

ZERO AGE SURVEY FOR Super-MoneyMaker

Client Profile and Status Assessment

MONITORING SURVEY CONDUCTED IN CENTRAL,  
EASTERN, RIFT VALLEY, WESTERN AND NYANZA  
PROVINCES OF KENYA

24<sup>TH</sup> JANUARY TO 26<sup>TH</sup> FEBRUARY 2000

Draft report

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## EXECUTIVE SUMMARY

### Objectives

To establish the Super-*MoneyMaker* client profile and status before buying the pump. In other studies, such profiles are established through baseline survey or through maintaining a control group. However, this is not possible in ApproTEC case since the pump buyers are not known before the actual buying and control groups are not possible to keep since this would amount to denying the persons in the group a chance to start a business. It is against this background that the survey was undertaken using the very new pump owners. The result of this survey will be used in future to show the various changes that take place within the household of the pump owners, which include sources of income, levels of income from the major sources, and job displacements which can be attributed to the Super-*MoneyMaker* pump.

### Sample characteristics

The sample taken consisted of clients who bought the pump between 1<sup>st</sup> December 1999 and 14<sup>th</sup> January 2000. They had stayed with the pump for about one month and therefore were assumed not to have had any socio-economic impact in their lives and the “past” was very vivid.

A random selection was made of 60 owners in 23 districts of Kenya. 53 owners were interviewed in Eastern, Central, Rift Valley, Nyanza and Western Provinces between 24<sup>th</sup> January 2000 and 26<sup>th</sup> February 2000. Sampling was based on Geographical distribution in the regions. The area was divided into 7 cluster areas for data comparison.

92% of the pumps are owned by men (ownership refers to the name given at the time the pump was bought) and 8% by women. However, results shows that pumps are considered as family assets and therefore the names given at the time of sale do not matter.

94% of the pumps had been put into use when the survey was conducted although they were hardly a month old. 2% had not been used while 4% were yet to get to the homes described in the guarantee forms. On pump management, past surveys where the pump had been used for an average period of 8 months show different figures from the ones got during this surveys. In the earlier cases, the percentage of women managers was higher. During the zero age survey the percentage was lower which was thought to be due to the fact that the pump had not settled well with the family and the “man” of the family was still attached to the new acquisition and had not let the management to get to the “real” manager. 58% of the pumps were found to be managed by men, 30% by women and 6% by a combination of men and women. The management of the rest could not be established.

### Current status of employment

28% of the owners have formal employment, 26% are in the informal sector and the rest 45% depend on farming, 60% of those in the formal sector are teachers which is equivalent to 17% of the sample. 79% of the managers are farmers, 8% are formally employed and 9% are in the informal sector.

### Relationship between the owner and the manager

51% of the pumps are managed by owners. All pumps owned by women are managed by the same. 23% of the pumps are managed by the wives, 8% by the sons and 2% by daughters. 4% are managed by brothers and 8% by employees who were directly answerable to the owners thus do not control the income generated.

91% of the owners are married and the rest 9% are single. On average each had 3.38 dependants most common being 3 and a similar median. 60% of the sample had no school

going children, 21% had 1 child going to school, 11% 2 children and 3% had 3. On average there are 0.52 children not going to school in the sample and 1.80 going to school.

### **Maximum education level**

16% of the owners have primary school level of education, 36% have up to secondary school level. 42% have attended other colleges, 6% have University education.

### **Age**

34% of the owners are within 21-30 years age bracket, 30% within 31-40 years and 17% are within 41-50 years bracket. 4% are less than 20 years. This therefore means that any promotion message should aim at targeting people within the age bracket of 21-40 who have had secondary school education. 60% of the managers have secondary school education with 23% having gone to other colleges and 2% have University education.

### **Income generation sources**

The five most important sources of income are farm income, businesses, salary, dairy and family sources. 84% of the respondents get income from the farm either as a first priority, second or third. 36% of the owners take farm income as the most important source, 28% as the second most important and 21% place it in the third position.

