultural output per unit of cropped land.
- Revenue from agricultural and non-agricultural activities.
- Value of land.

[Feder, 1987]

4.4 Literature review

Global studies

Studies have been carried out focusing on the economic implications of registering and subsequently titling land.

Feder's [1987] Cost/benefit analysis on titling in Thailand demonstrated that titling guarantees high returns expressed in land prices 'with-title' compared with 'without title'. The survey methodology was based on selecting farmers operating in geographic proximity within a similar agro-climatic environment, similar terms and infrastructural facilities. Random sampling techniques on villages and econometric empirical analysis employing regression and dichotomous choice models was used.

A Msc study carried out in Thailand on land titling [Sakdikul, 1994] offers evidence on the contrary Feder's findings. Henssen [1990], however, points out that Land Registration² is not "*a magical specific which will automatically produce good land use and development*".

Studies carried out in Peru, De-Soto [1994] indicate that investment in property increased nine-fold when squatters obtained formalized titles to their homes. Similar studies in Costa-Rica indicate that titled farmers have much higher income than those without.

Studies on Africa and Kenya are subjects of the ensuing sections.

Studies in Africa

Bassett and Crummey's [1993] study encompassed a number of authors perspectives on the

² Land Registration does not in itself automatically change Customary Land Tenure. The Land-Law changes the land tenure if necessary. But this change sometimes occurs with the Land Registration process.

issue regarding indigenous tenure systems *vis-a-vis* agricultural development [Bruce, 1993; Ogendo, 1993].

Bruce [1993] in his paper examined tenure change in terms of impact on agricultural development and resource use. Bruce acknowledges tenure reformers concern in terms of investment security, efficient resource allocation, credit access and land transfers. Apart from noting that in only a few cases they do pose serious problems to African farmers today, he points out that titles appear to have little impact on production, except for larger holders who have other assets and advantages that in conjunction with title increase their access to credit and other investment opportunities.

Okoth-Ogendo [1993] in his essay looked at land registration programs being pursued in sub-Saharan Africa. He has looked at agrarian reforms in sub-Saharan Africa and implications for agricultural development. He concedes that it is necessary to reassess the productive alternatives under which agrarian structures and conditions operate rather than tenure changes per se.

Bassett and Crummey [1993] on the basis of views and studies from many more authors [eg. Holstein, 1989] suggest that land reform only is not an essential prerequisite to investment in land, productivity or otherwise.

A Study by Place and Hazell [1993] in Kenya, Rwanda and Ghana focussed on land rights with respect to Rwanda and Ghana, for untitled areas *vis-a-vis* titled areas in Kenya. Their approach encompassing cross tabulations, statistical and regression analysis techniques looked at the relationship between land rights and incidence of land improvements/credit and agricultural productivity amongst others. They conclude that all types of land tenure are not equally restrictive and suggest that there are more binding constraints on agricultural productivity (eg. lack of improved technologies or inadequate access to credit).

Luning [1984], in his paper on agrarian reform seemed to support these arguments. Elsewhere in another paper [1995], he again points out that titling per se is unlikely to improve resource management.

A World Bank report [1992] also indicates that titling is unlikely to improve resource management unless external forces come into play (eg. weakening of indigenous systems by civil war or resettlement)

Elsewhere, Atwood [1990] and Migot-Adholla et al [1991] find little or no impact of titling on investment.

Studies in Kenya

The 'state-facilitated' individualization of tenure was geared towards agricultural development. As noted in Swynnerton plan³ [1954] which was drawn to facilitate the transition from

³ The Swynnerton plan of 1954 had in its objectives to intensify African agriculture.

indigenous to individualized tenure, Swynnerton, the author, recommended that

"the african farmer... be provided with such security of tenure through an indefeasible title as will encourage him to invest his labour and profits into the development of his farm and as will enable him to offer him it as security against financial credits".

However, studies⁴ carried out in Kenya dispute that consolidation and registration of land are essential prerequisites for agricultural development [Haugerud, 1984;- elsewhere 1989]. Haugerud's [1984,1989] studies were based in central Kenya's, Meru and Embu districts. Her study indicates that Kenya Meru which had 10% of its land registered by mid-1959 had highest monetary income which she attributed to lesser degree of political disruption during 1950s emergency and to its head start in coffee cultivation in the colonial period. She however notes that land privatization, litigation and erosion of customary rights were present in Kenya before the official privatization occurred, which tendencies she attributed to rising population densities, commercialization of agriculture and growing opportunities for wealth accumulation by colonial chiefs and other notables. In her conclusion she notes that tenure security has not institutionalized exclusive private control of land. Her study postulates that the Kenya state has overplayed the value of individual freehold tenure of title registration for agricultural development.

Elsewhere, Okoth-Ogendo [1976], in his paper points out that "Individualization of tenure *per se* seldom leads to a 'revolution' in agriculture".

Other authors [Lawrence, 1984; Gershenberg, 1971] point out that complementary factors⁵ must be taken into consideration in order to realize agricultural productivity. Many more studies have been carried out in Kenya which indicate little correlation between agricultural development and titling of land [Bakema, 1994; English, Tiffen and Mortimore, 1994]. According to [English, Tiffen and Mortimore, 1994] the statement is qualified only in instances where rights of ownership to settle on specific areas is in dispute.

Barrows and Roth [1990]'s studies based on empirical evidence from other scholars concludes that land registration has had very little effect on investment demand.

Pinkney and Kimuyu [1994] find little impact of titling on investment or credit markets.

These studies and many more studies seem to contradict the expectations that are

⁴ In an unpublished study Mbwika [1991], found a relationship between land titling and percentage of land planted in permanent crops in a cross-sectional regression using aerial survey data from western Kenya. The areas in which the land titling had been completed, tended to be the high-potential zones. It was not clear that Mbwika successfully controlled for the agro-ecological zones in the regressions.

⁵ Complementary Factors referred to in this case are increased research and extension services, improved domestic terms of trade for agriculture via marketing boards, pricing policies, alternative employment opportunities.

characterized with titling of land.

4.5 Research hypotheses and methodology

Recall (§ 1.2) that the two main hypotheses to be tested are:

- Registration of land increases the price of land.
- Registration of land results in additional investment on land.

The research methods entailed the following

- Review on the relevant literature on titling followed by a fieldwork on a selected site encompassing 'with-title' and 'without-title'⁶ and within fixed agro-ecological constraints.
- The post-fieldwork phase involved analysis of data using graphs and various statistical tools (§ 5.4).

4.6 Research area

(i) Location of the study area

Machakos district is an administrative unit of the Eastern province of Kenya. It is inhabited by the Akamba people [Figure 4.2].

The district lies in the south east of Kenya between Nairobi, the capital, and Mombasa, the seaport. In the district are hills on the eastern edge of the Athi plains (elevation 1600m) which rise to 1800m. The district generally slopes to the south east.

The district comprises seven locations namely, Kathiani; Central, Kangundo; Mwala; Yatta; Masinga and Matuu [Appendix B1].

The fieldwork was concentrated in the Matuu location which had two sub-locations namely; Matuu (Titled section) and Kithimani (untitled section) [Appendix B1]. The location lies between the longitudes 37° 15'E and 37° 45'E and latitudes 0° 45'S and 1° 15'S approximately.

The divisional offices are located in Kithimani which is a much older township than Matuu. However, Matuu township appears generally more developed in terms of infrastructure.

The Matuu township is approximately 110 Km. from Nairobi, the capital.

⁶ 'With-title' and 'without title' refer the areas that have been titled by the government, irrespective of whether the farmer has collected his title documents.

Figure 4.2 Map of Kenya showing the location of the former Machakos⁷ District in Kenya



Source: Kajiado District Atlas (1990)

⁷ The District has since been subdivided with its southern part forming the new Makueni District and the northern part the current Machakos District.

The selection of the study area was based on the following criteria:

- ◆ Matuu location provided a 'laboratory' situation i.e with-title and without-title situations and hence an ideal situation in which the study was to be conducted.
- ◆ The location is situated in a more or less same agro-ecological zone which was quite appropriate for the study. The same applied to hydrological characteristics. Subsequently, the need for differential corrections for variabilities in soil characteristics were eliminated.
- ◆ Reasonable accessibility within most of the terrain and besides it was not far from Nairobi.
- ◆ It was possible to communicate in the informants local language and this facilitated maximum cooperation from the informants.

(ii) Hydrology

The Yatta furrow which draws its waters from Athi river is the only permanent source of water. The Kawituuo river is semi-permanent but there are many temporary streams which discharge after rainstorms [appendix B1].

There is an ongoing project to provide people & livestock with clean drinking water. The landscape in the area is gently undulating with slopes < 10%.

(iii) Agro-Ecological Zones

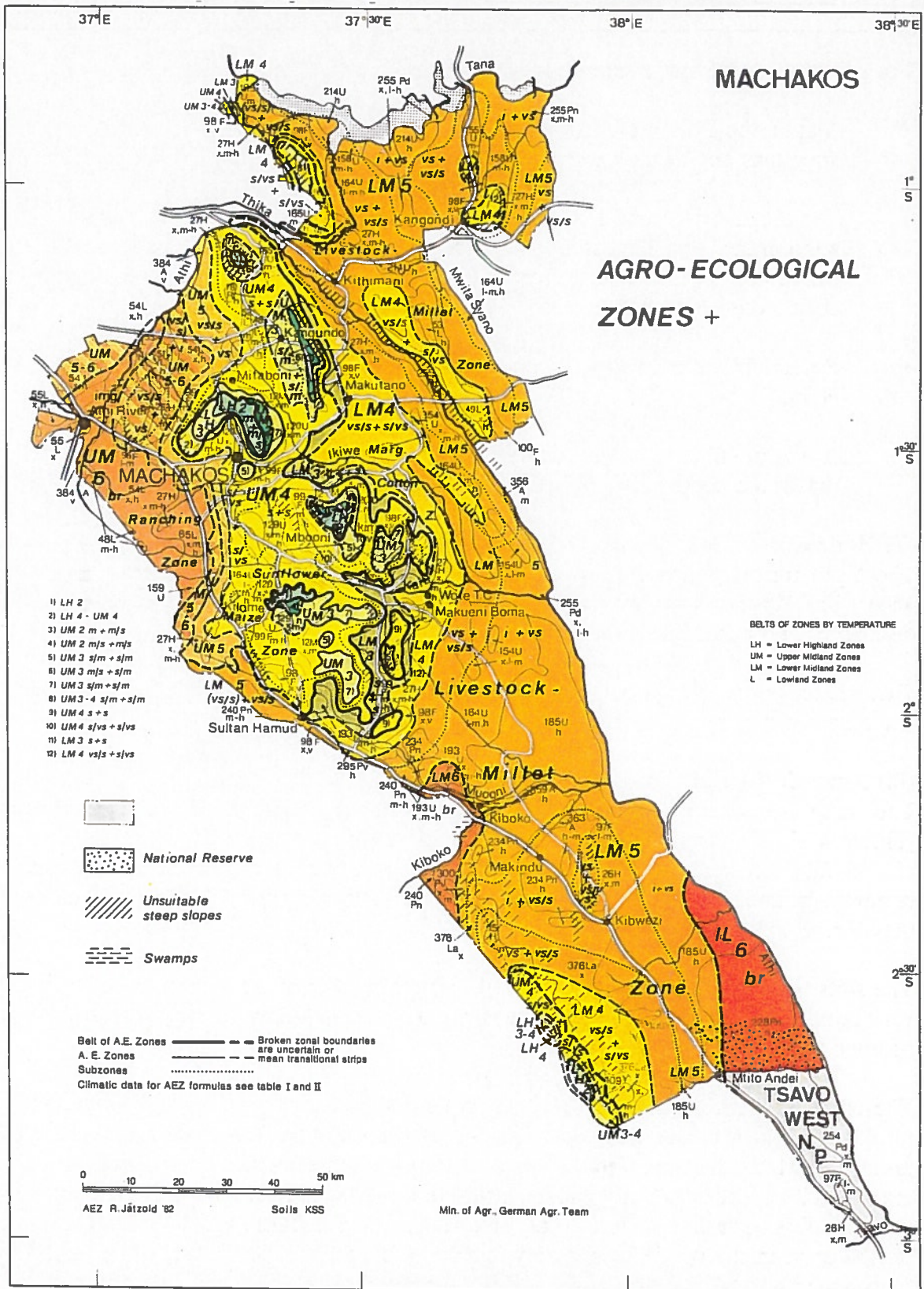
The study area was in the Lower Midland area agro-ecological zone based on temperature [Figure 4.3]. The farming activities likely to thrive well are livestock and millet [Jaetzold et al., 1982]. The zone provides a fairly good yield potential for cowpeas, greengram and bambura groundnuts (specifically on light soils) during the first rain. The perennial crops which may thrive with fair yield are castor and 'jojoba'.

The soils were well drained with low soil fertility in most of the places, moderately deep to very deep, dark reddish brown, friable to firm sandy clay to clay; in many places with top soil of loam sand to sandy loam [Figure 4.4].

The area experiences between 150-250mm rainfall in the first rains (April-May) and same range of rains in the second rains (Nov-Dec) [Figure 4.5]. However, the average annual rainfall in Matuu location lied between 700mm - 800mm distributed bi-modally. The rains are normally concentrated in two seasons, March to May and October to December. Besides, the rainfall is not reliable. While a rainfall year is defined from September to August, in one season or year, the whole season may receive a few times the average, while the following season/year hardly any rain falls. In addition rainfall distributions may be erratic during the rainy seasons, for instance, heavy runoff followed by a dry spell of one or two weeks.

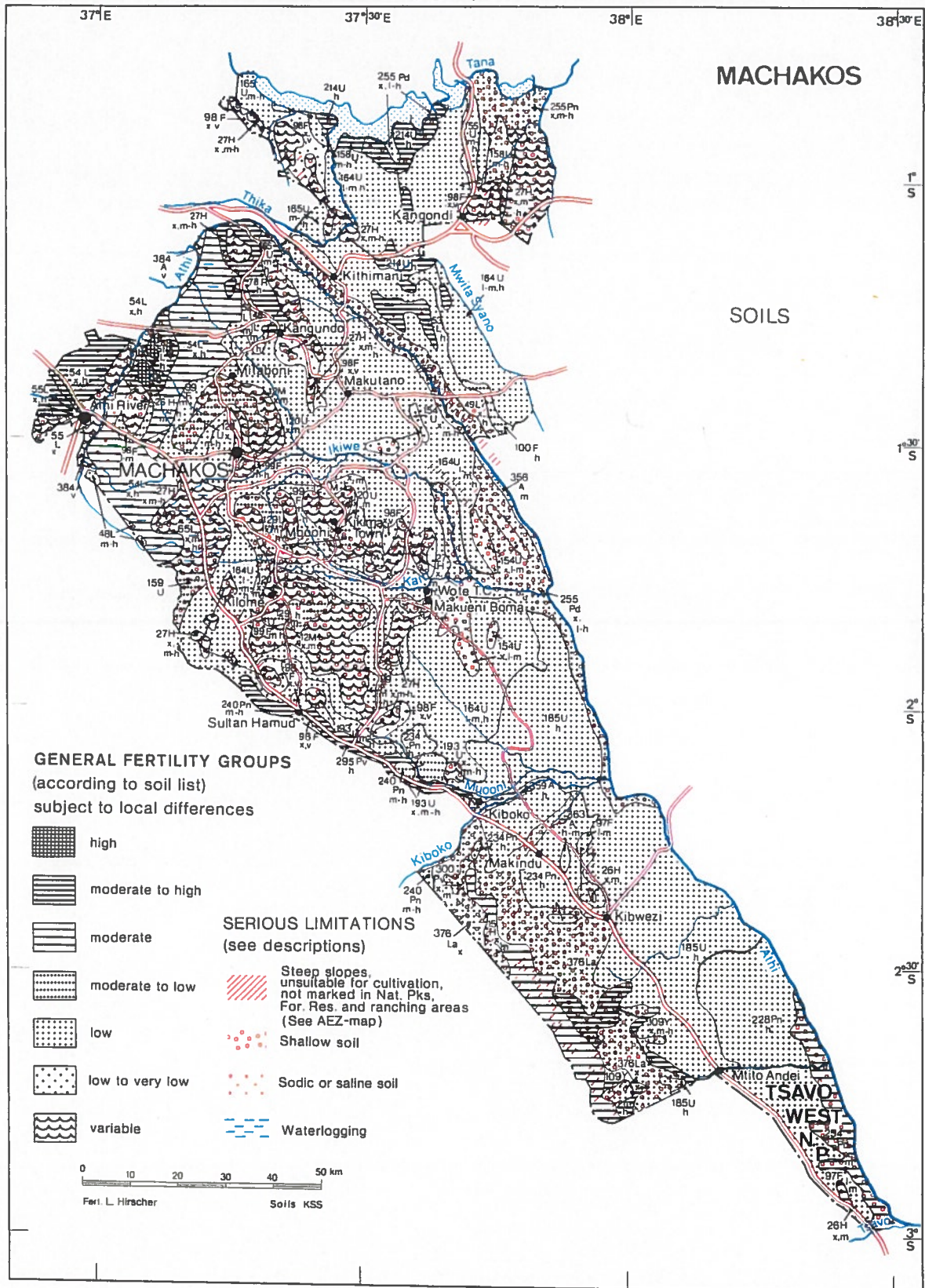
The annual mean temperature varies from 21.6°C to 24°C.

