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SOCIO-ECONOMIC EFFECTS OF
RURAL ELECTRIFICATION
AN INTERIM REPORT

By

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WORKING PAPER No. 175

INSTITUTE FOR DEVELOPMENT STUDIES

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ABSTRACT

This paper presents some preliminary results in a rather descriptive way: the little result of an unsuccessful general survey, a presentation of consumption patterns in ten selected places and three surveys (business-household- and attitude-). The social effects are not treated very much in this paper.

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1. Introduction

The study is organised at a national and a local level with an emphasis on the latter.

1. The study on the national level can at present be said to consist of two parts, the General Survey, Chapter 2, and Consumer Patterns, Chapter 3. Of these the General Survey was inhibited due to reasons outside my control. The purpose with it was to visit some 25 places selected in co-operation with the Ministry of Power and Communications in order to gather some basic information.

Chapter 3, Consumer Patterns, is a first outline of the next step. Here the number of places studied is down to 10 (of which two are treated jointly), mainly due to practical reasons. In this group are, however, centres electrified both recently and a long time ago. Eight of them are, or have been, sub-economic. They are geographically rather well spread, even though there are no centres from Coast, Western or Central Provinces.

2. The local level is covered by intensive studies. One is presently carried out in Isiolo and three other areas are being prepared. These are Garissa, Meru and a third not yet decided on (it will be in Nyanza or Western Province).

In Isiolo three major series of interviews are being carried out: business interviews, household interviews and interviews about people's expectations on electricity (Isiolo is not yet connected to the transmission system). The purpose is, among other things, to get a good picture of the economy of the township, how many people are able and willing to have electricity, what economic and social effects it might have, what effects people think it will have, if other development projects should be given priority, etc.

a. Business Interviews

Some preliminary results from the interviewing in Isiolo are presented in Chapter 4. Here can, for example, be seen the kinds of businesses, the values of the stocks, turnover, how much the businessmen are willing to spend on electricity and what they would use it for.

By reasoning around each businessman's possibility to afford electricity and his interest in having it, a prediction can be made as to how many businesses would probably get electricity immediately after electrification, how many would probably get it rather soon after electrification, etc. (see Chapter 4). At present this reasoning might be a bit of a guesswork. However, with comparisons with areas already electrified (long ago and recently) it will be possible to see what kinds of businesses actually got the electricity in the other areas and then some predictions should be possible. It will also be possible to see what major obstacles there are for people to have electricity.

As for the method the interviews are formal with standard questions. It is the aim to interview all businesses in Isiolo; slightly more than 100. Thus far about 80 interviews have been made.

The interviews in the other areas will contain the same questions as those made in Isiolo with some adjustments depending on the presence of electricity.

b. Household Interviews

These interviews cover among other things different aspects of family economy, consumption, time spending, whether the households want electricity and if so, how much they are willing to pay for it. The organisation of the household interviews is similar to that of the business interviews what regards comparisons between the different places to be studied.

At present some 60 interviews have been made, and some very preliminary results are presented in Chapter 5. The goal is to pass 100 interviews. These have been chosen with a random sample, which has been very complicated to make, as there is no systematic information about what people are living in the township. A map was made covering about 850 houses, these houses were numbered and afterwards chosen at random. To check the sample a quick series of interviews is carried out with a few of the most important questions. This will cover about half of the total number of households (the selection method is to choose every second household).

c. Interviews about people's expectations on electricity

Here, questions are asked about possible effects on economic and social activities, about the needs of other development projects and also some more general attitude questions about electricity. The category of people interviewed under this topic is to begin with Government employed people, as they are likely to be among the first to get electricity and also they might know more about electricity than others as they are often transferred. Interviews are carried out with every third of these households.

It has proved difficult to make these interviews; the respondents have been quite reluctant to answer. Therefore, only about 45 interviews have been finished, even though this interviewing started well before the household ones. See Chapter 6.

d. Other Interviews

This headline will have to stand for all other gathering of information that is necessary in this context. One example is to make calculations about the actual costs of private generating of electricity vs. the cost to buy from EAP&L.

3. Looking Ahead

I hope to get started with the other areas as soon as possible. The interviews in Meru Township can start in 2-3 weeks. The interviews in Garissa are presently being planned and I hope to be able to start those in 3-4 weeks. However, there remain some formal complications as well as with the fourth place in Western Kenya. The choice has not been made here but it should be an already electrified place. May be Vihiga is a good alternative.

II. A General Survey

Originally a background study was planned to take place August-September 1973. It was cancelled at the latest possible stage due to reasons accounted for a few months ago. It was my intention to visit the following places: Lamu, Kwale (and Kinango), Mariakani, Voi (and Wundanyi), Garissa, Kabarnet (and Mariagat), Narok, Kajiado, Ngong, Nanyuki, Rongai, Kapenguria, Siaya, Vihiga, Kisii, Keroka, Sotik, Migori, MacAlder's Mine, Homa Bay, Meru, Igoji, Chogoria, Kitui, Nyeri and Thika. A circular letter had already been sent out, stating what information I was interested in, so as to make the round-trip effective. In a few cases I received written answers (even though it was clear from my letter that this was not the intention), i.e. Garissa, Kabarnet, Mariagat and Meru. These answers are presented below without comments or comparisons as the number of respondents is so low.

The questions asked in the circular letter were:

1. The economic development of the Township and the economic set-up?
2. Which will the development in the near future be?
3. Has electricity had any effects on social activities?
4. Has electricity had any effects on migration from surrounding areas into the Township or to cities like Nairobi, Mombasa, Kisumu?
5. Does the Township have street light? In that case why?
6. Are people interested in electricity? What do they think about the costs?
7. Who is collecting the electric fee?
8. Where does one find electricity (industry, retail, schools, hospitals, administration, private)?
9. Any other information that you feel would be of interest for the study?

These questions were thought to be rather basic, and the intention was to spend 1-2 days in each place discussing them.

Garissa

1. "There are as yet no industries benefitting from the electricity supply at Garissa, and electricity is therefore

- mainly utilised in the shops as far as economic development goes. Many shops have been supplied with electricity and it has been observed that a number of shops in Garissa Township now remain open much longer than before in the evening, and many shops also have installed electric refrigerators.
2. It is anticipated that development in the near future will include establishment of photographic studios and cinema theatres in the town.
 3. Yes, the clubs have generally been better attended, since the supply of electricity in the town.
 4. No, electricity has not had any effects on migration from surrounding areas into the township, because the Manyattas where the local people live are not supplied with electricity.
 5. No, the township does not have street lights mainly because Garissa County Council is not in a position to afford that service at present.
 6. Yes, people are interested in electricity, but they think that the cost is too high.
 7. The electric fee is collected by the East African Power & Lighting personnel stationed at Garissa.
 8. One finds electricity in the shops, schools, hospitals, Government Offices including the administration and private houses.
 9. The only other information that I feel would be of interest for the study especially for the planners of future rural electrification in the ministries concerned is that:
 - a. The EAP&L should arrange to undertake the work of domestic wiring in the premises of the town where they introduce electricity because I consider this might be cheaper to the building owners, while at the same time ensuring acceptable standard of workmanship, than when the building owners have to negotiate their own arrangements with private contractors.
 - b. All accounting work including calculation of bills is made by computers in Nairobi and this has often resulted in a lot of complaints from the consumers whose bills carry computer mistakes and cannot be promptly settled in Garissa.