Figure 4.3 Agro-ecological zones for the former Machakos district



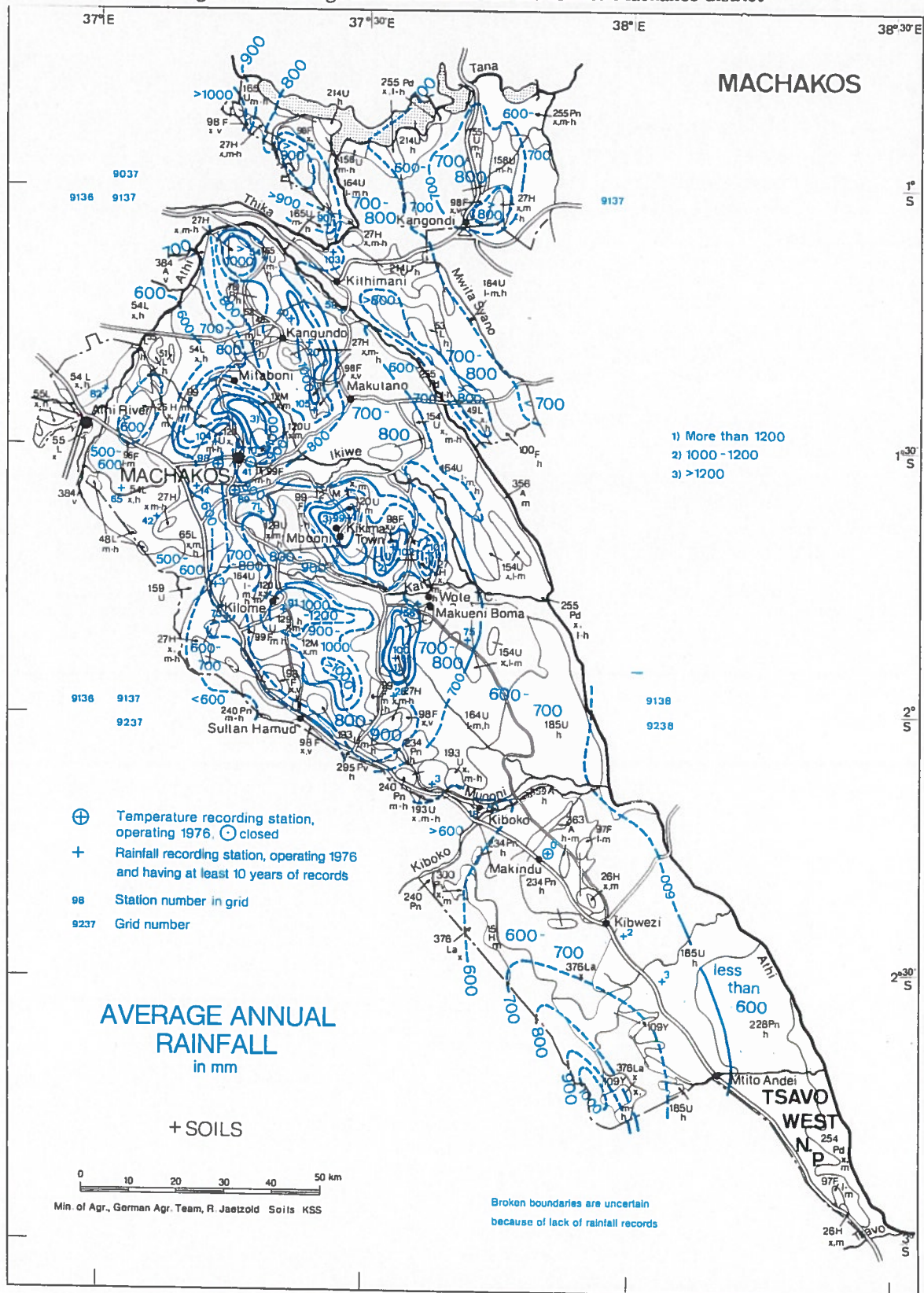
Source: Farm Management Handbook of Kenya (vol. II)

Figure 4.4 General soil fertility groups for the former Machakos district



Source: Farm Management Handbook of Kenya (vol. II)

Figure 4.5 Average annual rainfall for the former Machakos district



Source: Farm Management Handbook of Kenya (vol. II)

4.7 Concluding Remarks

The different studies review seem to indicate that titling of rural and should not always be presumed to be functionally related to agricultural productivity/development of land. The studies seem to suggest that titling of land is not the limiting constraint to agricultural development and productivity and hence the price of land.

The research study focusses on looking at the price of land for an area 'with-title' and 'without-title' under the limitations outlined in § 1.5. The detailed research methodology is the subject of the next chapter.

CHAPTER FIVE

5. EXPERIMENTAL RESEARCH METHODOLOGY

5.1 Introduction

In the previous chapter the different arguments for and against land titling have been outlined. In this chapter, an approach has been formulated via how to assess the impacts of titling on rural land price.

Different stages involved in the approach are discussed. The pre-fieldwork phase embarked consists of literature review and the definition of research questions and the design of the questionnaire to be used during the interview. The fieldwork phase involved office interviews with government officers and actual selection of the site, followed by field interviews and office verification of the data collected in the field. The post-fieldwork phase involved analysis of the data via use of digital maps and graphs. Different statistical tools of analysis were also used in the study in this phase (see fig. 5.1). Subsequently, regression analysis technique was carried out to determine the impact of titling on the price of land and also to derive the benefit of titling.

A framework on how to estimate costs through a cost models is also outlined.

5.2 Pre-fieldwork

Prior to carrying out the fieldwork, the following activities were carried out.

- Literature review of the literature related to land tenure conversion and Benefit-Cost analysis to understand the concepts of the research topic and objectives.
- Formulation of the problem and identification of data requirements for the experimental research.
- Questionnaire design to be used for farmer interviews and pre-determining the proposed site for the study (see appendix A1).

5.3 Fieldwork

5.3.1 Secondary data survey methodology

Initially, an interview was carried out with government officers in the Departments of Survey and Adjudication, in Nairobi, to investigate the status of adjudication with particular reference to Machakos district, which had been chosen apriori as the study district. Appraised also, during the interview were the current procedures involved in rural land registration in Kenya.

Initially, three sites each with-title and without-title were provisionally selected. The criteria for selecting the sites was mainly geographic proximity (i.e adjacency with respect to each other) pending further scrutiny in terms of their suitability with respect to agro-ecological zoning. Further interviews conducted at the Land Registry Department, in Nairobi, enabled a review of the registration procedures and the determination of the actual registration status (title or untitled).

The data on different possible factors that influence the price of land was obtained by interviewing an officer from the Land Valuation Department. Respective data on soil characteristics and physical environment, for the three provisionally selected sites, was obtained from the Kenya Soil Survey after a follow up interview on the same. The decision to adopt the study site was implemented after integrating the respective soil characteristics and physical environment data, with each of the three sites. The study site selected was located in one agro-ecological zone, based on soil, rainfall and temperature.

5.3.2 Primary data survey methodology

The survey techniques adopted were a reconnaissance survey based on a checklist followed by a formal questionnaire survey.

5.3.2.1 Reconnaissance survey

In this survey, a general overview of the study area was obtained. This was carried out (2 - days) by liaising with two different key informants. A visit to different farms was carried out based on a checklist (appendix A1). A deeper understanding of the study area and an appreciation of the types of farmers and farming practices and systems was gained in this stage. It also formed a basis for the planning of a detailed survey for later interviews.

The survey supported that the majority of these farms were operating in the same farming system under more or less similar circumstances.

5.3.2.2 Formal survey

Initially, informal interviews and direct observation, formed a core part to validate and streamline the questionnaire, an aspect of Rural Rapid Appraisal technique.

A pilot survey was carried out based on the questionnaire before fully embarking on the interviews. However, the first set of interview data had to be discarded because farmers¹ quoted unrealistically high values for the price of land. For the untitled section a total of 55 farmers were interviewed encompassing 9 villages; 31 farmers were interviewed for the titled farmers covering 5 villages. The formal survey was a trade off between coverage (short interviews with a greater number of farmers) and depth (to get deeper understanding of the farming systems and the impact tiling has had on their farming environment).

For the untitled farmers, the two coverage and depth criteria were met, where as for the titled farmers, in-depth survey was more feasible. The envisaged group interviews with the farmers enlisted maximum response from the untitled farmers, hence more villages were sampled within more or less the same time frame. Moreso, visits to all the fields could not be realised for all the farmers interviewed because of limited resources and time constraints. Reference was made to the prices reported in the District Land Registry.

The majority of the farmers interviewed were male.

¹ The word farmer in this context of the research should always be taken to mean the owner of land.

5.3.2.3 Sampling design

The sampling procedure was stratified sampling based on village level. Stratification was based on selecting five farmers at random from each village, based on a list of the villages in each sub-location, as provided by the chief. Strict adherence to this planned pattern could not be realised because of poor farmer response. Village heads were used to check the plausibility of the prices reported by farmers by asking them what prices land had previously been sold. The responses from these village heads were based on personal experience since they had acted as witnesses on land transactions.

An assistant was necessary to interlink with the local people and in some cases to facilitate the interpreting and guidance.

The fieldwork was concluded by final visits to the offices (Survey/ Land Registration and Adjudication Departments in Nairobi and Machakos) to verify some data collected from the field as a feedback (eg. Land adjudication officer).

5.4 Post-fieldwork

For the purpose of spatial analysis digitization of the maps were carried out as follows:

5.4.1 Digitizing

The location of the plots were digitized from the preliminary Index Diagrams (PIDs) [1:5,000] using ILWIS (Integrated Land and Water Information Systems) digitizing module. Geo-referencing was carried out by identifying similar points that could be identified on the PIDs and the topographic sheet [1: 50,000]. Permanent features, i.e roads and streams were digitized from the topographic sheet. Initially, four control points were chosen from each sheet to be digitised and the corresponding points on the topographic sheet identified. The coordinates for the control points were obtained from the topographic sheet and were in Universal Transverse (UTM) Mercator projection.

5.4.2 Distance maps

By use of ILWIS (spatial analysis module), distance maps were prepared to show relative distances from water, road and market on the geo-referenced map. The number of sample points within each distance interval was established and these classifications were used for further analysis.

5.4.3 Spatial analysis

5.4.3.1 General analysis technique and tools

5.4.3.1.1 Price of land versus titling and other factors

Dbase (IV) and Quattro-Pro spreadsheet [Borland International, 1992] programs were used. Tabular data analysis was carried out in Quattro-Pro and the output displayed in the form of bar graphs. Tabular data were exported from Dbase (IV) to SPSS statistical package [Norusis, 1990].

5.4.3.1.2 The t-test.

The *t-test* is used to test the means of two normal populations if the population variances are equal. The *t-test* is given by [Hayslett, 1981]

$$t = [(x_1 - x_2) - (\mu_1 - \mu_2)] / \sqrt{S_p^2 (1/n_1 + 1/n_2)} \dots\dots\dots (xii)$$

Where,

$$S_p^2 = [(n_1-1)s_1^2 + (n_2-1)s_2^2] / (n_1+n_2-2) \dots\dots\dots (xiii)$$

x_1 and x_2 are the means of the samples of sizes n_1 and n_2 respectively, and μ_1 and μ_2 are the corresponding populations means. S_p^2 denotes the *pooled sample variance*.

For a probability α , the critical region to accept H_0 , (H_0 that the sample means are equal) consists of t -values greater than or equal to $t_{\alpha/2} (n_1+n_2-2)$ and t -values less than or equal to $-t_{\alpha/2} (n_1+n_2-2)$.

5.4.3.1.3 The Chi-square test

The *Chi-Square test* [Hayslett, 1981] is a test that measures discrepancy between observed and expected sales of land. The Chi-Square statistic χ^2 is given by

$$\chi^2 = \sum (O_i - E_i)^2 / E_i \dots\dots\dots (xiv)$$

Where O_i is the observed frequency and E_i is the expected frequency of the observations. The larger the χ^2 the less the agreement between the expected frequencies and vice versa.

5.4.3.1.4 The Pearson correlation coefficient

The Pearson correlation coefficient is defined by Marija and Norusis [1990] as

$$r = \sum (X_i - X) (Y_i - Y) / (N - 1) S_x S_y \dots\dots\dots (xiv)$$

Where N is the number of cases and S_x and S_y are the standard deviations of the two variables, where as X_i and Y_i correspond to the observations.

The Pearson's correlation coefficient measures the strength of the association between two variables by calculating a summary index.

5.4.3.2 Multiple regression analysis

5.4.3.2.1 Techniques of regression analysis

Several techniques of regression can be applied in model building and analysis. These are backward elimination, forward selection and stepwise selection.

In Backward elimination, one starts from a regression which contains all the available variables, but it attempts to eliminate by testing one by one the independent variables. A criterion for the selection of the variables is predefined in terms of the minimum F-value the variable must meet to be accepted in the equation or the maximum probability associated with

the F-value. [Norusis, 1990].

In forward selection, a variable with the largest positive or negative correlation is entered. The F-test hypothesis for the entered variable is calculated. The F-value is compared to an established criterion in terms of the minimum value of F or maximum probability associated with F.

The actual significance associated with F is not the one usually obtained for F-distribution since t depends not only on the number of variables but the on correlations between the independent variables.

Stepwise selection is a combination of backward and forward procedures. The first variable is selected as in forward selection; if the variable fails to meet the entry criteria in terms of the specified F-value or maximum probability, the procedure terminates, otherwise the second variable is selected. Stepwise selection however differs from forward selection since once the first variable has been entered, it is examined to see whether it should be removed according to removal criterion in backward elimination.

The next variables, not in the equation, are examined for entry and after each step, variables already in the equation are examined for removal. The entry and removal criteria are selected such that the F-entry criteria is higher than F-removal criteria to avoid the same variables being repeatedly entered and removed. [Marija, 1990].

5.4.3.2.2 Methods for qualitative assessment

The following methods have been considered in the evaluation of the quality of the model. They are, however, limited to those features that were quantifiable.

(a) Goodness of fit

This is related to the predictive accuracy with which the model estimates the price. It is measured by several criteria.

i) The coefficient of determination (R^2) [Eckert, 1990]. This is referred to as Multiple correlation coefficient [Snedecor and Cochran, 1980] and it measures the percentage of the variations in sale prices explained by the model. If S_i is the sale price for property i, S is the average sale price, and S_p , the corresponding predicted price from the model. Then,

The sum of the squared deviations explained by the model (SS_{EX}) is given by,

$$SS_{EX} = \sum (S_p - S)^2 \dots\dots\dots (i)$$

The sum of the remaining (or unexplained square errors)

$$SS_{UN} = \sum e_i^2 = \sum (S_i - S_p)^2 \dots\dots\dots (ii)$$

From (i) and (ii), the total variance in sales prices (S_T) is given by,

$$S_T = \sum (S_i - S)^2 \dots\dots\dots (iii)$$

Simply stated as,

Total variation in sales prices = variation explained by the model + variation unexplained by the model. (iv)

From (i) and (iii), the coefficient of determination is computed as,

$$R^2 = \frac{\sum (S_p - S)^2}{\sum (S_i - S)^2} \dots\dots\dots (v)$$

The value of R^2 tends to overestimate the population R^2 , since it is based on the sample. The statistic adjusted R_a^2 [Norusis, 1990] more closely reflects the goodness of fit of the model population.

$$R_a^2 = R^2 - \frac{p(1-R^2)}{(n-p-1)} \dots\dots\dots (vi)$$

Where p is the number of independent variables in the equation and n is the number of observations. As the number of population parameters estimated from the sample increases, so does the goodness of fit measured by R^2 . This however does not necessarily mean that the equation with more variables better fits the population [Norusis, 1990]. This points out the weakness of R^2 as a measure of the goodness of fit.

(ii) Accuracy of the predicted values

The standard error of the estimate measures the amount of deviation between actual and predicted sales. The accuracy of the prediction is given by

$$Se = [\sum (S_i - S_p)_2 / (n-p-1)] \dots\dots\dots (vii)$$

The standard error is free from shortcomings of R^2 mentioned above. The value of standard error is inadequate as a measure of accuracy. A more accurate measure is obtained by dividing this by the mean predicted sale price. This ratio is referred to as a *coefficient of variation, COV* [Eckert, 1990].

(b) Importance of variables in the model

(i) t-statistic

This is a measure of significance or importance of a regression variables in explaining the differences in the sales price. The t-value measures the marginal contribution of a variable in predicting the sale price when all the other variables are kept constant.

$$t_s = b_j/s_j \dots\dots\dots (viii)$$

(for $n-p-1$ degrees of freedom).

When t_j is large one can be confident that the variable is significant in the prediction of S . Conversely when t_j is small one cannot reject the hypotheses that b_j equals 0 and X_j is important in explaining S .

(ii) The F-statistic

This is similar to *t-statistic* and is used to test whether individual variables are significant in predicting the dependent variable S. It is given by,

$$F = \text{additional variance explained by } X_j / \text{unexplained variance} \dots \dots \dots \text{ (ix)}$$

"Additional variance" refers to the variance without X_j included in the model less the variance with X_j included. The larger this ratio, the more important is X_j in reducing $\sum e_i^2$ and the more confidence on the variables significance in predicting S.

(iii) Beta coefficients

These are 'standardized' regression coefficients that measure the relative importance of individual variables. The coefficients are obtained by transforming the sales prices and the parameters so that they have means of zero and standard deviation of 1.

(c) Outliers

Outliers refer to those properties whose estimated values differ from sales prices by unusually large amounts [Eckert, 1990]. According to Marija and Norusis [1990], outliers can be located readily on residual plots since they are cases with very high positive or negative residuals. Outliers can be caused by incorrectly coded data. They may also be caused by unusual property characteristic or an unusual combination of characteristics. They provide clues to additional variables or other refinements that may improve the model, and therefore these unusual property characteristics should not be indiscriminately purged from the model.

(d) Unusual observations

Cases that have unusual observations for independent variables can have substantial impact on the results of the analysis and need to be identified. The distance of cases from average values of independent variables referred to as *Mahalanobis distance* [Norusis, 1990]. In the case of regression equation with a single independent variable, it is the square of the standardized value of x, given by

$$D_i = (x_i - \bar{x}) / S_x^2 \dots \dots \dots \text{ (xix)}$$

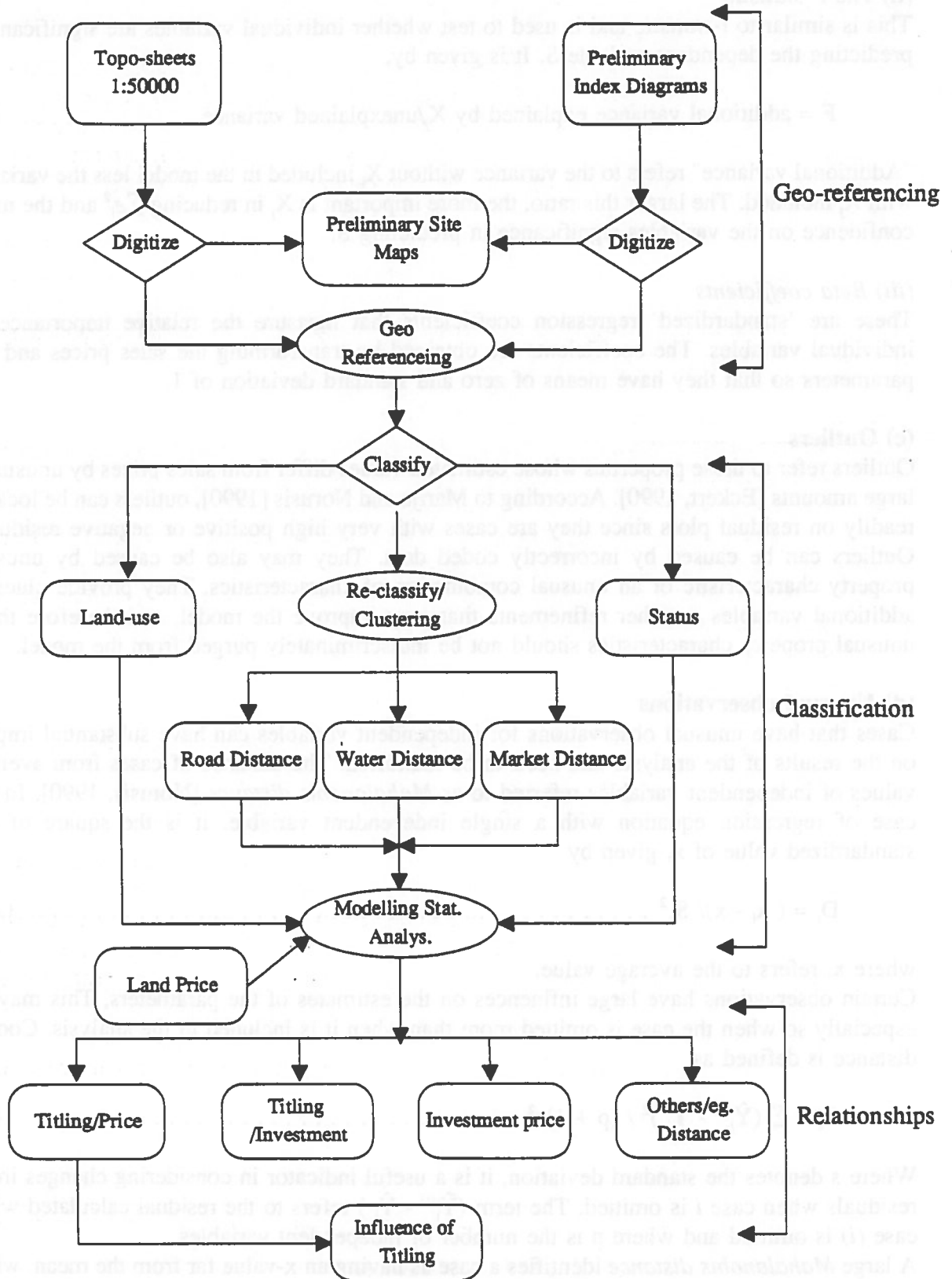
where \bar{x} , refers to the average value.

Certain observations have large influences on the estimates of the parameters, This may be especially so when the case is omitted more than when it is included in the analysis. Cook's distance is defined as

$$C_i = \sum (\hat{Y}_j^{(i)} - \hat{Y}_j)^2 / (p + 1)s^2 \dots \dots \dots \text{ (xi)}$$

Where s denotes the standard deviation, it is a useful indicator in considering changes in all residuals when case *i* is omitted. The term $(\hat{Y}_j^{(i)} - \hat{Y}_j)$ refers to the residual calculated when case (*i*) is omitted and where *p* is the number of independent variables. A large *Mahalanobis distance* identifies a case as having an x-value far from the mean, while a large *Cook's D* identifies the point as an influential point.

Figure 5.1 showing the post-fieldwork methodology



Source: Author (1995)

5.4.3.3 Benefit/Cost analysis

The purpose of Cost Benefit analysis is to investigate whether titling of rural land is attractive from a financial or economic point of view.

5.4.3.3.1 Cost/Benefit analysis

This is a systematic method of identifying and measuring the economic benefits and costs of a project or program. The benefits of a project are the values of incremental outputs of goods and services including environmental services made possible by the project, and the costs are the values of the incremental real resources used by the project. Both project costs and benefits are appropriately discounted² over time to make them commensurate.

Benefit cost analysis is based on neo-classical economic theory, which emphasises the philosophy of individual consumer sovereignty. A fundamental assumption of benefit cost analysis is that the degree of satisfaction or the economic welfare experienced by the individuals can be measured in terms of prices they were prepared to pay for the consumption of the goods and services.

5.4.3.3.2 Cost Benefit analysis criteria

The profitability of a project can be measured by different criteria, namely; the net present value, the internal rate of return and the benefit/cost ratio.

The Net Present Value (NPV) is defined as the sum of the discounted net benefits over the lifespan of the project. [Pelt, 1992]. The discount rate may be based on the interest rate which would have been received if the money had been put in the bank or if capital had been borrowed to finance the project.

It may be expressed mathematically thus;

$$NPV = \sum X_n/(1+i)^n = X_0 + X_1/(1+i) + X_2/(1+i)^2 + \dots X_n/(1+i)^n \dots \dots \dots (xv)$$

where, Xn are the net receipts in year n.

The Internal Rate of Return (IRR) is defined as the discount rate at which the Net Present Value = 0. It is also defined at the rate at which inflows and outflows are exactly equal [Eckert, 1990]. The project can be accepted if IRR exceeds a certain threshold. This threshold is the same as the discount rate as used in the determination of the NPV of a project. IRR is also referred to by Gittinger [1982] as the earning interest power or interest rate a project would earn.

The Benefit Cost ratio is a ratio of present worth of the discounted benefits to the present worth of the discounted costs.

² Discounting is a method of presenting present value of income streams by applying a present value factor to the individual dollar amounts of cash flows expected for each period [Eckert, 1990].

$$\text{Benefit-Cost ratio} = [\sum B_n/(1+i)_n]/[\sum C_n/(1+i)_n] \dots\dots\dots (\text{xxv})$$

where, B_n are the net benefits in year n and C_n the costs.

5.4.3.3.3 Measurement of benefits

5.4.3.3.3.1 The concept of benefit

Since resources are scarce, it is important to establish that gains from a policy exceeds the resource cost. This can be done by measuring the benefits in the same units as cost. In practise, expenditures should be undertaken until extra benefits equal to extra costs. This rule maximises the total net benefits that can be achieved with the resources. In reality, all benefits may not be measurable, nor is it possible to allocate resources to maximise net social benefits even if all benefits were measurable because of other influences (eg. politics). Furthermore, societies do not aim to maximise net social benefits alone, they also consider other objectives such as fair rules, national security and so on. Under these circumstances, benefit measurement only assists with more limited aim of checking that policy in question is an improvement in economic efficiency compared to the initial situation. The concept of benefit is thus interpreted in a particular way and the basic idea is "what people want" - Individual preferences should be the basis of benefit measurement.

These preferences can be identified by seeing how people behave when presented with choices between goods and services. It can reasonably be assumed that a positive preference for something will show up in form of willingness to pay for it. Since these differ between individuals an aggregate of the individual willingness to pay may be used to secure a total willingness to pay (WTP). The willingness to pay concept thus gives an automatic monetary indicator of preferences. The shortcomings of willingness to pay (WTP) may arise from the fact that while it can reasonably be presumed that people will not be willing to pay for something they do not want. WTP as measured by market prices, for the benefit to either individuals or society may not be accurate. This may be because some individuals may be willing to pay more than the market price. Hence the benefit received is larger than the market price.

Benefits from titling cannot be measured directly. Approaches to measure these benefits may include measuring agricultural production or the effect on the price of land. Other approaches to measure benefits include contingent valuation techniques³.

5.4.3.3.3.2 Investment on land

Land improvements are investments which enhance the productive capacity of the land, or maintain its productive capacity preventing erosion or moisture loss [Feder and Onchan, 1986].

Terracing, hedging, fencing, tree planting (fruit & timber), grass planting, gully stopping and repairs, tree shrub management on grazing land, efficient grain stores and housing constitute

³ Contingent valuation technique basically asks people how much they are willing to pay for a benefit and/or what they are willing to receive by way of compensation to tolerate a cost.

investment on land [Tiffen and Mortimore, 1994].

Terracing, trees (fruit and timber) condition of grain store and irrigation channel construction are aspects of investment considered in the study.

5.4.3.3.3 Price of land.

According to Feder and Ochan [1986], physical characteristics that influence the price of land include natural attributes (viz. soil type, slope, lowland/upland, irrigation and land improvements (viz. land cleared by farm machinery, trees present on land and clearing of stumps). Location and transportation possibilities with respect to the market and village respectively, also influence the price of land.

In the study area the major factors that were identified to have some characteristic influence on the price of land are:

- Access to the water channel
- Improvement in terms of irrigation
- Access to the road
- Access to the market
- Status (in terms of whether titled or untitled) of the land

Land values obtained from interviewing farmers have been used to estimate the value of legal ownership. The estimates are inclusive of other factors that may influence the price of land. [eg. proximity with respect to water, road and market].

Intangible benefits eg. security of title cannot be quantified.

5.4.3.3.4 Hedonic techniques

These are approaches that analyze the relation between certain environmental quality characteristics and the prices of private goods. They are also referred to as *property value* or *land value* approaches by Hufshmidt et. al. [1990]. Hedonic prices are defined as the implicit prices of the characteristics of the property [viz. size, location, quality and neighbourhood characteristics] and are revealed to economic agents from observed prices of differentiated properties and the specific amounts of characteristics associated with them [Rosen, 1974].

By use of appropriate statistical techniques, hedonic price approach attempt to firstly, identify how much of a property value differential is due to a particular environmental difference. Secondly, infer how much people are willing to pay for an improvement in the environmental quality and what the social value of the improvement is. Hedonic studies involve a number of property describing variables and environmental variables of interest.

The price function may be given by

$$P = \phi (S_i, N_i, Q_i) \dots\dots\dots (i)$$

Where S_i represents housing units such as size; N_i represent neighbourhood units such as

access and Q_i the effect of status (i.e effect of titling).

Estimation of the hedonic price equation may involve linear or non-linear relations. The determination of dependent variables can be based on actual sales or professional valuations. Such an estimated relationship can be used to infer the benefit of an effect.

The technique however makes the following assumptions: firstly, that the entire urban area can be treated as a single market (i.e individuals must have information about all alternatives and must be free to choose a property location anywhere in the market). Secondly that the property market is near equilibrium (i.e all buyers have made their utility maximising choices, given the existing stock of property and other characteristics).

If the function is linear then,

The implicit price of any property characteristic is estimated by

$$P_i = \alpha_0 + \alpha_1 C_{1i} + \alpha_2 C_{2i} + \dots + \alpha_n Q_i \dots \dots \dots (ii)$$

$\partial P/\partial Q = \alpha_n$, is a measure of the marginal willingness to pay for an extra unit of improvement resulting from titling.

The effect of titling (benefit) can be determined through multiple regression analysis.

5.4.3.3.4 Measurement of costs

The measurements of costs of mapping can be estimated through simulation of a cost model encompassing different processes in the production line. The cost of cadastral survey and registration process is made up of administrative costs, demarcation costs, recording costs, survey costs and settling of disputes costs. Considering these cost elements, the mapping cost takes the highest component of the costs [Dale, 1988]. An approach to estimate the mapping cost is the subject of ensuing discussion.

5.4.3.3.4.1 Assumptions

The cost of mapping an area varies depending on a number of factors. These include project requirements (map scale, map content, map accuracy and delivery schedules), project environment (size and shape of project area, type of terrain, accessibility etc.), production rates and basic costs standards. The effect of different parameters on mapping costs can be estimated using cost models [Templi, 1994].

5.4.3.3.4.2 Cost Models⁴

Cost models are composed of two components i.e production standards and basic cost standards.

(i) Production standards

⁴ The cost models outlined below can be used as a guideline to estimate costs.

Production standard express the personnel/equipment time and amount of material needed to realise a particular production unit (eg. 1 km²). Production standards are influenced by the project requirements, project environment, project parameters (such as photo scale and equipment/method combinations used) and factors of mapping organisations (production methods, skill and experience of staff etc.) Establishment of production standards is now more complex due to the large number of influencing factors some of which are uncertain.

(ii) Basic cost standards

Basic cost standards express the personnel and equipment costs per time unit (usually per hour) and the material costs per item unit (eg. per photograph map sheet etc). Personnel costs are organisation dependent being only governed by salary and overhead costs of the organisations concerned⁵. A cost model for a production phase is the 'execution cost to the organisation', also referred to as 'technical costs'. The prices included in tenders are a mark-up of technical costs (accounting for uncertainty and profit).

An example of simplified cost model for determining the flying costs per line kilometre is shown in Figure 5.2 whilst the cost model for identification and plotting are shown in Figure 5.3. The simplified cost model considers the processes encountered in the preparation of the Registry Index Map (RIM) [also referred to as Preliminary Index Diagram (PID)] at the Department of Survey, Ministry of Lands and Housing, Kenya [Figure 3.3].

The simplifications introduced concerning Figure 5.2 include amongst others,

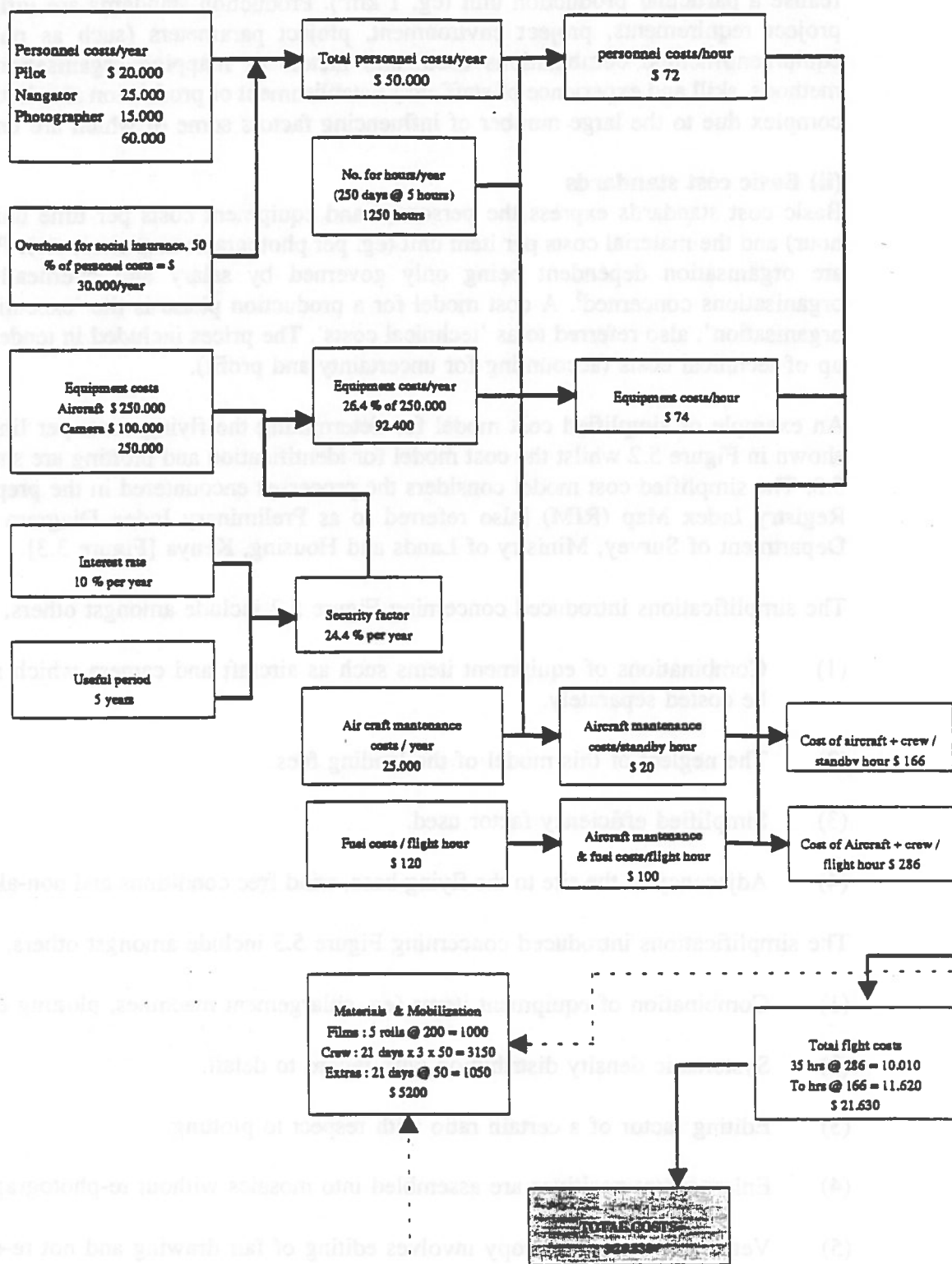
- (1) Combinations of equipment items such as aircraft and camera which should ideally be costed separately.
- (2) The neglect of this model of the landing fees.
- (3) Simplified efficiency factor used.
- (4) Adjacency of the site to the flying base, wind free conditions and non-altitude fatigue.

The simplifications introduced concerning Figure 5.3 include amongst others,

- (1) Combination of equipment items (eg. enlargement machines, plotting etc)
- (2) Systematic density distribution with regard to detail.
- (3) Editing factor of a certain ratio with respect to plotting.
- (4) Enlargement positives are assembled into mosaics without re-photographing.
- (5) Verification of diazo-copy involves editing of fair drawing and not re-establishing

⁵ In determining equipment costs; investment, maintenance and annuity must be taken into account.

Figure 5.2 showing the Basic cost and Production standards for mapping (continued next page).