It would therefore, be better if the EAP&L would institute a field accounting unit in Garissa to deal with all their accounts on the spot so that they would be easily available and accessible to the consumers for ready consultation whenever necessary."

Kabarnet

"The centre is the District Headquarters where a number of activities are centralized. There is a trading centre with over ten shops operating and there are a number of shops under construction. There is a saw mill and posho mills which operate in full swing because of the local demand.

There are about ten generators which are privately owned in the township. The generators serve secondary schools which are three in number, mission centres, the Development Training Centre, trading centre and areas for social recreations like clubs. The number of generators is a clear case of demand for electrification of the township. There are other developments where electrification is urgently needed. These are government offices and several houses.. The water works currently operated by some pumps that pose constant problems and electricity will be the solution.

The future of the township is rather bright with a lot of developments which are earmarked. The existing developments are expanding rapidly. The District Hospital is being upgraded to the standard of modern hospitals with all the facilities available. The sum of Shs 3,000 is presently being used to put/a^{up} number of buildings. An area has also been set aside for establishment of Police Divisional Headquarters. A number of buildings will be put up and the communication system will definitely need electricity."

Mariagat

"This is one of the Divisional Headquarters. It serves as a link for the trunk road to Lake Rudolf and it also falls within the tourists' circuit and constitutes a calling station en route. The great Pekerra Irrigation Scheme is attached to the township and the scheme has attracted a sizeable population. As a result of the scheme there are a number of machineries that need to be electricity propelled. There are several staff houses and offices that need electrification. There are also a number of shops.

There is presently one generator that is owned by the National Irrigation Scheme. The generator is currently used for lighting most of the government houses, and a few other buildings needed for operation of the scheme.

The township will definitely grow as a number of departmental officers are posted to the area. There will be more houses and offices constructed. The scheme is also having a bigger scope of development. More cash crops will be introduced within the scheme and relevant processing plants will also be introduced."

Meru

"Meru Municipality is situated on the North-East slopes of Mt. Kenya in approximately 5 000 feet above the sea level. The climate is because of this night rather pleasant all year around and because of the mountain the rains are usually enough for farming. The land is fertile and has been consolidated some years back, though there now is a tendency to by subdivision break the parcels of land into smaller places of uneconomical size. The land in the Municipality has never been owned by White Settlers, and thus no big farms are in existence inside the Municipal Boundary. Between 1962 and 1969 the population Meru Town showed an increase from 3 300 to 4 500 people which is 4.4% per annum. This is rather low compared with the growth rate of 6.4% per annum between 1948 and 1962.

As actual growth took place outside the former Township boundaries, this figure of 4 500 inhabitants does not represent the actual Urban Population.

Meru Town is serving as Administrative Head Quarters for the whole of Meru District, as well as being the commercial centre and the service centre.

The main economical resources for the inhabitants of the Municipal are the following, not necessary put in order of importance:

- a. Coffee growing is organised in co-operative societies which again are organised in Coffee Unions. The coffee is the only crop which truly can be called a cash crop, and it brings much money to the people of Meru.
- b. Commerce and trade are located in the town and the markets of which there are 23 inside the municipality.

- c. Services are located in and around Meru and in 1970 3 600 persons were employed in this.
- d. Farming is a quite important economical factor, because of enough rain and fertile soil. A thing as subsistence farming is rare and most farmers can keep their children in school for a number of years. There are more than 13 000 school seekers i.e. Primary Schools in the Municipality.
- e. Industry is very small. The only ones worth mentioning are forest industry and coffee processing. There is a vast reserve for forest industry in the Municipality which only waits for exploitation.

No doubt the only way forward when one consider the future population is to attract industries.

- 2. 1972-1978: Within this short time an extension of the towns Commercial Area is planned to the East of the present commercial area. This new area will connect the Town Market with the Town and contain more than 100 plots.

To the NE of the town and E of the hospital a residential area is planned. To the NW along Nanyuki road another residential area planned followed by an area for major industries.

The Municipal Council has hope to attract a huge industry which eventually will employ 7 000 people in Meru,

- 3. It is very hard to say that it has had any effect on the Social Activities, because people have been and still are able to manage without electricity to a large extent. Only the places where the "Upper one hundred" are meeting have got electricity. Many small bars have no electricity though they have the possibility. One important aspect though is the security side, and it definitely means a lot that streets are lighted when leaving a bar or a club.
- 4. It is not likely that electricity has had any effect on migration to Meru. The areas whereto migration is taking place in Meru have no electricity. It is very important to keep in mind that only very few (the above "Upper one hundred") can afford to pay the installation (800-1 000 Shs), the fee for getting the electricity (anything from 300 Shs

to several thousand shillings) and the monthly expense (30-40 Shs). If some major industries powered by electricity were placed in Meru the effect on migration would be great.

5. Meru has had street lights for quite a number of years, and is at present spending approximately 8,000/- on electricity and maintenance per annum.

Due to lack of funds when erected the street light is of poor standard and not covering all streets.

The Council has from M/s. Bicroconsult, Nairobi, recently got a sketch plan for development of street light. This plan is covering the Town as the Urban development is planned to be in 1978. The cost of this light is estimated to approximately one million shillings (1973 prices) and it will be almost impossible to raise that much for this purpose. So we have to face that for many years the street light will be lacking behind the town development, as many other services will have to.

The reason why street light is erected in Meru is, as we think all other places, to make traffic more secure and to prevent crime.

6. The Municipal Council has several times got inquiries from Councillors who want electrification brought to markets in the Municipality. Unfortunately there is not much we can do to that effect, but advice to turn to the EAP&L. People living north of Meru town along the Maua Road are very interested in electrification and several connections have been applied for.

We do not think people think much of the cost, either you can afford it or you can not.

7. The EAP&L people in Meru are reading the local metres, while fees are paid in either Nyeri or Nairobi.
8. Electricity is found in industry, retail, schools, hospitals, administration and at privates, but to what extent in each group we cannot say.
9. It is regrettable that electricity is beyond the average persons reach, and we feel that electricity for the common man will only come if prices are lowered or when the average income raises considerably."

III. Consumption Patterns

By looking at consumption by the different Tariffs, it is possible to see some consumption patterns. Tariff 1 is intended for domestic use, Tariff 2 for small lighting and power (very low consumption) and Tariff 3 for lighting and power up to 7 000 units per meter reading period (in this category falls basically all small business). Figures for the following places were provided by EAP&L:

Garissa
Kajiado
Nanyuki
Homa Bay/Kisii
Sotik
Kitui
Meru
Kitale
Kapsabet

These were all the places that the Company had separate figures for. In the list one finds recently electrified places as well as electrified ones, as can be seen from the following table:

TABLE 3.1: TEN PLACES SELECTED FOR THE CONSUMPTION PATTERN STUDY

<u>Place</u>	<u>Province</u>	<u>Type of Centre</u>	<u>Electrified as sub-economic</u>
Garissa	North Eastern	Rural	1972
Kajiado	Rift Valley	Rural	1972
Nanyuki	Rift Valley	Urban	1949
Homa Bay	Nyanza	Urban	1967
Kisii	Nyanza	Urban	--1)
Sotik	Rift Valley	Rural	1971
Kitui	Eastern	Urban	1969
Meru	Eastern	Urban	1965
Kitale	Rift Valley	Urban	1949
Kapsabet	Rift Valley	Urban	--1)

1) Made as an economic project.