Source Templi, 1994

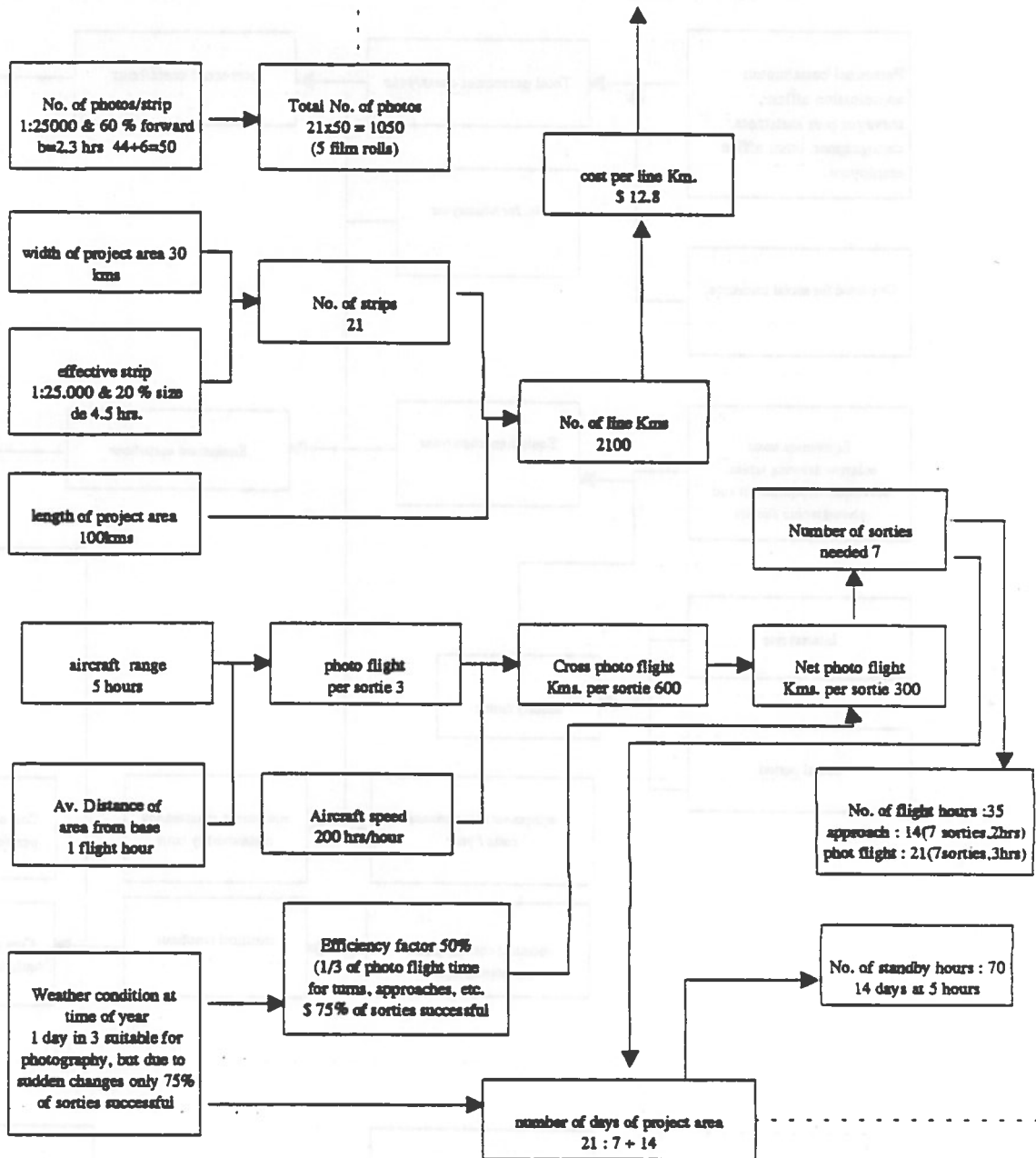
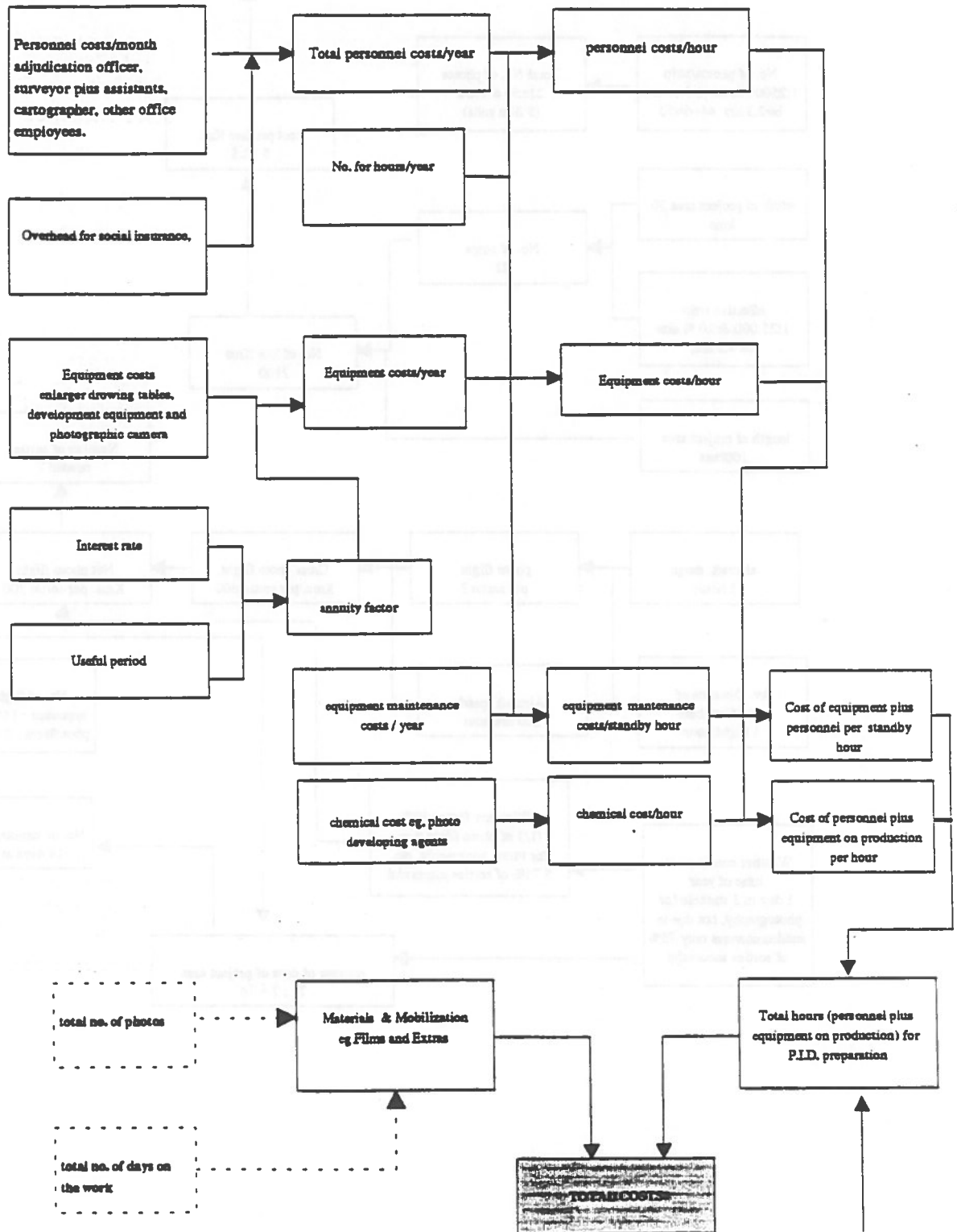
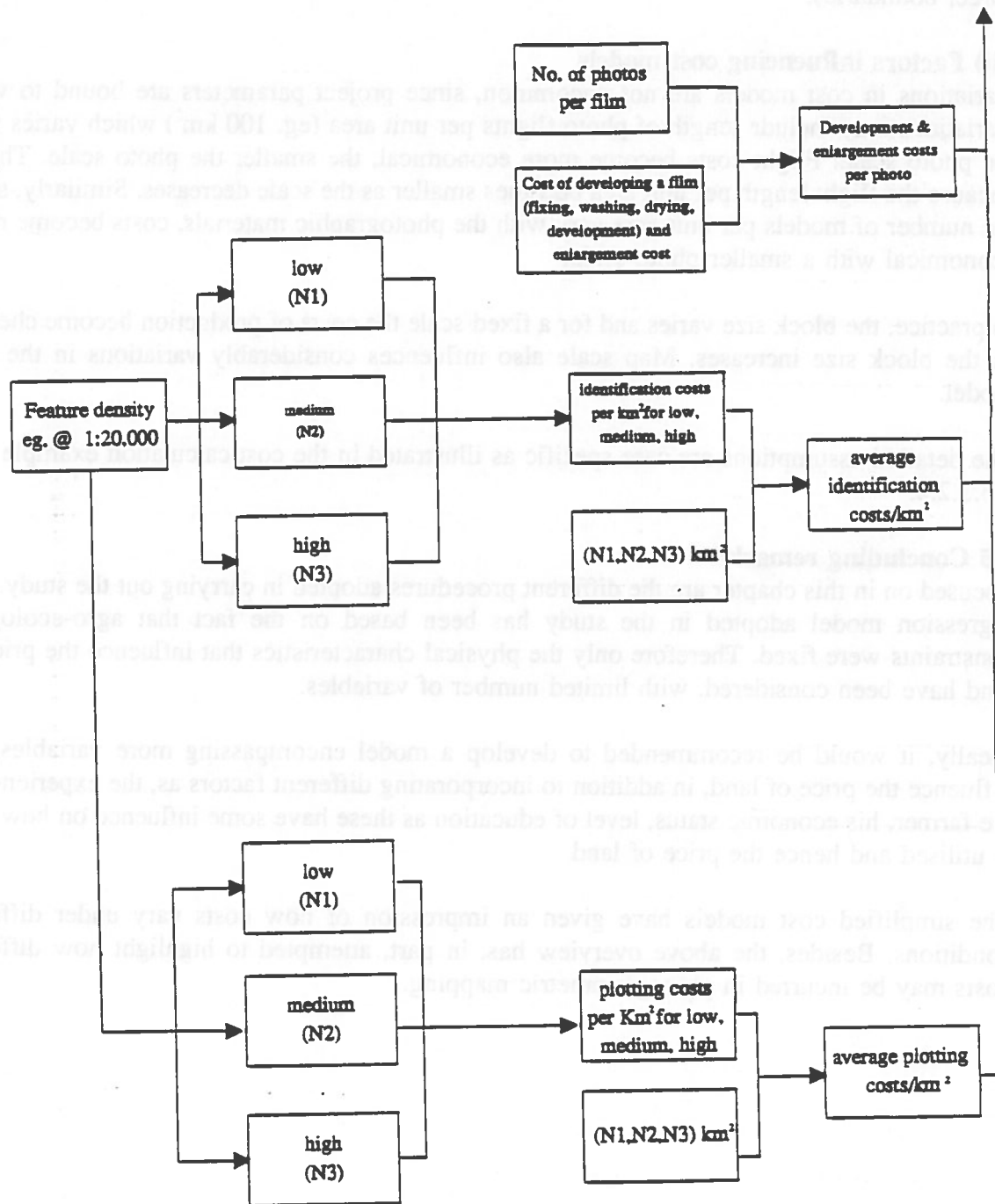


Figure 5.3 showing the Basic cost and Production standards for PID preparation (continued next page).



Source Author, 1995



parcel boundaries.

(iii) Factors influencing cost models

Variations in cost models are not uncommon, since project parameters are bound to vary. Variations may include length of photo flights per unit area (eg. 100 km²) which varies with the photo scale. Flight costs become more economical, the smaller the photo scale. This is because the flight length per unit area becomes smaller as the scale decreases. Similarly, since the number of models per unit area vary with the photographic materials, costs become more economical with a smaller photo scale.

In practice, the block size varies and for a fixed scale the costs of production become cheaper as the block size increases. Map scale also influences considerably variations in the cost model.

The detailed assumptions are case specific as illustrated in the cost calculation example in § 6.3.3.2.2.

5.5 Concluding remark

Focused on in this chapter are the different procedures adopted in carrying out the study. The regression model adopted in the study has been based on the fact that agro-ecological constraints were fixed. Therefore only the physical characteristics that influence the price of land have been considered, with limited number of variables.

Ideally, it would be recommended to develop a model encompassing more variables that influence the price of land, in addition to incorporating different factors as, the experience of the farmer, his economic status, level of education as these have some influence on how land is utilised and hence the price of land.

The simplified cost models have given an impression of how costs vary under different conditions. Besides, the above overview has, in part, attempted to highlight how different costs may be incurred in photogrammetric mapping.

CHAPTER SIX

6. ANALYSIS OF RESULTS AND DISCUSSION

6.1 Introduction

The framework for analysis of data has been presented in chapter 5. In this chapter the analyses of results on the price of land are carried out and the procedures involved in sampling and screening the data have been detailed.

A general analysis of the price of land versus titling is carried out by graphs generated in the Quattro-Pro spreadsheet package, followed by a brief discussion. Subsequently, an estimate of the benefits incurred during the titling has been discussed based on regression analysis. In addition, the impact of other factors (eg. irrigation) on the price of land has been estimated via the regression analysis.

The costs incurred by the farmer have been briefly outlined and an attempt to show how the actual costs can be arrived at illustrated. Thereafter, an analysis is carried out, with reference to titled and untitled farmers.

6.2 Analysis of Empirical Data

Outlined below is the sampling criteria used in the study, together with the fieldwork screening procedure adopted during the fieldwork. The clustering criteria has also been briefly outlined.

6.2.1 Sample data

6.2.1.1 Sampling criteria

As described in § 5.3.2, it was envisaged in the sampling design to have at least five respondents from each village. Prior to adopting this criteria for stratification an attempt to further stratify farmers based on size into categories [≤ 5 acres; > 5 and ≤ 10 acres; > 10 and ≤ 15 ; and > 15 acres] could not be practically realized [see appendix A1, for the map of the distribution of the points].

For the untitled section, 7 out of 9 villages met the criteria of at least five farmers per village [see Table 6.1a]. However, for the titled section, 3 out of 7 villages satisfied this criteria of at least five farmers per village [see Table 6.1b]. Since sampling was carried out within the same time frame, this discrepancy is mainly attributed to the fact that most of the interviews for the untitled farmers were group based, where as, the converse was the case for titled farmers. This was because untitled farmers enlisted maximum response to the group interviews contrary to the titled farmers. Furthermore, most titled farmers were absent during the interviews.

Table 6.1a

Untitled section's kithimani sub-location	
Village	No. of respondents
Msingini	4
Kahukuni	6
Kithendu-A	5
Kithendu-B	14
Muthesya	5
Kondo-B	6
Kithembe A	4
Kauthurini	6
Kithumbi	5

Table 6.1b

Titled section's- Matuu Sub-location	
Village	No. of respondents
Matungulu	2
Masaku	2
Matuu	12
Kikule-A	6
Kakumini	3
Kikule-C	5
Ivumbuni	1

Total No. of farmers in Tables 6.1a & 6.1b = 55 and 31 respectively

Owing to the large number of groups and cooperation that turned out when the interviews were being conducted for the untitled section's Kithendu B village and Titled section's Matuu village (Table 6.1), correspondingly large number of respondents were interviewed (14 and 12, respectively). The time constraint however dictated that more data could not be collected to balance out the non-uniformity in the data samples.

6.2.1.2 Data screening

This was carried out in two stages i.e during the fieldwork and after the fieldwork (§ 6.3.1) Data screening during the fieldwork was necessary to phase out unrealistic prices quoted by the farmers. The pilot survey (§ 5.3.2.2) was based on interviewing three key informants and two village heads, and it gave a perception of the order of magnitude of the expected sales prices to be obtained during the interview.

During the fieldwork, the first set of data had to be discarded because the prices quoted by the farmers were astronomically high and hence did not seem reliable. This was attributed to the fact that the farmers treated the interview with suspicion. This evidence was supported by the fact that most of the farmers were inquisitive and hesitant when answering the questions.

6.2.1.3 Clustering

Clustering was carried out to stratify properties into groups with respective distances from the road, water and market since these seemed to be the physical characteristics having major influence on the price of land. Distances from the water were determined by the number of times in a week (frequency) a farmer may be allowed to irrigate his land assuming he had

dug irrigation sub-channels within his land to facilitate flow of irrigation water. Farmers closer to the water have a higher frequency of irrigation because their farms provide frontage to the main irrigation channel. Three classes were obtained, though the overall sample data was too scanty to aggregate enough samples for each of these three classes. Therefore, two classes had to be adopted based on 0-1 km and 1-2 km ranges [see appendix A2 for the map].

In order to obtain the road classification, general interviews with some key informants enabled classification of distances from the main road (freeway) under the three categories i.e close, medium and far from the road. Again, as for the case for water classification, the limited number of samples dictated that only two classes could be aggregated in order to have enough samples for each of the classes [see appendix A3 for the map]. Two classes based on 0-1 km range and 1-2 km range from the road were obtained.

Access to the market was classified again based on general interviews with some key informants and four classes were obtained (viz. close, medium close, far, and very far from the market). Again the sample data was too scanty to realize enough samples within these classes. Two classes were adopted based on 0-2.5 km range from the market and 2.5 km to 5.0 km range from the market [see appendix A4].

Nevertheless, the use of these classifications did not enable subscription of enough samples within these classes because of the limited amount of overall data. However, it gave a base on which some general analysis could be carried out.

Ideally these classifications would have been set out apriori, and hence used as a common denominator for sample stratification. In practice, this could not have been realized within the projected time frame. All in all it had been envisaged that the stratification based on village level would more or less give representative fractions since sampling was random.

6.2.2 Price of land versus titling and other factors

Out of 86 farmers that were interviewed, only 41 cases could be spatially located. This was because some farmers preferred not willing to disclose their plot numbers during the interviews. Graphs of prices against distances from the water, road, market and irrigation were drawn. The graphs depict the mean prices for titled and untitled plots for these 41 cases that could be spatially located.

6.2.2.1 Results

The results presented in this sub-section correspond to the influences of access to road, water, market and the impact of irrigation.

6.2.2.1.1 Distance from the Main Road

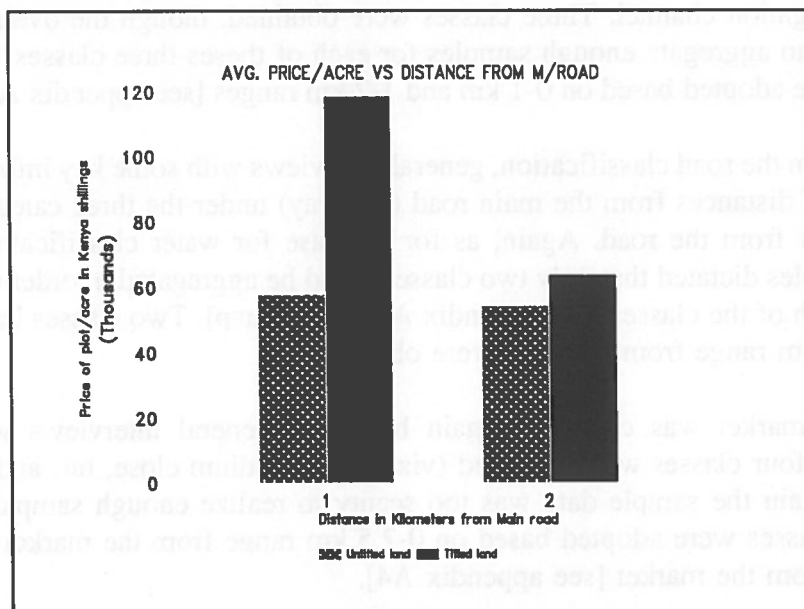


Figure 6.1: shows the average price per acre versus the distance from the main road. Class 1 corresponds to (0 - 1 km) range from the market and class 2 ($\geq 1 - 2$ km) range.

A graph (Fig 6.1) of prices versus distance from the main road indicates that the mean price/acre of titled land is more than twice the price¹ of untitled land when considering prices within one kilometre buffer from the road ($N_T=6, N_{UT}=2$)². This is because titled land closer to the road is perceived to have higher potential in terms of investment than for the untitled land closer to the road.

The price of untitled land seems to be more or less the same irrespective of the distance from the road, though it seems to be slightly less when further from the road. This difference appears quite dismal to warrant any deduction. This may be attributed to the fact that untitled farmers perceived their lands to be more constrained in terms of their potential to invest, since the land would not attract any credit opportunities because of lack of title documents.

However, it is observed that when the prices are compared for both titled and untitled land for the 1-2 km range distance from the road ($N_T=14, N_{UT}=19$), the mean prices of titled and untitled land tend to be the same. Nevertheless, the price of titled land seems to be still higher than that of untitled land. There is no conclusive evidence in this respect and this could be

¹ The price in the context of the discussion should be taken to imply the mean price/per acre.

² N_T and N_{UT} correspond to the number of titled and untitled respondents, respectively.

attributed more to speculative reasons associated with titling of land.

Notwithstanding, possible influences of other factors [eg. water), the data is not sufficient enough to enable elaborate deduction or warrant any statistical analysis (eg t -test).

6.2.2.1.2 Distance from the water

Figure 6.2 indicates that the mean price (per acre) of titled land is more than double the price of untitled land, when prices are compared for samples within one kilometre buffer from the water canal ($N_T=4$, $N_{UT}=14$).

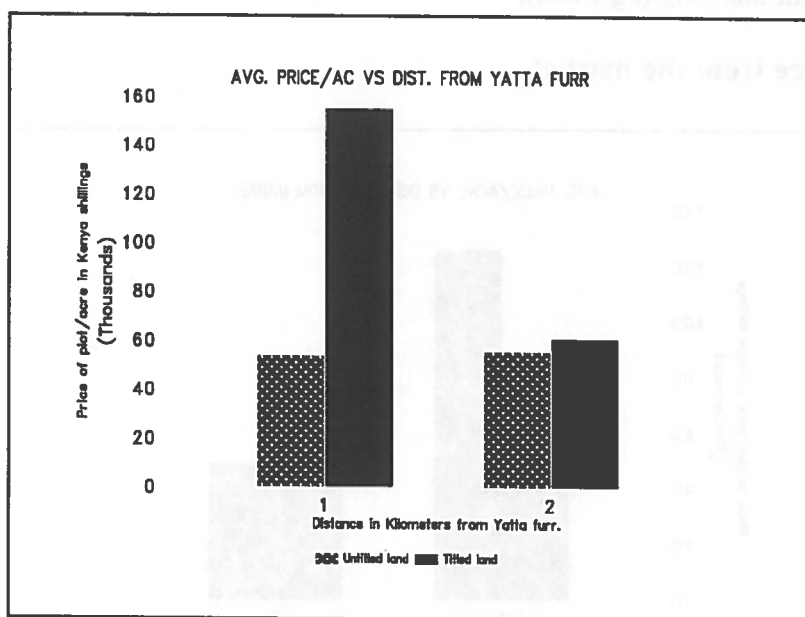


Figure 6.2: shows the average price per acre versus the distance from the Yatta furrow (water canal). Class 1 corresponds to (0 - 1 km) range from the market and class 2 ($\geq 1 - 2$ km) range.

This is because titled land closer to the water stands a higher irrigation access than land further from the water channel. It seems that irrigation access within the 1 km buffer has pushed the price of titled land up. The higher price of titled land compared to untitled land implies that titled land has a higher potential for agricultural production than untitled land. Perhaps this is due to the fact that farmers feel more secure with titled land. The fact that a title document can be used as a collateral (for bank loans) and insurance (eg. court cases) could also be a contributing factor.

However as the distances (of titled versus untitled land) from the water canal (generically referred as Yatta furrow) increases, the prices tend to be more or less the same ($N_T=16$, $N_{UT}=7$). Nevertheless, the price of titled land seems to be higher than that of untitled land though the difference is not appreciable. Again no conclusive evidence can be attributed to this effect. However, the fact that the price of untitled land remains, more or less, constant can be attributed to the fact that untitled farmers feel potentially constrained in terms of

agricultural production. The diminished impact of tilting and the tendency of the two prices to converge with increased distance from the water channel, seems to suggest that at a certain limiting distance from the water, land is perceived to have the same agricultural potential irrespective of its status (titled or untitled). This convergence of price can be attributed to the fact that institutional lenders, base their amount of credit on the potential returns to land. Therefore, since less returns are expected from agricultural potentially constrained land, less credit would be subscribed for that land, hence the lower the price.

Notwithstanding the influence of these other factors, the samples were small to warrant any rigorous statistical analysis (eg t-test).

6.2.2.1.3 Distance from the market

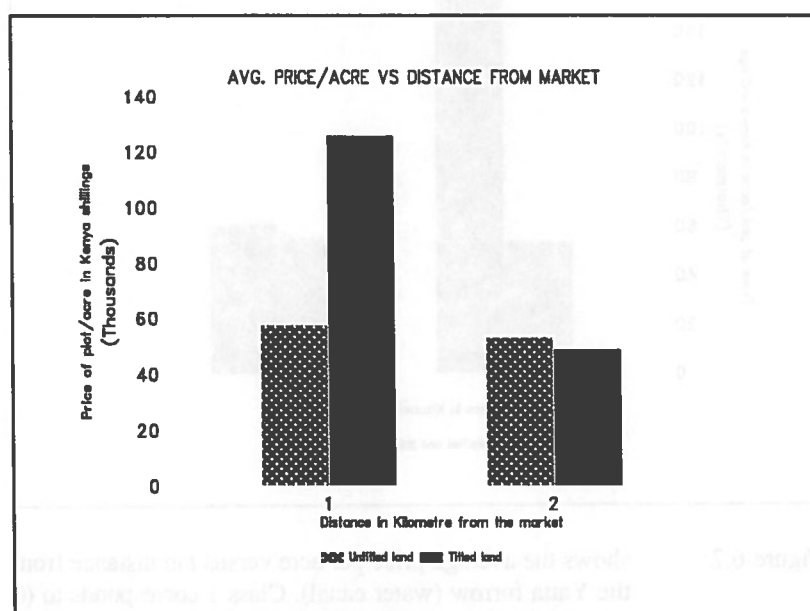


Figure 6.3: shows the average price per acre versus the distance from the market centres. Class 1 corresponds to (0 - 2.5 km) range from the market and class 2 (≥2.5 - 5 km) range.

Figure 6.3 again shows the influences of the market for both titled and untitled plots. There is marked significance in the prices of titled and untitled plots with respect to the distances from the market. The price of titled land seems to have doubled the price of untitled land when the distance to the market is within the 2.5 km buffer ($N_T=8, N_{UT}=6$). The pronounced difference in price is attributed to the fact that titled land closer to the market is again perceived to be having more potential in terms of investment (in combination with marketing opportunities) comparatively to untitled land.

The prices of both categories of land decrease with increasing distance from the market ($N_T=12, N_{UT}=15$). However, the price of untitled land further from the market appears to be higher than that of titled land, which contradicts intuitional expectations. This anomaly can be attributed to the influence of other factors (eg. road, water) on the price of untitled land.

The price of untitled land seems to more or less the same, though it has decreased slightly with the distance from the market. This slight decrease in price is not pronounced, an evidence supported by low Pearson correlation coefficient (0.008) [Table 6.2]. The price of land can generally be presumed to be more or less the same irrespective of the distance to the market. Again, this could be attributed to the fact that farmers perceive untitled land to be having less potential for investment.

6.2.2.1.4 Effect of Irrigation

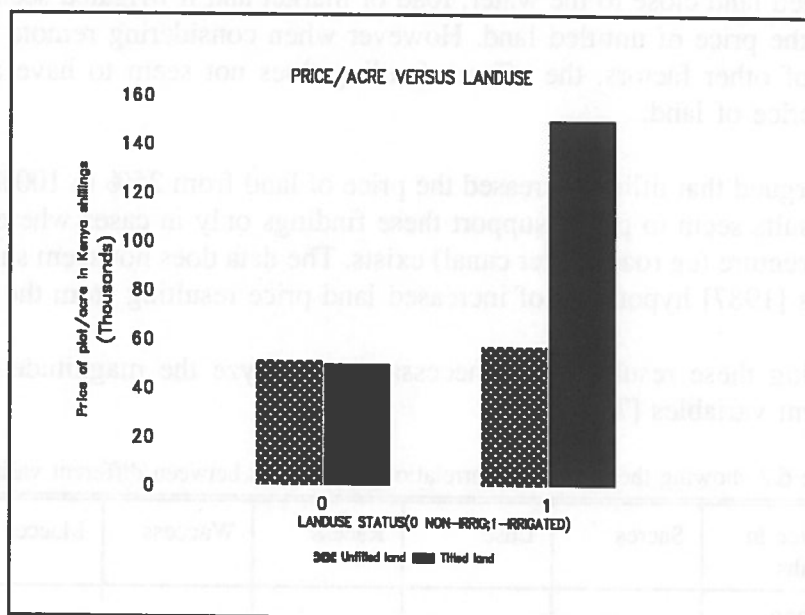


Figure 6.4: shows the average price per acre for titled and untitled land. Classes 0 and 1 corresponds to non-irrigated and irrigated lands respectively.

The price of irrigated titled land seems to be more than twice the price of irrigated untitled land ($N_T=6$, $N_{UT}=12$). This pronounced difference can be attributed to the fact that irrigation increases productivity of land and hence its price.

However, the price of non-irrigated titled land appears to be less than that of non-irrigated untitled land ($N_T=14$, $N_{UT}=9$). Again this seems to contradict intuitional expectations. However the difference appears to be too small to warrant any conclusion. This could be due to unobserved effects during the interview which may have interfered with the price of land some residual influences from other factors on the price of untitled land.

The fact that the price of non-irrigated untitled land and non-irrigated titled land are more or less the same may be due to same perceived agricultural potential. The difference in price of non-irrigated untitled land and irrigated untitled land is not pronounced, perhaps due to the low potential expected from untitled land. Again the samples are too small to make any elaborate deduction. The price of untitled land seems to have increased as a result of irrigation

and this is due to the fact that increased agricultural production is anticipated from irrigation of land.

6.2.2.2 Preliminary Discussion of Results

The analysis of data to investigate the influence of access to the road, water and market and the impact of irrigation have been severely constrained by the inability to collect ample data to warrant appropriate t-test statistical analysis.

The price of titled land close to the water, road or market and if irrigated seemed to more or less be double the price of untitled land. However when considering remote land free from the influences of other factors, the effect of titling does not seem to have any significant impact on the price of land.

Feder [1987]³ argued that titling increased the price of land from 25% to 100% of its untitled price. These results seem to partly support these findings only in cases where some form of physical infrastructure (eg road, water canal) exists. The data does not seem sufficient to fully confirm Feder's [1987] hypothesis of increased land price resulting from the titling of land.

Before embracing these results it was necessary to analyze the magnitude of correlations between different variables [Table 6.2].

Table 6.2 showing the Pearson's correlation coefficients between different variables

	Price in Kshs	Sacres	Luse	Racess	Waccess	Maccess	Status
Price	1.000						
Sacres	-.120	1.000					
Luse	.379	-.045	1.000				
Racess	-.205	-.061	-.499	1.000			
Waccess	-.144	.274	-.388	-.212	1.000		
Maccess	.008	.190	-.103	.155	-.034	1.000	
Status	.219	.276	-.182	-.247	.656	-.248	1.000

Price: Price of land Sacres: Size in acres Luse: Irrigation Racess: Access to Road
Waccess: Access to water Maccess: Access to market Status: Titled or Untitled.

Considering the price of land, the highest Pearson correlation coefficient exists between the price of land with the land use (irrigation) variable. The high Pearson correlation coefficient between price of land and irrigation seems to suggest that the influence of irrigation on price is higher than the influence of titling, which is contrary to the expected [Figure 6.4] because of small samples.

³ Other authors eg De Soto (1994) provide figures that concur with Feder's findings in Peru & Costa Rica.

The Pearson correlation coefficient associated with the status of land (0.219) is somewhat the highest, relative to the other remaining variables. The insinuation of this is that titling contributes more to the price of land and this is evidenced in figures 6.1, 6.2 and 6.3. Nevertheless, the values is still low for titling and all the other variables which seems to suggest that the linear relationships between the variables and the price of land is fairly weak. This is mainly attributed to limited data. However, the signs of the variable Luse is positive. This implies that the price of land is expected to be higher for irrigated land. The signs for size in acres, access to road, water are negative because the price/per acre is supposed to decrease as you go further away from the main road and water access. The sign for Pearson's correlation coefficient for access to the market was expected to be negative. Since, its magnitude is small (almost zero) the value is not significant.

The results seem to indicate further support the fact that titling in itself has no influence on the price of land [Bruce, 1993; Ogendo, 1993].

Bassett and Crummey [1993], Luning [1984-elsewhere 1994] , Lawrence [1984] and others mentioned that titling in itself did not pose as a constraint to agricultural production. The marked difference in price when other influences are taken into consideration indicate that titling should always be considered as one constraint, amongst others, influencing the price of land.

Haugerud (1989) stated that although land rights affect agricultural performance, they do so in ways that do not favour standardized tenure prescriptions (such as freehold title registration). Furthermore, she notes that agricultural performance is tied to opportunity costs to farmers of on-farm and off-farm labour and to complex relations of dependence and change among rural individuals with respect to land, food, cash and political favours.

6.2.2.3 Remarks

Figures 6.1 to 6.4 are based on access to water, market, road and the effect of irrigation. However, different combinations of mixed categories could have been considered to give a more elaborate deduction, but the amount of data was too limited to focus on these different possibilities.

6.3 Regression Analysis

The objective of regression analysis is to determine the marginal increase in price of land as seen from § 5.4.3.2.

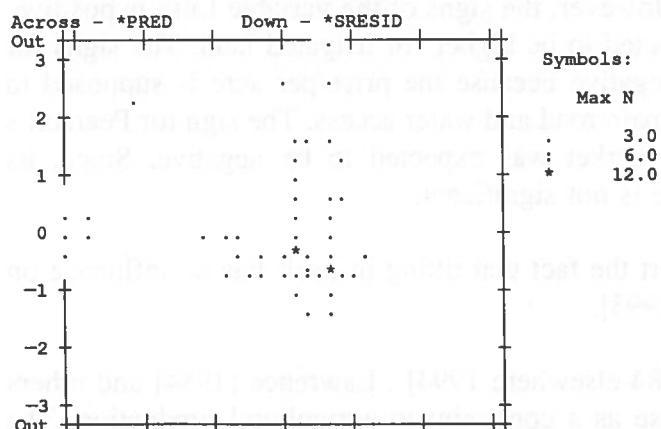
6.3.1 Pre-processing

(i) Linearity

Initially, prior to carrying out the regression, linearity tests were carried out via use of scatterplots of residuals against predicted values to judge how well the straight line fits the data. No relationship was observed for the bivariate situations between predicted values and the residuals for bivariate situations [eg. mean price versus size in acres]. Linearity assumption was met for the size in acres, as no observable pattern [Figure 6.5] was observed

between predicted values and the residuals [Norusis, 1990]. The strength of linear association between the variables seemed to be fairly weak as seen from the value of the Pearson's correlation coefficient 0.007 [see, Table 6.2].

Figure 6.5 showing the standardised scatterplot of predicted values versus residuals [spss output].



Scatter plots for other variables were expected to show some pattern because of constraints imposed by classification the data [see appendix A5].

(ii) Outliers

Outliers were detected by means of casewise scatter plot. Only one of the prices seemed to be higher than that predicted by the model (case 9) [Box 1]. The second column indicates that the outlier was found on the price of untitled land. (status = 0). The price per acre of Kshs 300,000/- is quite high compared with the average price per acre for the sample of kshs 69854/- which implies that the model may not fit very well for land with higher prices per acre.

The Cook's statistic and the Mahalanobis index [§ 5.4.3.2.2] computed during the regression did not indicate further outliers. Moreover the residuals of the other variables were not large enough to suggest any further outliers. Therefore only case 9 was excluded from the regression analysis.

Casewise Plot of Studentized Residual						
Outliers = 3. *: Selected M: Missing						
Case #	STATUS	-6.	-3.	3.	6.	
9	0	0	:	:	*	PRICE 300000 *PRED 75409.7253 *RESID 224590.2747
1 Outliers found.						