In this chapter a few results are presented very briefly and very little analysis is made. This has to be left to the real report later this year.

Table 3.2 presents the number of consumers in these places per Tariff 1-3 and per different periods of time. Table 3.3 shows the number of units sold in the same places per Tariff 1-3 and per different periods of time. It is then possible to calculate an average consumption, which is done in Table 3.4

TABLE 3.2: NUMBER OF CONSUMERS

<u>Tariff</u>	<u>Jan 71</u>	<u>Jul 71</u>	<u>Jan 72</u>	<u>Jul 72</u>	<u>Jan 73</u>	<u>Jul 73</u>	<u>Place</u>
1	-	-	-	-	11	33	Garissa
1	-	-	-	-	11	11	Kajiado
1	134	138	141	151	152	163	Nanyuki
1	210	210	231	230	237	239	Homabay/Kisii
1	-	-	11	11	15	15	Sotik
1	-	-	-	79	76	75	Kitui
1	101	114	125	140	148	152	Meru
1	208	208	235	234	233	236	Kitale
1	32	32	32	32	34	35	Kapsabet
2	-	-	-	-	119	183	Garissa
2	-	-	-	-	69	78	Kajiado
2	235	262	284	290	288	303	Nanyuki
2	400	400	456	454	463	479	Homa Bay/Kisii
2	-	-	42	54	65	64	Sotik
2	-	-	-	126	118	163	Kitui
2	395	405	433	433	447	459	Meru
2	547	547	507	508	508	516	Kitale
2	76	76	85	85	82	83	Kapsabet
3	-	-	-	-	11	25	Garissa
3	-	-	-	-	14	21	Kajiado
3	98	97	104	96	100	107	Nanyuki
3	147	147	176	176	179	179	Homa Bay/Kisii
3	-	-	9	12	27	28	Sotik
3	-	-	-	45	48	53	Kitui
3	88	94	105	119	134	132	Meru
3	196	196	194	196	208	204	Kitale
3	22	22	26	26	27	27	Kapsabet

TABLE 3:3: UNITS SOLD (kWh)

<u>Tariff</u>	<u>Jan 71</u>	<u>Jul 71</u>	<u>Jan 72</u>	<u>Jul 72</u>	<u>Jan 73</u>	<u>Jul 73</u>	<u>Place</u>
1	-	-	-	-	1090	3229	Garissa
1	-	-	-	-	1380	2941	Kajiado
1	18335	22116	29178	28217	36356	43447	Nanyuki
1	28743	28220	41902	36894	39620	36213	Homa Bay/Kisii
1	-	-	1196	815	2209	1302	Sotik
1	-	-	-	13226	14237	19371	Kitui
1	22517	28006	25263	26432	26689	33132	Meru
1	34318	31529	38464	37820	36998	31934	Kitale
1	3789	4794	3487	5305	5860	5268	Kapsabet
2	-	-	-	-	3759	5721	Garissa
2	-	-	-	-	716	1744	Kajiado
2	4185	4402	4908	5534	6816	8503	Nanyuki
2	6716	6993	7909	6472	7979	7930	Homa Bay/Kisii
2	-	-	860	771	1058	1005	Sotik
2	-	-	-	2673	2715	2823	Kitui
2	7282	8671	9053	9659	8135	8926	Meru
2	8343	7969	9215	8809	(90000)	8402	Kitale
2	1425	1208	1353	2546	1463	1777	Kapsabet
3	-	-	-	-	2778	8413	Garissa
3	-	-	-	-	6534	9636	Kajiado
3	119557	106618	125734	114472	113452	96447	Nanyuki
3	64515	73603	70970	65238	63467	80300	Homa Bay/Kisii
3	-	-	17536	16209	19974	11608	Sotik
3	-	-	-	10484	13881	13794	Kitui
3	55593	55593	52600	76114	48537	47920	Meru
3	107651	97934	114507	120370	115045	102390	Kitale
3	10128	16108	13113	15894	15263	16013	Kapsabet

TABLE 3.4: AVERAGE CONSUMPTION (UNITS PER CONSUMER)

<u>Tariff</u>	<u>Jan 71</u>	<u>Jul 71</u>	<u>Jan 72</u>	<u>Jul 72</u>	<u>Jan 73</u>	<u>Jul 73</u>	<u>Place</u>
1	-	-	-	-	99.1	97.8	Garissa
1	-	-	-	-	125.5	267.4	Kajiado
1	136.8	160.3	206.9	186.9	239.2	266.5	Nanyuki
1	136.9	134.4	181.4	160.4	167.2	151.5	Homa Bay/Kisii
1	-	-	108.7	74.1	147.3	86.8	Sotik
1	-	-	-	167.4	187.3	258.3	Kitui
1	222.9	245.7	202.1	188.8	180.3	218.0	Meru
1	160.0	151.6	163.4	161.6	158.8	135.3	Kitale
1	118.4	149.8	109.0	165.8	172.4	150.5	Kapsabet
2	-	-	-	-	31.6	31.3	Garissa
2	-	-	-	-	10.4	22.4	Kajiado
2	17.8	16.8	17.3	19.1	23.7	28.1	Nanyuki
2	16.8	17.5	17.3	14.3	17.2	16.6	Homa Bay/Kisii
2	-	-	20.5	14.3	16.3	15.7	Sotik
2	-	-	-	21.2	23.0	17.3	Kitui
2	18.4	21.4	20.9	22.3	18.2	19.4	Meru
2	15.3	14.6	18.2	17.3	(177.2)	16.3	Kitale
2	18.8	15.9	15.9	30.0	17.8	21.4	Kapsabet
3	-	-	-	-	252.5	336.5	Garissa
3	-	-	-	-	466.7	458.9	Kajiado
3	574.2	606.5	652.0	670.1	726.4	886.7	Nanyuki
3	438.9	500.7	403.2	370.7	354.6	429.4	Homa Bay/Kisii
3	-	-	1948.4	1350.8	739.8	414.6	Sotik
3	-	-	-	233.0	289.2	250.3	Kitui
3	631.7	591.4	501.0	639.6	362.2	363.0	Meru
3	549.2	500.0	590.2	614.1	553.1	501.9	Kitale
3	460.4	732.2	504.3	611.3	535.3	593.1	Kapsabet

FIGURE 3.1 UNITS SOLD, TARIFF 1

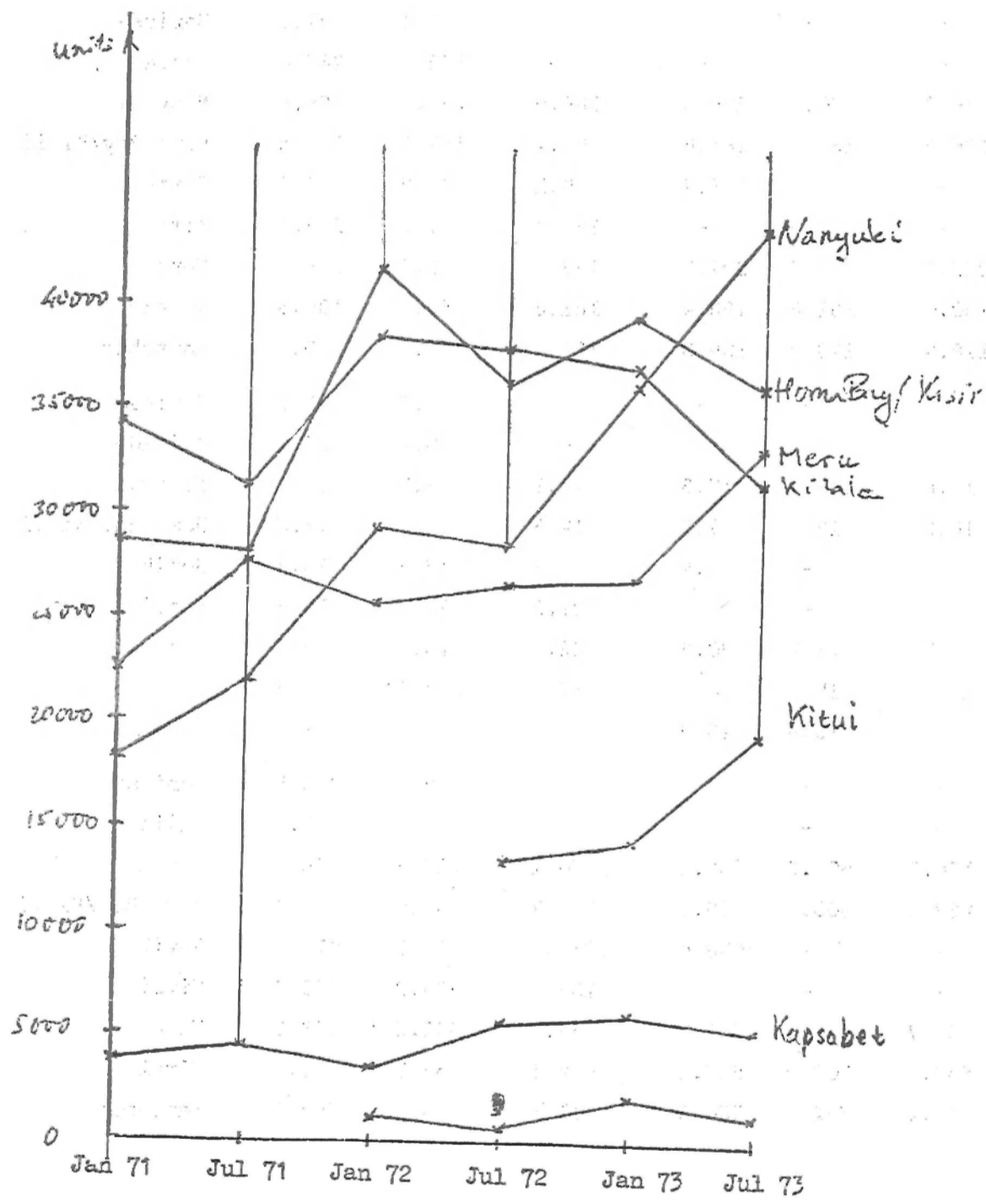


FIGURE 3.2 UNITS SOLD, TARIFF 2

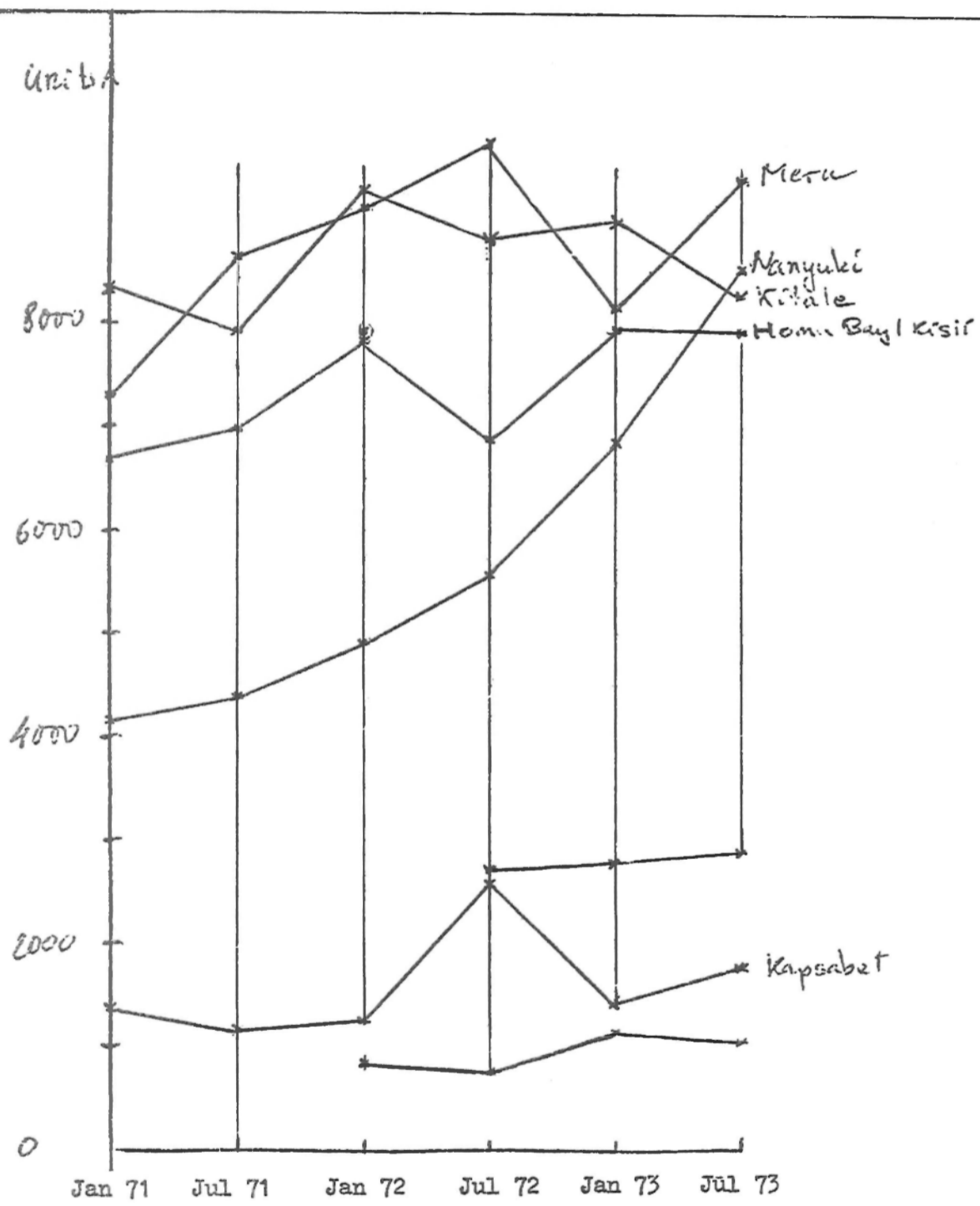
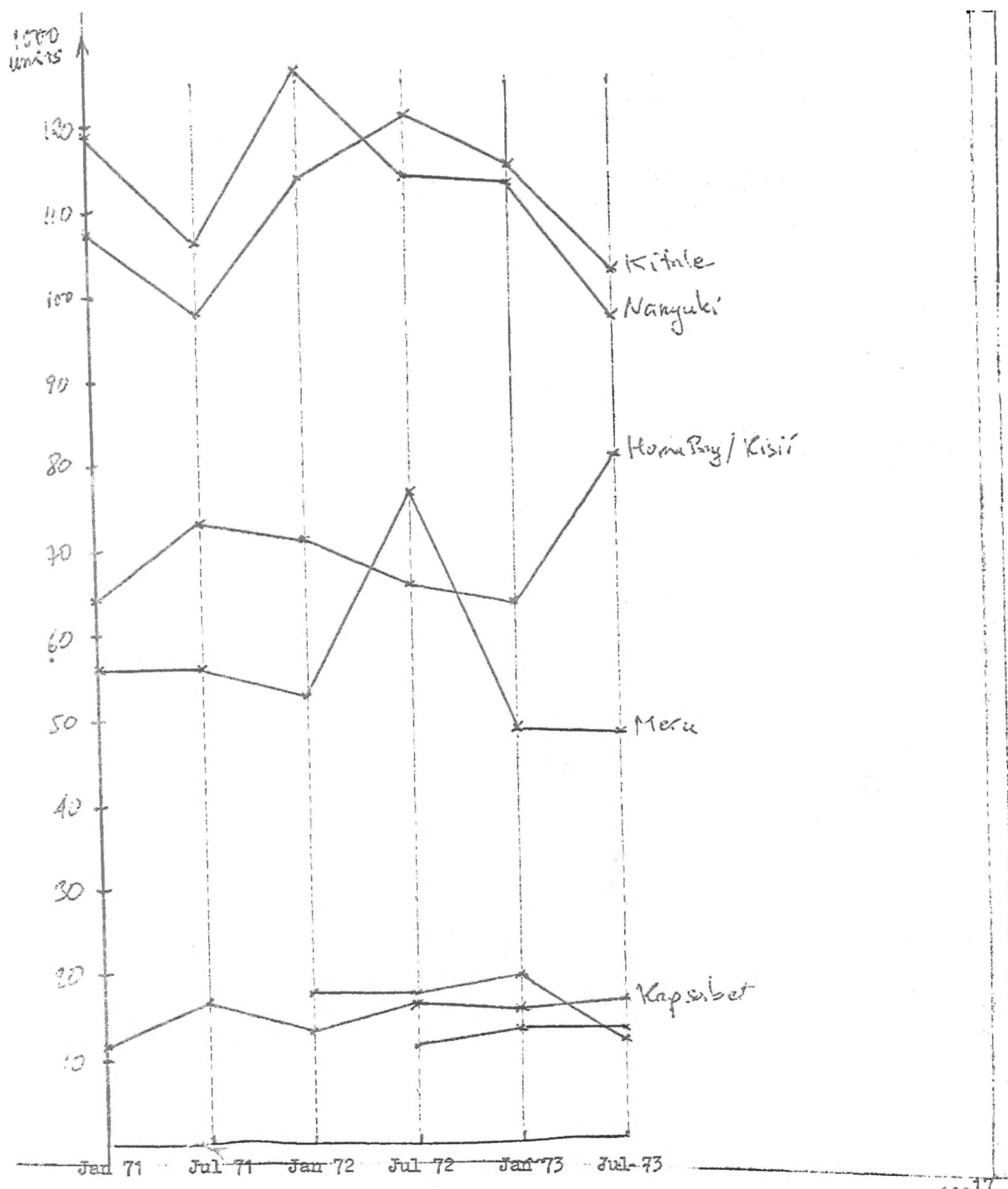


FIGURE 3.3 UNITS SOLD, TARIFF 3



It can be seen from Table 3.2 that there is a rather steady increase in the number of consumers. For those places which have (at least) been electrified from January 1971, the increase per Tariff during the time Jan 71 - Jul 73 is (in % of the January 1971 figures):

TABLE 3.5 THE AVERAGE INCREASE IN THE NUMBER OF CONSUMERS PER TARIFF JAN 71 - JUL 73

<u>Place</u>	<u>Tariff 1</u>	<u>Tariff 2</u>	<u>Tariff 3</u>
Nanyuki	22	29	9.2
HomaBay/Kisii	14	20	22
Meru	50	16	50
Kitale	14	-13	3.1
Kapsabet	9.4	9.2	23

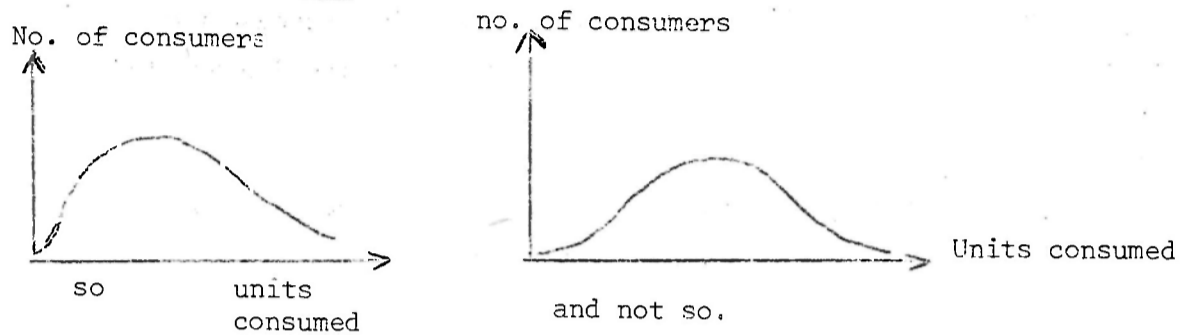
The calculation of percentages is simply calculated with the figures of January 1971 and those of July 1973, as the increase is a rather steady one, apart from Kitale, Tariff 2. The intention is only to give a rough estimation. Garisssa, Kajiado, Sotik and Kitui have been excluded as they are recently electrified and the figures of percentage increase not very meaningful. One can see, that the increase of consumers in all the tariffs varies between 10% and 50% with the exception for Kitale over the time period in question.

TABLE 3.6: THE AVERAGE INCREASE OF CONSUMPTION PER TARIFF JAN 71- JUL 73

<u>Place</u>	<u>Tariff 1</u>	<u>Tariff 2</u>	<u>Tariff 3</u>
Nanyuki	140	81	-11
HomaBay/Kisii	43	23	15
Meru	24	33	- 8
Kitale	0	8	0
Kapsabet	39	33	45

It here seems that Nanyuki has the greatest increase in consumption, while generally speaking Tariff 1 (the "more expensive" private consumption) has increased more than Tariff 2 (the "less expensive" private consumption). Tariff 3 ("business" consumption has the lowest increase.