Box 1. showing output of cases that were detected with outliers (spss output)

6.3.2 Evaluating the quality of the model

From § 5.4.3.3.2 it may be recalled that there are different methods of analysis to evaluate the quality of the regression model.

$$P_i = \alpha_0 + \alpha_1 C_{1i} + \alpha_2 C_{2i} + \dots + \alpha_n Q$$

where P_i , denotes price, α_0 is a constant, $\alpha_1, \alpha_2, \dots, \alpha_n$ denotes the coefficients of the variables and $C_{1i}, C_{2i}, \dots, C_{ni}$ define the independent variables (eg. access to water, market etc.) and Q defines the independent variable status (i.e titled or non titled).

(i) The goodness of fit

The goodness of fit (R^2) (§ 5.4.3.2.2) or the extent to which the model explained the variation in sales prices was found to be 37%. This value seemed to underestimate the goodness of fit. The low value of R^2 is attributed to the fact that the model was based on several assumptions. These include prices based on interviewing the farmers; assumptions of linearity of distances to road, water and market places. Notwithstanding, the major factor concerned with the model were physical characteristics that seemed to influence the price of land. Other factors that could be contributing to this include the fact that data was classified into groups. This type of classification inevitably calls for generalization of data, hence a possible source of error. Besides, the classification was a prerequisite to warrant any meaningful deduction.

As observed earlier in § 5.4.3.2.2, the value of R^2 increases as the number of population parameters increases, though this does not mean that the equation with more variables better fits the population [Norusis, 1990]. According to Eckert (1990), by adding more regression variables R^2 can only increase or stay the same, even when insignificant variables are included, or the number of variables is large relative to the number of sales. The inconsistencies and the subjective process of assigning variables to different characteristics could also have contributed to this low value of R^2 .

(ii) Accuracy

In order to estimate the prediction accuracy of the model, several statistics (eg. coefficient of variation, standard error) of the residuals were used. The low value of R^2 has in part contributed to the predictive accuracy of the model. This has been reflected in the standard error predicted by the model. The value of the standard error (kshs 27,086/-) is considerably high if the average price of land is taken into consideration. This implies that the coefficient of variation (§ 5.4.3.2.2) is approximately 38%.

A post mortem of the approach via which the model was developed does not seem to point out any gross assumption that could be directly attributed to this low value. Perhaps the model did not still provide a good fit with respect to the different characteristics that influence the price of land. Alternatively the other characteristics (eg. economic factors; social factors; local, governmental and political factors) that influence the price of land could be contributing more to the price of land than the physical characteristics considered [Eckert, 1990].

6.3.3 Benefit cost Analysis

Recall from § 5.4.3.3.1, that approaches used to measure benefit include agricultural production or its effect on the price of land.

6.3.3.1 Measurement of Benefits

The price of land equals the discounted present value of all the future net benefits from that land. Recall § 5.4.3.3.4, the price of land is given by

$$P_i = \alpha_0 + \alpha_1 C_{1i} + \alpha_2 C_{2i} + \dots + \alpha_n Q$$

The multiple regression analysis (MRA) gave the following results [Table 6.3]. The signs of the model variables bear the expected signs.

Table 6.3: Showing the F statistics and the Beta coefficients for the MRA model.

Variable	F-value	R ² change (%)	Beta Coefficient α_n	Confidence (%)
Land use (irrigation)	6.18	14	.3865	99
Status	5.34	8.6	.3540	99
Water Access	4.72	5.9	-.3021	99
Size in Acres	3.70	4.5	.2332	90
Market Access	3.91	2.7	.0941	90

Note: Road access is not included because it has been eliminated through the stepwise regression analysis technique

From the results the status of land seems to offset significant contribution to the price of land after land use (irrigation). The status of land contributes 8.6% of the variation in the price. This is further evidenced by the large F [Table 6.3] and t [Table 6.4] statistics [see § 5.4.3.2].

Table 6.4: showing the T statistics for the MRA model.

Variable	t	sig t
Luse	2.268	.0307
Status	3.190	.0033
Waces	1.371	.1804
Macea	1.499	.1442
Races	0.478	.6364
Constant	0.719	.4779

This means that status is significant in predicting the price of land at 99% confidence. As can be seen from Table 6.3, the beta coefficient (§ 5.4.3.2) for the status is 0.3540. The results seem to suggest that except for irrigation which seems to offset higher contribution to the price of land than status, all the other variables do not seem to be significant in predicting the price.

The value 0.354 is the marginal willingness to pay for an extra unit of improvement resulting from titling (§ 5.4.3.3.4), hence the benefit of titling.

However, the small values of t and F corresponding to other variables should not lead to the conclusion that the variables are not correlated to the price [Eckert, 1990]. This low values could be attributed to the fact that some variables have the characteristic of predicting prices in combination with other variables, although individually none may be related to sales prices [cf. Figures 6.1, 6.2, 6.3, 6.4].

The average price of untitled land per acre was found to be kshs 67,708/- (when all the 86 samples were considered, except one outlier), whilst for the titled land, the price was found to be kshs 72,000/-. The mean difference in price of kshs 4,292/-, which is the net benefit of titling as perceived from the farmers perspective. This benefit resulting from titling is quite minimal considering the average price of land. In fact, the effect of titling seems to account for a paltry of 6% of the average price of land.

The results seem to contradict the expected results obtained in Figures 6.1, 6.2 6.3 and 6.4. This is because the average figure is a simple statistical figure that does not take other influences into consideration. Ideally the benefit associated with titling of land could have been investigated by considering different categories of land (eg. close and remote from physical infrastructure) [cf. Figures 6.1, 6.2, 6.3, 6.4] in order to obtain a more meaningful estimate of the benefit.

However, again as earlier pointed out, small samples limit the scope of this type of benefit estimation. The same approach could have been carried out for mixed categories.

6.3.3.2 Measurement of costs

Outlined below is the costs estimates for the farmer resulting from titling. An attempt to estimate the real costs to the farmer has been illustrated as an example based on the cost model framework [§ 5.4.3.3.4.2].

6.3.3.2.1 Actual costs to the farmers

The fees paid by the farmer for a title depends on the size of the farm. Although the exact fee per unit of land could not be established, the fee ranged from kshs 100/- to Kshs. 300/-. Transport costs and accommodation costs are comparable to the fees.

However, other costs could have been incurred by the farmer in obtaining his title eg. hospitality to the adjudication officers during adjudication, and income foregone when going to collect the title. The farmers mentioned cumbersome procedures as an obstacle in getting the title [6.4.2.1].

On the whole it can be concluded that the actual costs for titling for a farmer is relatively small.

6.3.3.2.2 Cost estimates

Estimation of costs is a difficult operation in land registration, because of eg. lack of proper business plans, complexity of sharing cost between parts of the organization and different parts of the organization, and between different organizations such as departments and ministries.

An attempt is hereby made to explain how costs can be estimated by reference to § 5.4.3.3.4.2 and figures 5.1 & 5.2.

COST⁴ CALCULATION EXAMPLE

In order to estimate costs, the different processes in titling, need to be revisited, because each process has a cost element associated with it. The process of titling involves three main processes. viz. adjudication, surveying and registration. Surveying processes in generally the most costly process in any operation [Dale, 1988]. Therefore only that cost will be considered in the example, as a minimum cost of the titling operation.

The example below (refer to § 5.4.3.3.4) illustrates how costs can be estimated. The figures produced do not mean actual costs, since enough information on costs is not available.

Mapping an area of 20 * 20 km at 1:2500, from 1:10,000 photography (W.A) flown with 60% forward and 20% side overlap.

b = 0.9 km:	No. of photos per strip	=	23 + 4 = 27
2d = 1.8 km:	No. of strips	=	12
No. of lines kms of flight	12*20kms	=	240kms.
No. of Photos=	12*27	=	324
No. of models=	12*23	=	273

Flying costs : 240km @ \$15/km = \$17,600

Material costs : 324 Photos @ \$10/photo = \$3,240

Total flying costs = \$20,840

Identification costs assuming that equal areas are of low, medium and high density.

Low density 92 photos @ \$50 per photo = \$4,600

⁴ This calculation is based on a model and should be used as a guideline to estimate costs, the figures produced do not mean actual costs.

Medium density 92 photos @ \$100 per photo	= \$9,200
High density 92 photos @ \$150 per photo	= \$13,800
Total identification costs	= \$41,400
Plotting costs	
Low density 92 photos @ \$100 per photo	= \$9,200
Medium density 92 photos @ \$200 per photo	= \$18,400
High density 92 photos @ \$300 per photo	= \$27,600
Total identification costs⁵	= \$55,200
Total costs (flying, identification & plotting)	=\$117, 440
	=\$293.60 per km²
	=<u>\$2.93 per Ha.</u>
	=<u>\$1.22 per acre.</u>

Assumptions:

- Size of the area 20 km by 20 km.
- Shape of the area rectangular.
- Photo scale 1:20,000.
- Flying @ 3500 ft.
- Minimum distance to air-photo flying altitude.
- Good weather.
- Well planned flight strips to get maximum number of models covering the area.
- Uncontrolled mosaic.
- Professional photographer.
- Area covered by low, medium and high density in equal proportions.
- The film is developed directly into enlargement positives.
- Enlargement positives are assembled into mosaics without re-photographing.
- Verification of diazo-copy involves editing of fair drawing and not re-establishing parcel boundaries.
- Diazo-copy and mosaicking are carried out as one single process.

⁵ The model is used as a guideline to estimate costs, and the figures produced do not mean actual costs because enough information was not available.

6.3.3.3 Cost Benefit analysis

Recall (from § 5.4.3.3.2) that benefit cost ratio is given by: Net benefit/cost.

In the study, using the mean price/per acre of land, (for titled and untitled), the net benefit is given by

$$\text{Price(Titled)} - \text{Price (Untitled)} = \text{kshs } 4292/-$$

The fixed cost of obtaining the title, base on the conservative estimates using public transport is approximately kshs/- 500/-.

This would give an average benefit cost ratio of

$$4292/500 = 8.6 \dots\dots\dots (i)$$

This ratio shows that the benefit to the farmer is 8.6 times the cost he incurs. This ratio shows that titling could give high returns from the farmers perspective.

It may be concluded that titling of land seems to be beneficial to the farmer when he is not paying survey fees, but only charged for a nominal fee (including transport).

6.3.4 Remarks

The actual costs could be estimated via the cost model illustrated in § 5.4.3.3.4.2 & § 6.3.3.2.2, and this would give a more realistic ratio, once the actual benefits have been established through actual land prices, or agricultural production.

However it should be clear that other considerations must be taken into account, when farmer has to decide whether to take the title. If the farmer does not perceive the presumed benefits, he/she will not go for the title. Besides, as mentioned above, the intangible costs of getting the title may be much higher [§ 6.3.3.2.1].

A Cost/Benefit analysis at regional level would be interesting, to evaluate the impact of tiling.

6.4 Qualitative analysis of results

Feder's [1987] arguments and conceptual framework suggested that titled land offers more security to the lender and thus an incentive for investment. Recall from § 4.2 that he postulated that reduction in investment would result in reduction in demand of variable inputs which are complementary to capital accumulation and hence a reduction in output per unit of land and value of land.

Cross sectional interviews with untitled and titled farmers⁶ yielded the following responses

⁶ In the discussion the word farmer should be taken to mean the owner of the land.

along some themes derived from Feder's [1987] causal chain (§ 4.2).

6.4.1 Untitled farmers:

All the 55 farmers interviewed said they would opt to have their land titled. However they felt disenchanted that the title documents were to be collected from the District Land Registry office. They voiced their feelings that the District Land Registry should decentralize its operations to the location level to minimize the costs of collecting the title. Reasons for opting for titling are summarized below.

- (i) Security of their land.
- (ii) Enable them to access credit to purchase farm implements (eg. water pumps), for farm improvement (piping for water, irrigation, keeping of grade cows & stock cattle and other domestic needs eg. school fees), and to purchase extra land.
- (iii) Act as security against court cases.

6.4.1.1 Aspect of credit

3 out of 55 farmers, a mere 5%, had taken formal credit (5%). One farmer reported having taken a cooperative loan with which he bought a water pump machine and an extra piece of land whilst the second farmer purchased a tractor. Both these farmers are full time employed (one locally and the other in Nairobi) and farming is their secondary occupation.

The third farmer is a full time farmer and he used his credit for farm inputs in terms of fertilizer and insecticides.

6.4.1.2 Investment

Ownership of an ox-plough (farm implement) seemed common to all the farmers sampled. In fact 43 (78%) of the sampled farmers owned at least an ox-plough. A farmer who reportedly owned 3 ox-ploughs, 2 carts, and 4 sprayers had the highest number of farm implements among the sampled farmers. The village head reported him as one of the prominent farmers within his jurisdiction. He was seconded by one of the village heads who had 4 ploughs, and 1 oxcart. The farmer who purchased a tractor is an elite working in Nairobi, and has other sources of income.

Table 6.5 showing the percentage of farmers using fertilisers

Variable Inputs	Percentage of farmers [†] Kithimani sub-location (n=55)
Natural fertilizers (Manure)	85%
Chemical fertilizers	50%

[†] Some farmers used both hence, total \neq 100%

Source: Field survey December 1994 - February 1995

All farmers who used chemical fertilizer also used natural fertilizer (manure).

It was observed that all but one farmer who used chemical fertilizers had their land irrigated. This is attributed to the fact that farmers who had irrigated their land generated more from on-farm income. However, one farmer had irrigated his land but reported not having used any chemical fertilizer. The farmer was a widow and she reported that she could not afford the fertilizer.

Only one farmer who was irrigationally constrained, had used chemical fertilizer. Since he had bought a pump machine, he had reasonable off-farm income.

All the farmers reported having received extension exposure in terms of farming advice. Although this appeared to be the effort of the government programme to provide extension services rather than the initiative of the farmers, as elsewhere noted by Alcoba et al (1983).

Terracing seemed to be universal on all the farmers sampled. A study carried out by Rostom & Mortimore (1991) in Machakos district indicated that 100% of the blocks (under their study) had been terraced. Information from background reading suggests that terracing was imposed on the inhabitants during pre-independence (before 1963). The observed terraces on the farmers visited could be attributed to the fact that farmers have opted to maintain a status quo of the forced terracing earlier prescribed to them. Nevertheless, terrace maintenance cannot be generalized for all the farmers.

In terms of investment in trees, the results of a t-test analysis provides no evidence to suggest that investment in terms of trees is related to the titling of land as hypothesized in § 1.2. Table 6.6 below shows that the mean number of trees for untitled (status = 0) and titled land (status = 1) were approximately 138 and 36 respectively.

Table 6.6 showing the mean number of trees for titled and untitled sections.

Variable	Number of Cases	Mean	SD	SE of Mean
TREES				
STATUS 0	33	137.8485	227.166	39.545
STATUS 1	27	36.2593	45.808	8.816

Mean Difference = 101.5892

As can be seen from the Table 6.6, the standard deviation is very high due to some farmers with exceptionally high number of trees.

The implication of this is that some aspect of security is inherent in the indigenous land tenure system (Tiffen et. al., 1994), contrary to Feder (1987). This could be explained by the fact that no indigenous system of land tenure was in existence in Thailand. Furthermore land did not possess value for commodity over and above its agricultural productivity (Pickney and Kimuyu, 1991). Farmers under customary land tenure system seem to be less eviction prone than farmers in the Thailand situation over which Feder [1987] based his arguments.

6.4.2 Titled farmers

6.4.2.1 Title deed collection

Out of 31 farmers with titled land interviewed six (19%) had not collected their title deeds. They pointed out several reasons which as to why they had not collected the documents. Two claimed that they have been suffering from periodic illness. The other four reported costs⁷ as having inhibited their collection of the same. One farmer, who had two pieces of land and had managed to collect title documents to only one of them, felt that the procedures of collecting the title were too discouraging. His opinion was that administrative procedures unnecessarily delayed the process. Another farmer collected only one title for his two farms since only one title was being issued at the time. Since he collected his title in early 1993, when the collection of title documents had just been publicized, there was a possible influx of prospective title holders to the District Land Registry office. This could have prompted the land titles issuing officers to enforce a temporary control to ensure that at least every farmer who visited the office collected a title document. His case seemed to be unique and the same could not be confirmed by a visit to the District Land Registry office. However, a lot of activity seemed to be going on with regard to land transactions. However it was not possible to establish whether these were normal land transfers matters or farmers collecting titles for first registration.

⁷ Costs in this context refer to fees for being issued the title documents, transport to the District Land Registry office and foregone costs.

All but one farmer reported having had to spent a whole day in the process of collecting title documents. The exceptional farmer spent two days, because he had gone to the District Land Registry office late and his title documents could not be processed in time.

Title Deeds certificates were collected between the periods March 1993 and January 1995.

6.4.2.2 Security of tenure

Proprietors indicated that with titled documents no one would dispossess them their land. As elsewhere, Barrows and Roth [1990] mention that three quarters of the respondents interviewed mentioned that land titling had increased security of tenure. It was not possible to discern any litigations for both titled and untitled farmers. In addition, no incidence of disputes was reported during the interview.

Although the respondents were not directly confronted with the issue of disputes, the social repercussions linked with the disputes should have spilled out, at least to a discernible level, during the interview. Alternatively, perhaps the field interview did not provide the farmers with an appropriate forum within which they could raise matters related to disputes. Odingo [1985] mentioned that 98.4% of the farmers who had obtained land titles had no recent serious litigation.

However, the data in the study was not sufficient enough to draw any elaborate conclusion in the respect. Moreover, it was not possible to liaise with the local court to obtain hard data regarding this issue because of time constraint.

6.4.2.3 Aspect of credit

None of the 31 farmers had taken credit based on their titles.

Respondents were of the opinion that title documents would provide access to credit to further investments in their land. Different farmers reiterated that they viewed a title document as a 'mere piece of paper'.

Farmers reported that access to credit was severely hampered by other constraints that have deferred them from subscribing to the credit. They elucidated these constraints as payment of unofficial fees (bribes & kickbacks) in order to access these loans in addition to friendship and kinship ties. Shipton [1992] mentioned out that no one for certain knows the frequency of aggregate amount of payments made under the table. Also there is some reluctance on the part of the institutions that offer loans. This is because the banks⁸ have found the courts reluctant to allow taking over of land offered by farmer as his security for loan [Haugerud, 1989]. This implies that the default risk is quite high; 'the list of AFC⁹ defaulters resembled a roll call of Kenya's political leaders' [Weekly review, 12 feb 1988 pp. 32]. It was not possible however to interview a farmer who had taken title-based credit, despite several

⁸ The banks referred here are Kenya Commercial Bank and Agricultural finance cooperation.

⁹ AFC refers to Agricultural Finance Corporation.

attempts as he was reportedly absent. As elsewhere, Okoth-Ogendo [1976] notes that farmers who received the titles did not expand credit because of constraints on the supply of the same. Ogendo adds that the carrot of credit, so long dangled before farmers as a lure for accepting land titling remains for most an illusory one.

The dismal percentage of 2% (2/115) of farmers who had taken credit as elsewhere observed [Pinckney and Kimuyu, 1994] seems to support the study that almost no credit undertaking seems to result from titling contrary to Feder's [1987] findings. However, the almost virtual absence of formal lending has prevented testing of the hypotheses.

Nonetheless, some farmers did not opt for credit, since they felt that their repayment interests rates were high and feared the possibility of losing their land. Elsewhere Odingo [1985] and Pinckney and Kimuyu [1985] mention that farmers would never accept a land secured loan if there were the least possibility of losing land.

Also reported by the farmers were the agro-climatic constraints which have contributed to their reluctance of undertaking credit. The rainfall unreliability constrained them from undertaking credit because farm produce was not guaranteed. Nevertheless, some farmers seemed to be ignorant of the need for credit whereas others lacked the know how of the mechanism on how to access the credit.

6.4.2.4 Investment

Farmers cited different reasons to which they would put credit into use. These are summarized below as:

- (i) Purchase of farm implements.
- (ii) Use of yield improving inputs such as chemical fertilizers, insecticides and imported seeds (eg katumani maize).
- (iii) Fence their land and plant grass.
- (iv) Invest in farm labour, services, sales and marketing factors.

Table 6.6 (§ 6.4.1.2) indicates that there is no increased investment in terms of trees on the part of titled farmers. These results seem to be contrary to the hypothesis (§ 1.2) and the school of thought advanced by Feder [1987].

The results of the Chi-square test (see, § 5.4.3.1.3) offers no evidence to confirm the relationship between increased investment in terms of constructing irrigation sub-channels [Table 6.7 below].

Table 6.7 showing irrigation (across) versus status (down)

Row percentage Column percentage	0	1	Row Total
0	48.8 40.0	51.2 72.4	41 51.9
1	78.9 60.0	21.1 27.6	38 48.1
Column Total	50 63.3	29 36.7	79 100.0

Pearson Chi-Square $\chi^2=7.72$, df 1, $\alpha=0.005$

Non-irrigated, irrigation status = 0: Irrigated, irrigation status = 1

Untitled, status = 0 : Titled, status = 1

As can be seen 72.4% [Table 6.7] of titled land is not irrigated. This further confirms that investment in terms irrigation is not dependent on the status of land.

In terms of fertilisers, the percentage of farmers using natural fertilisers seems to be more or less the same for both titled (87%) [Table 6.8] and untitled farmers 85% [Table 6.6]. The percentages are more or less the same because all the farmers (titled and untitled) kept some form of livestock from which they could get the natural fertilisers.

However, with regard to the use of chemical fertilisers, only 26% of titled farmers [Table 6.8] used chemical fertilisers, where as 50% of untitled farmers [Table 6.6] used chemical fertilisers. This could be attributed to the fact that a greater percentage (78.9%) of untitled farmers had their land irrigated, hence more of them purchased chemical fertilisers to improve their yield [Table 6.7]. Only 21.1% of titled farmers [Table 6.7] had their land irrigated and hence the corresponding low investment in terms of fertilisers. The implication of this is that titling of land in itself has not attracted use of fertilisers in land. This could be attributed to the lack of credit, which is a prerequisite to investment. It may be inferred that a greater percentage of untitled farmers generate more on-farm income part of which is re-cycled into the farm in terms of investment in chemical fertilisers.

Table 6.8 showing the percentage of farmers using fertilisers

Variable Inputs	Percentage of farmers [†] Matuu sub-location (n=31)
Natural fertilizers (Manure)	87%
Chemical fertilizer	26%

[†] Some farmers used both hence, total \neq 100%

Source: Field survey December 1994 - February 1995

Although the credit taken by the farmers has been directly used for on farm investment, the data (6%) is too scanty to warrant any elaborate deduction. Shipton [1992] mentioned that most of the loans were borrowed for non-farming purposes like trade, housing school fees and consumption and not the least for marriage payment, as elsewhere noted by Haugerud [1989].

Again, the almost virtual absence of data on formal lending in this study prevents testing the hypotheses. However the little evidence presented above seems to suggest that investment on land via transmission of land secured credit may not be fully functionally related as perceived in the western conceptual glasses. More research on what farmers do on their credit is recommended.

6.4.2.5 Land Market and Land Value

Recall Feder's [1987] arguments (§ 4.2) that titling is supposed to stimulate land market. A visit to the District Land Registry office did not seem to reflect a lot of activity on the Land Register.

Barrows and Roth [1990]; Haugerud [1989] observed that many people decided to make purchases immediately prior to registration in order to have holdings adjudicated in their name. Out of approximately 500 records perused only 15 (3%) transactions had been recorded in the Land Register. The results seem to indicate that the land market is dormant.

Place and Hazell [1993] and Birgegard [1993] mentioned that current farmers had access to land titles but they were not bothered to update existing titles to reflect current ownership status. As elsewhere, Wilson [1972] mentioned that 75% of the sellers of land sold it because of financial difficulty.

Table 6.9 shows the data on prices obtained from the District Land Registry office. The purpose of the Table is to compare the actual prices obtained from the District Land Registry with those obtained during the interview. 3 farmers were recorded as having received their land as gift. The land prices have been inflated using 16% discount rate (Approximate current interest rate¹⁰ of the National Bank of Kenya).

Table 6.9 showing the actual prices per acre as obtained from the Machakos District Land Registry office.

Year	Interest rate factor	Date	Price in Kenya Shillings (kshs)	Size in Hectares (Ha)	Present worth Price /Acre
t_0	$(1.16)^0$	12/01/95	40000/-	0.79	20491/-
t_1	$(1.16)^1$	14/9/94	42,000/-	0.31	63,603 [†] -
"	"	17/3/94	100,000/-	2.00	23,472/-
"	"	1/7/94	25,000/-	0.49	23,952/-
"	"	-/8/94	15,000/-	0.25	28,167/-
t_2	$(1.16)^2$	7/6/93	10,000/-	0.70	6706/-
"	"	8/6/93	39,000/-	0.77	27,582/-
"	"	4/3/93	5,000/-	0.06	45,379/-
"	"	4/3/93	30,000/-	1.30	12,567/-
"	"	1/9/93	5,000/-	0.39	6,981/-
"	"	23/9/93	45,000/-	0.48	51,053 [†] -
"	"	20/7/93	15,000/-	0.39	20,945/-
"	"	13/9/93	15,000/-	0.80	10,210/-

[†] The prices appear realistic when compared with those reported during the interview.

Source: District Land Registry office, Machakos, Kenya.

Notwithstanding the very low transaction activity reported from the District Land Registry office, the prices obtained from the District Land Registry seem to grossly underestimate the prices reported by the farmers during the interview. This discrepancy could be attributed to under-reporting of these prices because of high transaction charges on land transactions [Pinckney and Kimuyu, 1994, Haugerud 1989]. Alternatively this could be because farmers have some form of sentimental attachment to their land and hence expect higher price than

¹⁰ The interest rate has been fluctuating between 23% and 16% within the last two year, due to the instability of the Kenya shilling against the hard currencies.

the market price from their lands. As noted by Shipton [1992], the attachment to land in some communities was so strong that it was that it was a betrayal to alienate land.

Only two prices seemed to be in harmony with those reported from the interviews. However, it may not be wholesomely concluded that the sales were underestimates. Perhaps there were sellers who could have sold the land because of financial hardships (eg widows or farmers desperately in need of money for school fees) [Barrows and Roth, 1990]. The two prices are still below the average price of titled land as reported by the farmers.

The data is scanty and it is dangerous to extrapolate too far. However, it gives an indication, in part, of the dynamics of transactions as reflected on the District Land Registry.

6.5 Concluding Remarks

The results obtained from the analysis of graphs and via Multiple Regression Analysis suggests that titling of land has to be considered together with a host of other factors to justify its impacts.

Regression results show that other physical characteristics hardly have any significance in explaining the price of land except irrigation on land. This could only be verified with more samples and more variables in the regression analysis.

However, in order to evaluate the impacts of titling, an economic Cost/Benefit analysis based on the real benefits [eg. agricultural productivity] and real costs of providing titling would be more interesting.

CHAPTER SEVEN

7. CONCLUSIONS AND RECOMMENDATIONS

The study has largely addressed its objectives and the following conclusions and recommendations can be made.

7.1 Conclusions

The present study has looked at the influence of titling on the price of land in Matuu location, Machakos district, Eastern province, Kenya.

The study also looked into the relation between price of land and aspects of physical infrastructure, particularly access to the road, water, market and effect of irrigation within fixed agro-ecological constraints.

The study has made reference to considerable merits associated with titling of land viz. increased security of tenure, easier access to credit, increased investment, higher agricultural output and higher land price amongst others [Feder, 1987].

The study showed that the potential merits associated with land titling is greatly influenced by a host of other factors. The results indicate that titling of land has an influence on land price only in the presence of physical infrastructure.

The findings from the study indicate that,

Titled rural land close to some physical infrastructure has a higher land price¹/per acre (hence higher agricultural productivity/potential) than an identical tract of untitled rural land².

Titled irrigated rural land has a higher land price/per acre (hence higher agricultural productivity/potential) than an identical tract of untitled rural land.

Titled remote rural land has generally the same price as untitled rural land, hence the agricultural productivity is expected to be the same.

The results imply that the impacts of titling should always be addressed in anticipation of these factors.

Regression analysis results confirm that titling and other factors influence the price of land.

With regard to investment, titling of rural land has not resulted in increased investment on land in terms of undertaking more improvement [eg. planting trees,) or use of variable inputs [eg. fertilizers]. The results on the contrary indicate more investment in land on the part of

¹ land price per acre referred to here is the average price.

² Untitled rural land referred to should be taken to be irrespective of its closeness or remoteness from some physical infrastructure.

untitled farmers.

Increased security of tenure from titling of land has not been reflected in increased credit undertakings as postulated by different studies [eg. Feder, 1987]. The virtual absence of land secured credit by titled farmers implies that access to credit is not a 'turn-key' operation once land has been titled. Title documents are only a prerequisite to access to credit only when other factors have been taken into consideration.

Titling of rural land seems to be economically feasible for the farmers so long as he/she is being charged fees³. However, it is inconclusive as to whether it would be economically feasible when considering the social costs⁴ of providing the title.

However, if farmer do not expect or perceive the presumed benefits from titling of land, they will not go for the title.

This all shows that titling of land should be considered within a wider context (i.e together with other factors) in government programmes/projects.

However it should be noted that the sample data was too limited, and more data would be necessary to verify the conclusions.

7.2 Recommendations

The study has provided a framework along which the benefits vis-a-vis the costs associated with titling can be estimated.

The benefits from the study has been based on pseudo observations of land prices and costs paid by the farmer. A more realistic evaluation of the impact of titling could be obtained by measuring economic performance [eg. agricultural productivity, land price] via use of hard data on the benefits and the costs, and this would be more interestingly be carried out at the society (regional) level, with varying agro-ecological constraints.

Several other lines of research may be undertaken based as follows,

- (1) Investigate what farmers do with credit based on their titles.
- (2) Further study into a more refined regression model via which the benefits of titling can be measure encompassing more variables. This is because the studied variables have not given a conclusive picture about variation of land prices.
- (3) More studies on the relationship between agricultural output, land price and

³ The fees charged to the farmer do not correspond to the cost of titling the land, they are heavily subsidized by the government.

⁴ The social costs and benefits are more complete concept of economic value, whereby goods and services are evaluated at the real value of resources required to provide them.

investments.

- (4) Further study into other possible benefits of titling (eg. higher security).

The framework adopted in this study of estimating benefits and costs of titling may be adopted by the Kenya government in assessing the feasibility of the current titling program that has continued since mid- 1950's to date. This would help the government in making investment decisions in view of scarce resources facing its economy.

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CRIBSHEET TECHNOLOGICAL

- Farm size
- Cultivated area and grazing area
- Fertilizer
- Crop grown (food, cash)
- Livestock
- Source of farm power
- Water available
- Source and use of farm inputs
- Off farm activities and employment
- Access to markets
- Availability of credit
- Major production/developmental changes
- Rights and tenure on farm

Note: To confirm that the questions are being framed in a simple manner (e.g. "How much land do you own?") the questions are being tested on a group of farmers. The feedback on the results of the test will be used to revise the questions and the order of the questions.

CRIBSHEET TECHNOLOGICAL

APPENDICES

Generation for the farmer

- Sample no.
- Secondary occupation of farmer
- Location
- Size

Adjudication (to the adjudication officer)

- How is adjudication of customary land carried out?
- What problems are encountered in the adjudication of customary land?
- How often do disputes over ownership of land arise?
- What procedures are involved to resolve disputes specifically over boundaries?
- What causes the disputes?
- How often do these boundary disputes occur?
- What are the causes of disputes?
- What documents are prepared during adjudication?

The procedure to be cross-checked with a few farmers. The questions apply to both customary and statutory land. (The CRIBS attempt to explain the role of Survey of Kenya and the process of adjudication)

CHECKLIST RECONNAISSANCE

- Farm size
- Cultivated area and grazing area
- Topography
- Crops grown (food, cash)
- Livestock
- Source of farm power
- Water availability
- Sources and use of farm inputs
- Off farm activities and employment
- Access to markets
- Membership of cooperatives
- Major problems/possibilities in farming
- Rights and status on farm

Aim: To confirm that the area represents a single farming system (eg. Maize based/maize/beans based). To be carried out at random to develop an idea of the study area and type of farmers and farming practices.

SAMPLE QUESTIONNAIRE:

Ownership (to the farmer)

- Sample no.
- Secondary occupation of farmer
- Location
- Size

Adjudication (to the adjudication officer)

- How is adjudication of customary land carried out ?
- What problems are encountered in the adjudication of customary land ?
- How often do disputes over ownership of land arise ?
- What procedures are involved to resolve disputes specifically over boundaries ?
- Who resolves the disputes ?
- How often do such boundary disputes occur ?
- What are the causes of disputes ?
- What documents are prepared during adjudication ?

nb. Procedure to be cross-checked with a few farmers. The questions apply to both customary and statutory land. (The DFDS attempt to explain the role of Survey of Kenya and the process of adjudication)

Surveying (at the national level, superintending survey office)

- What are the standards for cadastral survey techniques
- What survey techniques are carried out ? (eg. Chain survey, cadastral survey, topographic survey etc)
- What is the existing process of first registration ? (eg. provide options for title deeds, lands certificate)
- What different alternatives in line with the acceptable standards may be adopted ?

Costs (from the district survey officer)

- How much fees do owners pay for adjudication ?
- What are the major overhead costs associated with the survey of land ?
- How much fees do owners subscribe for survey of land ?
- How much do they pay for registration ?
- Are there any miscellaneous costs ? If so how much ?
- How much does it cost to survey an area ?
- What is the relationship between costs and fees ?
- Would alternative surveys influence fees ?

nb. The information to be cross checked by a few farmers.

Land tax office (to the land tax officer, district level)

- How much tax is paid on transfer of land ?
- On what basis is the value of land assessed ? Is it up-to-date ?
- What percentage of land has been assessed ?
- How many sales taken place annually ?
- What percentage of properties are mortgages ?

nb. The questions apply to statutory land.

Rights (to the farmer)

-Have you collected your title/certificate to the land ? YES/NO
If NO why ?

-Did you incur any costs ? YES/NO If yes which costs ?

-How long did it take you ?

n.b The above questions apply to titled land.

-What rights do you have on your land ?

- (i) grow crops (ii) transfer (iii) grazing (iv) cut trees
- (v) others

-Are there any other rights co-existing with your rights ?

(i) use rights/grazing rights (ii) use rights/planting rights (iii) others

-Would you opt for a conversion from customary to statutory tenure ? (for land held under customary tenure) ?

If YES why ? (i) transfer (ii) investment (iii) no conflicts
(iv) Access to credit (v) Others

If NO why ? (i) No expectations, no need (ii) too much obstacles (finance, time)
(iii) too high costs (iv) others

-What are the benefits of having your land under this system of tenure (for land held under statutory tenure) ?

(i) Transfer (ii) Access to credit (iii) others

-What limitations (disadvantages) are associated with this system of tenureship (for land under statutory tenure) ?

(ii) Breakdown of indigenous institutions (ii) Risk of lose of land through financial institutions.

(iii) Others

-How did you acquire your land ?

(i) Buying (ii) Gift (iii) Government allocation (iv) Inheritance
(v) Others

nb. These questions need to be answered by a few farmers and where information is missing the gaps can be filled by questioning others.

Benefits (to the farmers)

-Do you know what is the average price of land ?

range(i) range(ii) range(iii) range(iv)

-How much money would you expect from your land if you would sell it ?

-Did you buy land in the last five years ? if so how much ?

range(i) range(ii) range(iii) range(iv)

-Would you expect if your land was titled ? **(for customary land)**

nb. Both questions apply to both customary and statutory land.

Improvement (to the farmers)

-How many farms do you own ?

-What is the total area of the farms ?
(i) 0-5 acres (ii) 5-10 acres (iii) 10-20 acres (iv) 20-40 acres
(v) > 40 acres

-What is the area of land
(i) under cultivation(%) ? (ii) under grazing(%) ?