As for the averages in Table 3.4, they are too high, because the distribution of consumers with different numbers of units consumed can be expected to be not normal, but logarithmically normal:



This means that many persons have a low consumption and only a few a high consumption. Thus the medians trace the distribution more satisfying than the average. (The medians are the middle-most value, i.e. all consumers are sorted according to the size of consumption and then the middle-most consumer is chosen. This gives a lower value than taking the total consumption dividing it with the number of consumers). The medians are, however, not immediately available in the consumption figures, even though they are easy to find when using a computer. I hope it will be possible to do this in the near future.

The Table 3.7 gives an example. A journey to Meru Township was made, a sample of 50 consumers per Tariff was made and the medians for the payments in July 1973 were sorted out. It shows that the median value is almost half of the average, which is a considerable difference:

TABLE 3.7: CONSUMPTION IN MERU JULY 1973: THE AVERAGES AND THE MEDIANS

Tariff	Average number of units	Medians	
1	218.0	147.0	As a practical example, one 40W lamp used 3 hours per night is equivalent to 3.6 units per month.
2	19.4	9.0	
3	363.0	163.5	

The figures in Table 3.4 might, however, still be of interest looking at some trends.

To get a rough idea about how large a proportion of the inhabitants in the studied places that has electricity, a comparison with the 1969 Census is possible. In Table 3.8 these figures have been used adjusted with

a yearly increase of 4% (this should be a conservative estimation). The population figures have then been divided by 5 to get an idea about how many households there might be. This is a rough estimation based on the interviewees in Isiolo only. It will be checked in the control-areas (it might also be that the number of household members is significantly different between households with and without electricity). The proportion of electrified households if the reasoning is correct is given in the right column.

TABLE 3.8: A COMPARISON OF THE POPULATION AND THE NUMBER OF CONSUMERS

Place	(1) Population 1969	(2) Estimated pop. 1973	(3) Est. no of households	(4) No of consumers 1,2 July 1973	Tariff 1973	(4): (3)
Garissa	872	1 020	204	216		?
Kajiado	1 755	2 053	411	89		0.22
Nanyuki	11 624	13 598	2 720	466		0.17
HomaBay/ Kisii	9 332	10 917	2 183	718		0.33
Sotik	808	945	189	79		0.42
Kitui	3 071	3 593	719	238		0.33
Meru	4 475	5 235	1 047	611		0.58
Kitale	11 573	13 539	2 708	752		0.28
Kapsabet	2 298	2 688	538	118		0.22

The table indicates that approximately 20% to 50% of the households should have electricity in the places in question. This sounds high and will be checked.

The average yield for the company calculated in cents/kWh for the period January 1971 - July 1973 is presented per Tariff and per Place in Table 3.9. For a comparison the national average per Tariff for 1970 is also included.

TABLE 3. 9: AVERAGE YIELD

a v e r a g e y i e l d p e r u n i t

Place	<u>Tariff 1</u>	<u>Tariff 2</u>	<u>Tariff 3</u>
Garissa ¹⁾ 1)	44.5	108.2	51.4
Kajiado	35.6	125.2	42.0
Nanyuki	30.0	116.0	40.4
HomaBay/Kisii	32.8	122.0	43.9
Sotik ²⁾	45.5	121.3	42.0
Kitui ³⁾	28.7	113.3	53.9
Meru	27.6	116.0	43.4
Kitale	32.7	123.9	42.3
Kapsabet	35.7	116.1	39.4
<hr/>			
National average	25.9	115.1	32.7

1970

1) 1973 only

2) Jan 72 - July 73

3) July 72 - July 73

The table shows that the average yield per unit in general is higher than the national average.

To make a comparison between recently electrified places and well electrified, one can sort those electrified 1965 or before together with the economically viable in one group, i.e. Nanyuki, Homa Bay/Kisii, Meru, Kitale and Kapsabet. In Group 2: then, are Garissa, Kajiado, Sotik and Kitui. In Tables 3.10 - 3.12 are presented the number of consumers, July 1973, per group, d:o units sold and d:o average consumption:

TABLE 3.10: NUMBER OF CONSUMERS? JULY 1973

	<u>Tariff 1</u>	<u>Tariff 2</u>	<u>Tariff 3</u>
Group 1	825	1 840	649
Group 2	134	488	127

TABLE 3: 11: UNITS SOLD, JULY 1973

	<u>Tariff 1</u>	<u>Tariff 2</u>	<u>Tariff 3</u>
Group 1	149 994	35 538	343 070
Group 2	26 843	11 293	43 451

TABLE 3.12: AVERAGE CONSUMPTION IN UNITS/CONSUMER, JULY 1973

	<u>Tariff 1</u>	<u>Tariff 2</u>	<u>Tariff 3</u>
Group 1	181.8	19.3	528.6
Group 2	200.3	23.1	342.1

The number of consumers is higher in the places electrified long ago while the average consumption is higher in the places electrified recently for Tariffs 1 and 2 (i.e. private consumers). This might be because it takes time for potential consumers to decide to have electricity. The difference in Tariff 3 is probably accounted for by differences in businesses.

In Table 3.13 below the number of units sold per Tariffs 4-8 are presented. The Tariffs stand for Industrial, Off Peak, Street Lighting, Special Contracts and Staff respectively.

Both Garissa and Kajiado are excluded here because there are no units sold according to Tariffs 4-8.

As can be seen in the table, Nanyuki, Homa Bay/Kisii, Kitui, Meru and Kitale have industrial consumption (1-2 consumers per township) while Garissa, Kajiado, Sotik and Kapsabet do not. This correlates rather well with newly electrified places, Group 2 above.

Most places have off-peak consumption, which in the national level is mostly for heating water for big households and for irrigation pumping. The consumption varies a lot.

All places apart from Garissa and Kajiado have street-lights, even though the consumption is much different for the different places.

If one looks at the average yields in cents/kWh from Tariffs 4-8, it shows that the places in question give above the national average in all tariffs except lighting, where the yield is lower than the national average:

TABLE 3.14: AVERAGE YIELDS PER TARIFFS 4-8 JANUARY 1971 - JULY 1973

Place	Tariff 4	Tariff 5	Tariff 6	Tariff 7	Tariff 8
Nanyuki	21.5	48.3 ¹⁾	12.8	65.3	11.9
Homa Bay/Kisii	22.7 ²⁾	19.0	12.9 ³⁾	53.4	15.0
Sotik ⁴⁾	-	22.7 ¹⁾	11.8 ⁵⁾	66.4 ¹⁾	-
Kitui ⁵⁾	31.8 ³⁾	-	13.4	66.0	-
Meru	24.0 ⁵⁾	21.4	12.6 ³⁾	66.0	10.5
Kitale	21.4 ⁴⁾	18.2	12.3	41.1	15.8
Kapsabet	-	44.0 ⁵⁾	12.5 ³⁾	-	-

National average 1970:

18.4	12.4	26.7	12.2	10.5
------	------	------	------	------

1) 1973 only

2) July 1973 only

3) One figure wrong and therefore excluded

4) 1972 and 1973 only

5) July 1972 - July 1973 only

IV. Business Survey in Isiolo

This survey is intended to give a picture of different businesses economy and organisation. With this information it should be possible to make predictions about future electric consumption

by business in Isiolo Township. When the other areas have been studied later, even more serious predictions could be made as it is here possible to see what kind of business actually gets electricity.

It is the intention to cover all business in Isiolo with these interviews. So far 80 interviews have been made (there are approximately 20 more to do), and a few preliminary results will be presented. Methods of gathering and checking data are not accounted for here, even though much could be said. For example the calculations of monthly turnover sometimes proves time-consuming as the information often must be checked and corrected.

Table 4.1 shows the distribution of different kinds of business. A great majority are Retail Traders, the other categories being fairly evenly distributed.

TABLE 4.1: KINDS OF BUSINESS

<u>Category</u>	<u>Nr. of Businesses</u>
Retail	47
Hotel, bar	11
Wholesale	7
Butchery	5
Others ¹⁾	10
	<hr/>
	80

1) includes: petrol stations, shoe repair, tailor, manufacture, radio repair, wet cleaner, gum collecting, timber shop and book-shop.

Table 4.2 is a compilation of the monthly turnover for Retail Traders. Roughly one third of the businesses have a turnover of less than 1 000 K. Shs per month and one third a turnover over 6 000 K Shs per month.

The preliminary categories A, B, C and D in this table are intended to show the degree of economic possibility of buying electricity were it provided. The categories have the following meaning:

- A = being able to afford electricity
- B = probably being able to afford electricity
- C = hardly being able to afford electricity
- D = not being able to afford electricity

They are at this stage a rough estimation, and will be sharpened by studying the other areas already electrified.

TABLE 4.2: THE MONTHLY TURNOVER FOR RETAIL TRADERS

<u>Turnover p.m.</u>	<u>Nr. of Businesses</u>	<u>Percentage</u>	<u>Category</u>
1 000	15	31.9	D
1 000 - 3 999	17	36.2	C
4 000 - 6 000	6	12.8	B
6 00	9	19.1	A
	<u>47</u>	<u>100.0</u>	

In Tables 4.3 - 4.6 the monthly turnover for the other categories is presented. The average monthly turnover per category is presented in Table 4.7

TABLE 4.3: THE MONTHLY TURNOVER FOR HOTELS AND BARS

<u>Turnover p.m.</u>	<u>Nr. of Businesses</u>
1 000	1
1 000 - 3 999	3
4 000 - 6 000	2
6 000	5
	<u>11</u>

TABLE 4.4: THE MONTHLY TURNOVER FOR WHOLESALE BUSINESS

<u>Turnover p.m.</u>	<u>Nr. of Businesses</u>
1 000	0
1 000 - 3 999	3
4 000 - 6 000	0
6 000 ¹⁾	4
	<u>7</u>

1) The figures being 250 000, 50 000, 150 000 and 150 000 K. Shs

TABLE 4.5: THE MONTHLY TURNOVER FOR BUTCHERIES

<u>Turnover p.m.</u>	<u>Nr. of business</u>
1 000	1
1 000 - 3 999	0
4 000 - 6 000	3
6 000	1
	<hr/>
	5

TABLE 4.6: THE MONTHLY TURNOVER FOR OTHER BUSINESS

<u>Turnover p.m.</u>	<u>Nr. of business</u>
1 000	5
1 000 - 3 999	3
4 000 - 6 000	0
6 000	2
	<hr/>
	10

TABLE 4.7: THE AVERAGE MONTHLY TURNOVER PER BUSINESS CATEGORY

<u>Category</u>	<u>Average turnover p.m. (K.Shs)</u>
Retail	3 628
Hotel, Bar	7 064
Wholesale	87 071
Butchery	5 080
Others	(12,540) ²⁾

2) The category "Others" is dominated by the petrol stations which increases the average, so that it is hardly interesting.

The total monthly turnover for the 80 business interviewed is around 1 000 000 K.Shs. Among those interviews remaining are at least three important businesses and a number of small Retail Traders. Finally, the estimated values of the stock of Retail and Wholesale Traders are presented in Table 4.8.

TABLE 4.8: ESTIMATED VALUES OF RETAIL AND WHOLESALE TRADERS STOCKS

<u>Category</u>	<u>Total (K.Shs)</u>	<u>Average (K.Shs)</u>
Retail	330 000	7 021
Wholesale	879 000	125 571

Going through the 80 businesses and sorting them according to the categories A,B,C, and D as they are presented above, the result is:

TABLE 4.9: ECONOMIC POSSIBILITY TO AFFORD ELECTRICITY

<u>Category</u>	<u>Nr. of Businesses</u>	<u>Percentage</u>
A	24	30.0
B	7	8.8
C,D	<u>49</u>	<u>61.2</u>
	80	100.0

It seems, thus, that about 40% of the businesses would probably be able to afford electricity.

It is my estimation that at least five more business will fall in category A when interviewed.

On the question whether the respondent wanted electricity all but three answered "yes" (three realizing that they could not afford it). Some questions were also asked about how much the respondent would be willing to pay for having electricity installed and for the monthly cost. Using their willingness to pay, the respondents can be sorted in the categories:-

- X = very interested
- Y = rather interested
- Z = vaguely interested

The result, then, is:

<u>Category</u>	<u>Nr. of Businesses</u>	<u>Percentage</u>
X	19	23.8
Y	23	28.7
Z	38	47.5

TABLE 4.10: INTEREST IN ELECTRICITY

The Table means that about half of the businessmen show a definite interest in having electricity.

Going through the material correlating "economically possible" (A-D) with "economically interested" (X-Z), the result is:-

<u>Correlations</u>	<u>Nr. of Businesses</u>	<u>Percentage</u>
AX	12	15.0
AY,EX	12	15.0
CX,BY,AZ	11	13.8
CY,BZ	12	15.0
CZ	33	41.2

TABLE 4.11: INTEREST IN AND POSSIBILITY TO AFFORD ELECTRICITY

I have here given the same weight to e.g. AY and BX, i.e. "able to afford electricity" and "rather interested" and "probably able to afford electricity" and "very interested."

The prediction would then be that the first category would get electricity immediately it was installed, the second category would probably get it, the third still rather probable at least in the near future, the fourth would possibly get it and the fifth would not get it.

The prediction would then be that the first category would get electricity immediately it was installed, the second category would probably get it, the third still rather probable at least in the near future, the fourth would possibly get it and the fifth would not get it.

On the question how much the respondent would be willing to spend on electricity for installation and monthly cost, the following results were obtained:-¹⁾

TABLE 4.12: PAYMENTS FOR INSTALLATION AND MONTHLY COSTS

<u>Amount (K.Shs)</u>	<u>Installation</u>	<u>? Monthly</u>
1- 49	31	46
50- 99	19	14
100-149	9	5
150-199	4	5
200-249	5	2
250-299	0	0
300-349	1	1
350-399	0	0
400-449	1	0
450-499	0	0
500-549	2	2
550-599	0	0
600-649	1	1
.	.	.
.	.	.
.	.	.
1000	3	1
.	.	.
.	.	.
.	.	.
2000	1	0

1) 3 persons stated no amounts.