-What crops do you plant on your farm ?
(i) food crops (eg. Maize, beans, cowpeas, s. potatoes, onion, tomato, chilies, cabbage, others.
(ii) cash crops (eg. cotton, tea, etc)

-Have you planted trees ? if Yes for what purpose ?

-What farm inputs have you used on your land ?
(i)insecticides (ii)improved seed (iii)chemical fertiliser
(iv)hired labour (v) others

-Do you own or share

own share no

-an ox-plough ?
how many ?
what type ?
-an ox cart
-a sprayer
what type ?
what volume ?

-How many cattle (goat, sheep, cows) do you have ?

-Have you ever used a tractor for your ploughing ? If so when ?

-Have you contacted an extension officer, in terms of advice on farming ? YES/NO

-What improvement in land did you make ?
(i) Ditches and trenches (ii) borehole (iii) barns, stables, stores
(iv) Others

nb. the questions apply to both types of systems.

-What investment in soil conservation did you make ?
(i) Soil fertility (ii) mulching (iii) others (iv) none (why)

Observations

-No. of corrugated iron roofs
-condition of grain store. (bad/medium/good)

Accessibility (to the farmer)

-How long does it take to the nearest (road) by car ? (what is the approximate distance ?)

-How far is the market place ?

-What is the availability of public transport ?

(i) A few hours a day (ii) Available in half a day

(iii) Available in a whole day

Observations

-Type of road surface (earth, stone or road)

-no. of traffic lanes (one lane, two lane for specific vehicles, two lane for all)

-vehicles

Sources of credit

-Do/Did you obtain any credit ?

-Which financial institution gave you credit ?

(i) Agricultural finance corporation

(ii) Commercial Bank

(iii) Private money lenders

(iv) Others (specify)

(v) None (Why)

-Did you need a collateral for the credit ? YES/NO

If yes which ?

(i) Land title (ii) others

-What is the interest rate p.a

-How did the credit help you ?

(i) farm inputs (ii) machinery (iii) Digging a borehole

(iv) Others (specify)

-Would you consider having a land title as having any merits ? YES/NO

If YES which ?

(i) Security of ownership

(ii) Can be used as a collateral

(iii) Less land/boundary dispute

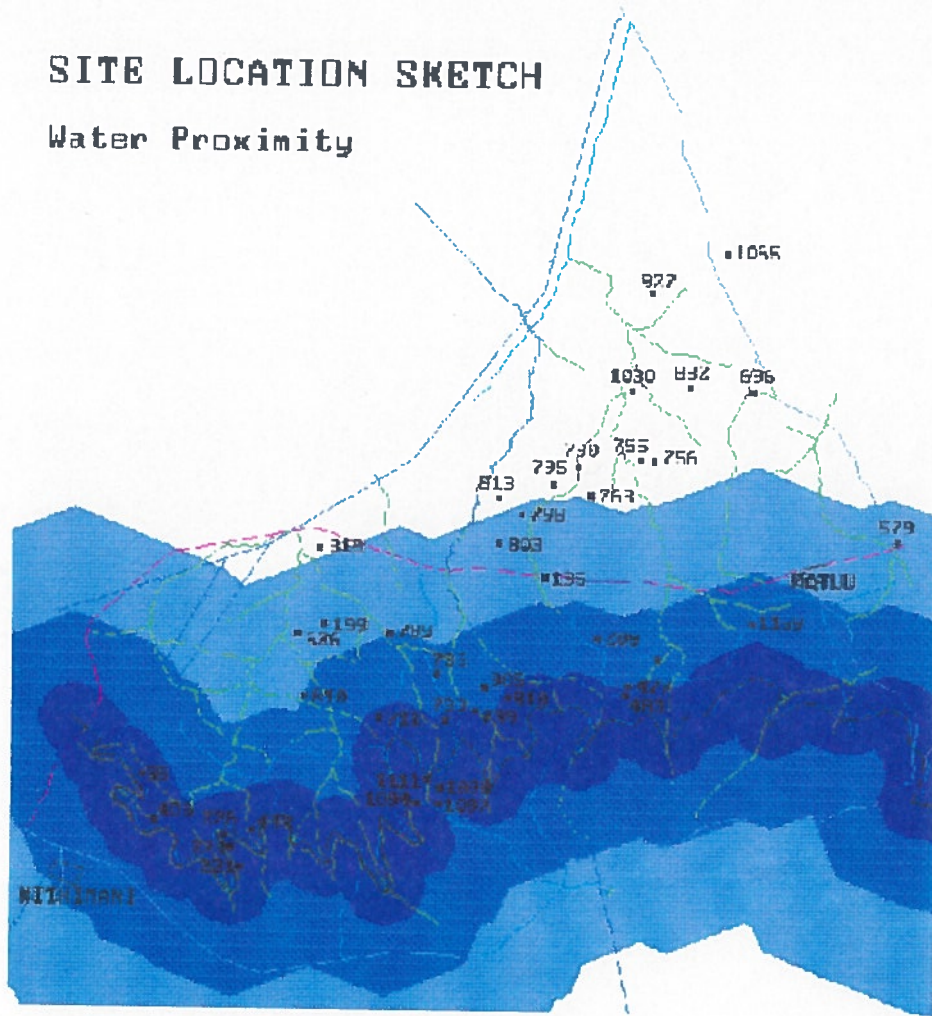
(iv) High land price

(v) Others (specify)

Appendix A2 Showing the Buffering on the Yatta Furrow, based on the distances from the Yatta furrow. Sample points close to the furrow have higher frequency of irrigation access.

SITE LOCATION SKETCH

Water Proximity



Legend

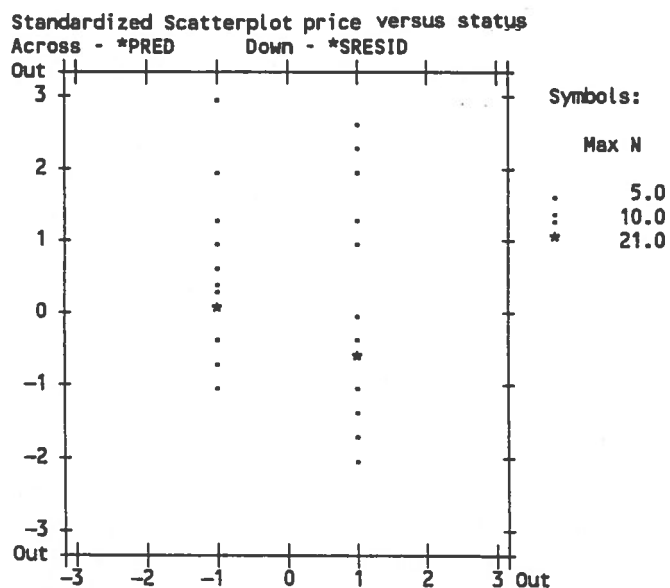
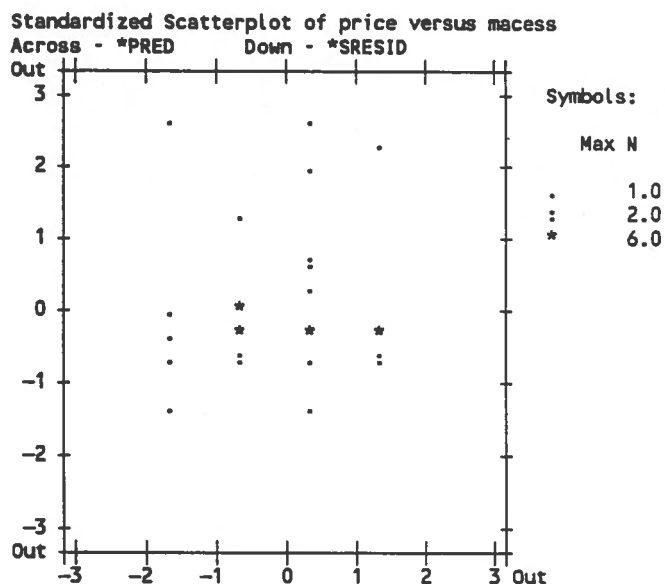
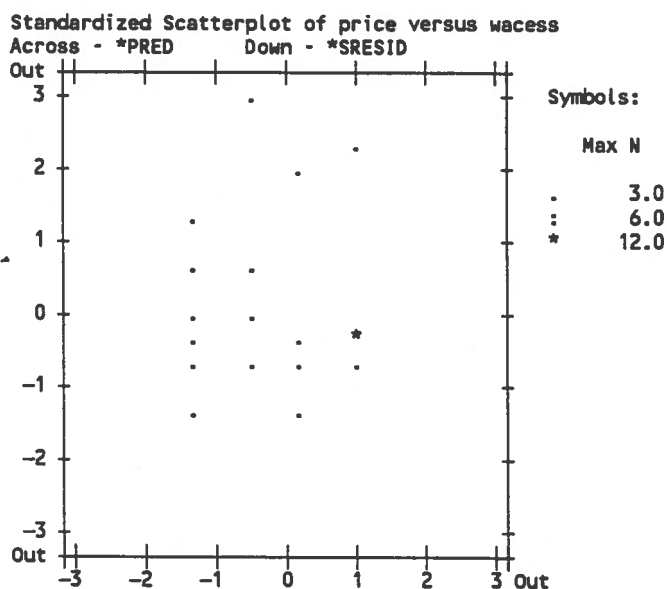
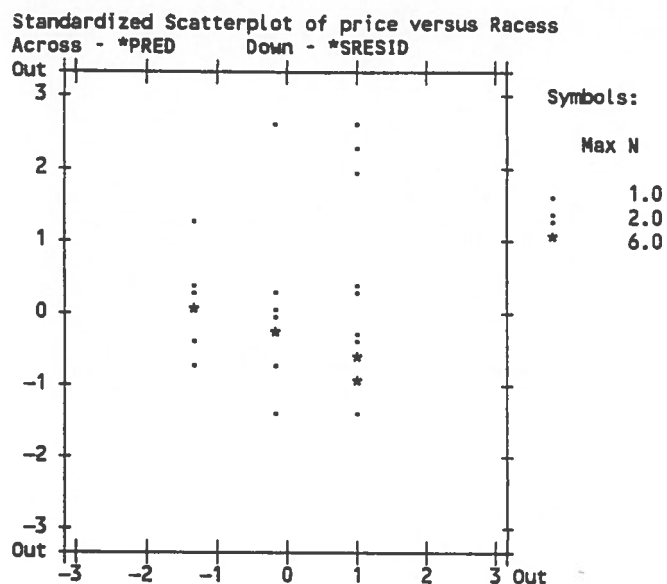
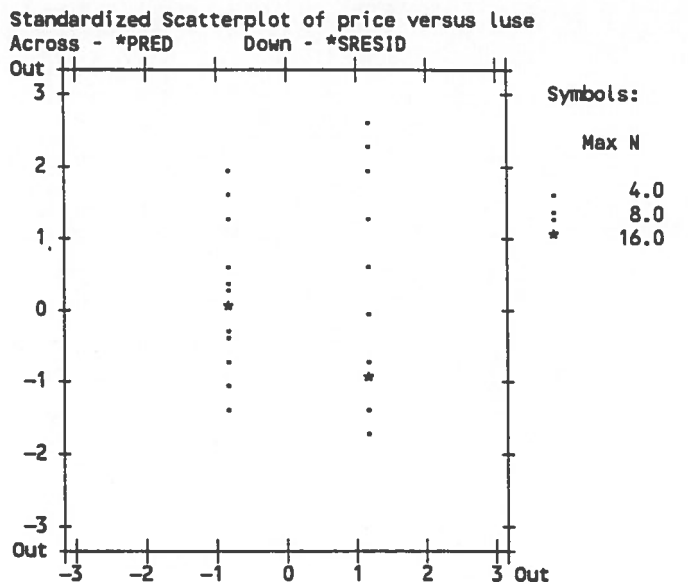
sample points

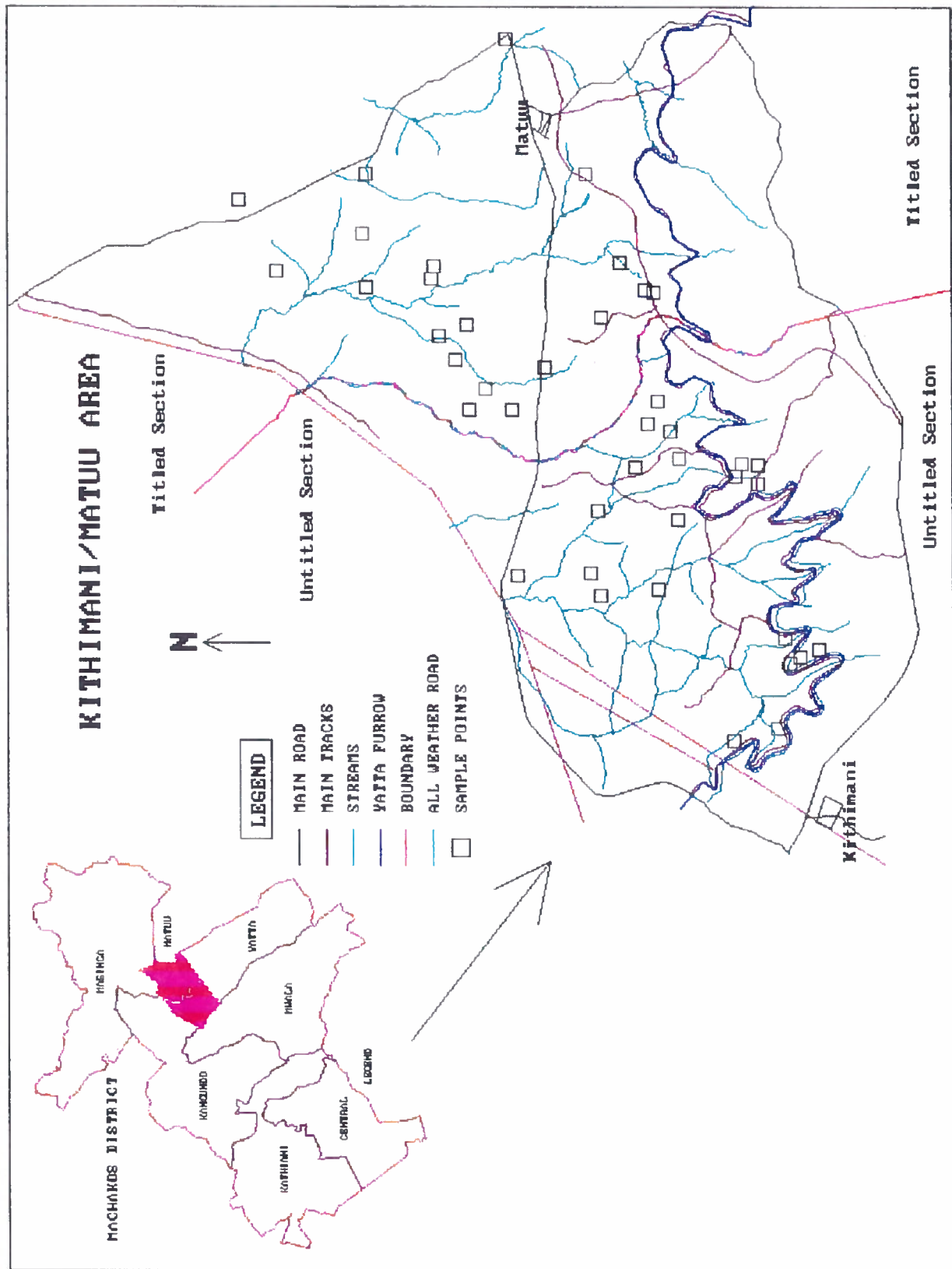
■ Upto and less than 0.5 km

■ Between 0.5 km and 1.5 km

■ Greater than 1.5 km but less than 3.0 km

Appendix A5 Showing the pattern of scatter plots for other variables that were used in the MRA model.





Appendix B1 Corresponding to the District map showing the titled and untitled sections..

Appendix C1 FormI used for applying for the letter of consent to the District Land Board.

REPUBLIC OF KENYA
THE LAND CONTROL ACT
(Cap. 302)

APPLICATION FOR CONSENT OF LAND CONTROL BOARD
To be submitted in TRIPLICATE in respect of each transaction and sent to or left at the appropriate office of the Commissioner of Lands

To: THE
LAND CONTROL BOARD.

L.C.R. No.

I HEREBY apply to the
Land Control Board for its consent to the transaction described below, and give the foillowing information:

1. (a) Present registered holder of interest (full name in BLOCK LETTERS):

.....

(b) Nationality
(c) Address

2. (a) Proposed purchaser, transferee, mortgage, chargee, allottee, etc. (full name in BLOCK LETTERS)

(b) Of a limited liability company, names of directors authorized and issued share capital and principal shareholders; if a co-operative society, names of chairman, secretary and treasurer and total number of members:-

.....
.....
.....

(c) Nationality Certificate No.
(d) Address

3. Nature of transaction (e.g. sale, gift, lease, mortgage, charges, etc.; if sale or allotment of shares name of company, number and particulars of shares to be transferred)

.....
.....
.....

4. Term (i.e. the length of time for which the land affected is to be transferred or leased if sale or allotment of shares, authorized share capital of the company and numbers of shares issued at date of application

.....

5. Description of Land—
L.R. or Parcel No.

Area
Locality
County Council

Appendix C2 Form RLI use for applying to transfer land.

Date received for Registration: Presentation Book Registration Fees: Shs.
..... 19 .. No. / 19 .. paid. Receipt No.

REPUBLIC OF KENYA

R.L 1

THE REGISTERED LAND ACT
(Cap. 300)

TRANSFER OF LAND

TITLE No.

I WE

in consideration of

(the receipt whereof is hereby acknowledged) **HEREBY TRANSFER** to

.....

.....

of

the land comprised in the above-mentioned title.

The Transferees declare that they hold the land as joint proprietors/as proprietors in common* in the following undivided shares:—

Dated this day of,
19

Signed by the Transferor
in the presence of:—

I CERTIFY that the above-named

.....

appeared before me on the day of,
19

and, being known to me/being identified by*

of
acknowledged the above signature or marks to be his (theirs) and that he (they) had
freely and voluntarily executed this instrument and understood its contents.

*Signature and Designation of
person Certifying*

*Delete whichever is not applicable.

(P.T.O.)