As can be seen many businessmen have stated a rather low amount.

Most of the businesses lie along the main road, so the installation costs would not be very high (aprt from the deposit the cost is 10/- per meter if the distance exceeds 15 meters, otherwise no extra cost).

One open question about what the respondent would use the electricity for resulted in:-

TABLE 4.13: WHAT ELECTRICITY WOULD BE USED FOR

Shoplight	72
Refrigerator	34
Light in living quarters	15
Stove	10
Light outside the shop	6
Carpentry	6
Oven	5
Mill	5
Dry cleaning	5
Radio repair	4
Ironing and sewing	4
Garage	3
Machine accounter	2
Record player	1

V. Household Survey

This is presently being carried out in Isiolo and has this far been conducted outside the "rich" area of the township. The possible consumer category would most probably be according to Tariff 2, just as there should be a tendency towards Tariff 1 for the survey presented in Chapter 6.

A few preliminary results will be presented here based on 55 interviews. There is no point in going into detail in the material at this stage. The interviewing will be more valuable when they are also carried out in the other areas as well. Then fruitful comparisons can be made.

Some background material is provided in Table 5.1., which shows the number of households that have a shamba, animals, somebody doing trading or someone employed.

TABLE 5.1: ECONOMIC ACTIVITIES IN THE HOUSEHOLDS

	<u>No. of households</u>	<u>Percentage of the sample (55)</u>
Shamba	17	31
Cattle	19	35
Somebody trading	5	9
Somebody employed	21	38

It should be pointed out that many households have more than one source of income (e.g. shamba and trading), and a number thus no source of income. No such correlations have yet been made.

The average salary for those employed (from 38% of the households) is 304 K. Shs.

Table 5.2: covers some basic expenses, i.e. for house rent, food, charcoal, kerosene and firewood:-

TABLE 5.2: SOME NECESSARY EXPENSES FOR THE HOUSEHOLDS:

	<u>Average (K.Shs/month)</u>	<u>Population</u>
House-rent ¹⁾	16.52	23
Food	174.36	55
Charcoal, kerosene, firewood	29.85	55

1) 32 stated that they owned their house.

In Table 5.2 no variances are presented. However, they are high for Food and Charcoal etc. Actually the material seems to group around two points, for Food 80 K.Shs and 300 K.Shs. and for Charcoal... 10 K. Shs. and 60 K. Shs. This probably reflects different degrees of cash and subsistence economies.

A question is also asked about how many people are willing to pay for installation of electricity and for the monthly payment. Such figures are, of course, not very reliable, but an effort has been made to get at least the figures for the monthly cost realistic.

TABLE 5.3: WILLINGNESS TO PAY FOR ELECTRICITY

	<u>Average (K.Shs)</u>	<u>Population</u>
Installation	10.18	44
Monthly cost	19.39	
Not wanting electricity		<u>11</u>
		55

Sorting the monthly "payments" in different categories, the following result is obtained:-

TABLE 5.4: LEVELS OF MONTHLY COSTS

<u>Monthly payment (k.Shs)</u>	<u>No. of households</u>	<u>Percentage of the sample (55)</u>
10	11	20
10-30	27	49
31-60	6	11
Not wanting electricity	11	20
	<u>55</u>	<u>100</u>

It seems that the installation would be a major obstacle rather than the monthly cost, if people pay according to Tariff 2, which implies a fix charge of 4 K Shs per month plus 1 K Shs per consumed kWh, e.g. 3.6 kWh per month for one 40W lightbulb used 3 hours per night. That would be a monthly cost of 7.60 K Shs. There would also then be a slight reduction in the costs for kerosene.

Half the population would be willing to pay a realistic monthly cost.

VI. Attitude Interviews in Isiolo

These interviews are presently carried out in Isiolo and are mainly intended for comparison with results from other areas. So far the interviews have been carried out with Government employees, the purpose being to seek this "middle-class." The interviewing has proved difficult. At present 46 interviews have been conducted. On these the following preliminary results are based.

18 persons (39%) of the interviewed think that electricity will come 1976, 11 (24%) 1975 and 16 (35%) in 1974. One person said that he did not know. The present five-year plan states 1974, but the actual planning states 1976.

On the question "Who do you think would get electricity first?", the following alternatives were given by the respondents:-

TABLE 6.1: WHO WOULD GET ELECTRICITY FIRST

	<u>Number</u>	<u>Percentage of 46</u>
Township, shops	15	33
Government quarters	13	28
Administration	12	26
Hospital	11	24
Schools	6	13
Police	3	
Petrol Stations	1	
Streets	1	
VIP:s	1	

The following usages of electricity were suggested by the respondents:

TABLE 6.2: THE USE OF ELECTRICITY

	<u>Number</u>	<u>Percentage of 46</u>
Houselight	38	83
Cooking	18	39
Ironing	16	35
Refrigerator	7	15
Radio	5	
Heating	3	
Sewing	1	
TV	1	
Washing	1	

37 of the 46 interviewed are of the opinion that the Government (or some equivalent institution) should pay for the installation costs. Everyone wants street-lights.

As for the costs, the respondents say they are willing to spend in the average about 50 K Shs per month on electricity. The answers are confusing what regards the cost of installation, probably due to the fact that most respondents feel this is the duty of the Government.

Most people feel that there is a net in-migration to Isiolo, mainly because the township is a trading centre. They feel that this tendency would increase if electricity were brought to Isiolo. The possible effects suggested by the respondents are presented in Table 6.3:

TABLE 6.3: SUGGESTED EFFECTS OF RURAL ELECTRIFICATION

	<u>Number</u>	<u>Percentage of 46</u>
More business	20	43
More job opportunities	10	22
Easier movement at night	6	13
Studios, cinemas	6	13
Better hospital service	5	
Better schooling	5	
More attractive for tourists (hotels)	3	
Better water supply	1	
Easier household work	1	
KMC factory	1	

One question about what development projects the township needs gave the following result (of course electricity has a high figure):

TABLE 6.4: NEEDED DEVELOPMENT PROJECTS

	<u>Number</u>	<u>Percentage of 46</u>
Electricity	28	63
Hospital	26	57
School	22	48
Irrigation	13	28
Roads	13	28
Water	11	24
Entertainments	10	22
Housing	7	15
Facilities for industry	5	
Trade	3	
Railway	2	
Telephone	2	

As for social activities, finally, most of the respondents say they would go out more in the evenings and also attend evening courses.

Post Scriptum Six Months Later

The above report was written in December - January (1973 - 74). Since then the mentioned interviews have been carried out as well in Isiolo as in Garissa, Meru and Vihiga. Also, some rather minor studies have been carried out, e.g. a discussion of the use of private generators. The material collected has not yet been analyzed. I shall start with this in August and have a preliminary report ready in October.