34% of the owners have some income coming from business. In terms of priority 23% get their main income from businesses, 6% as the second important and the 6% as the third. On average, net income from the first source of income for the entire sample is Ksh. 303,634/- per annum with the most repeated figure being Ksh. 120,000. Ksh. 120,000/- is the most representative value for the average owner of the pump. The median is Ksh. 120,000/- per annum. From the second income source, owners are earning an average of Ksh. 130,000/- with the most repeated figure being Ksh. 18,000/- and a median of Ksh. 30,000/-. The third most important income on average generates Ksh. 36,993/- with the most repeated figure being Ksh. 5,000/- and median of Ksh. 12,000/-. The results of the sample are skewed by the few people earning very high incomes.

68% of the sample earn less than Ksh. 250,000/- per annum while 19% earn over Ksh. 500,000/-. The latter are people working in senior positions or own large scale businesses.

### **Control of income**

75% of the owners control the income earned by the household.

### **Landholdings**

On average, 0.1 acres (0.04 ha) was under irrigation before the pump was bought. The average potential land for irrigation is 1.58 acres (0.65 ha). The maximum potential land for irrigation in the sample was 11 acres (4.5 ha) with the most repeated value being 1.00 acre (0.4096 ha)

The most common total land size is 2 acres (0.82 ha) with a median of 4 acres (1.64 ha). Due to the very big land sizes in North Rift Valley (Uasin Gishu in particular) the average size does not give a representative picture.

High agricultural potential areas have small land holdings while low agricultural potential areas have larger farm sizes.

### **Housing**

Two thirds of the owners live in their own houses, while 30% live in family houses. Only 2% live in either rented houses or Institutional houses.

38% of the pump owners either live in mud or timber houses. However, 93% of the owners have used iron sheets for roofing their houses. 6% have used grass thatch.

### **Livestock**

62% of the pump owners have cattle with a median of 2 cows. More cows are kept in the marginal areas than in the high potential areas. 32% of the respondents kept shoats (sheep/goats). There were few cases of shoats in the Central Province.

### **Other amenities**

30% of the owners have television sets. 8% have solar panels and 21% have access to main electricity. 11% have piped water and 17% have cars/pick-ups.

### **Main expenses**

43% of the respondents take domestic spending as their main expenditure in the household. This would include clothing, utensils, consumables and other miscellaneous household expenses. For 26% of the sample, school fees consumes most of their incomes. 15% use most of their income to expand their income base. These are mainly the young farmers who either have no children at all or children do not go to school. These are the high priority expense category.

### **Crops currently grown**

Of the first priority crops, maize is grown by 43% of the respondents. Tea comes second with 8% while coffee and kales have 6% each. Horticultural crops do not feature prominently in the list of the first priority crops. However, they do feature in the second category crops. The horticultural crops grown are:- kales, cabbages, tomatoes, onions, carrots, pepper, coriander among others.

### **Irrigation without the pump**

#### **Area under irrigation**

38% of those interviewed were doing irrigation before buying the pump. On average, these farmers were irrigating 0.23 acres (0.1 ha). Their potential area for irrigation was 1.33 acres (0.54 ha) and their average total land size was 5.14 ha. Those who were not doing irrigation before on average have bigger farms. Out of the 38% doing irrigation before, 30% consider irrigation as a business. 28% grew crops for local market and 2% were targeting export market (grew french beans).

#### **Income generated from sale of irrigated crop**

38% of the sample doing irrigation before were earning Ksh. 22,867/- from the sale of crops. Out of these, Ksh. 1,813 was used for paying wages, Ksh. 1,328/- for farm inputs (fertilisers and pesticides) leaving the net profit to be Ksh. 19,726/-. Total benefits per crop cycle is Ksh. 21,539/-.

Overall, pump owners were generating Ksh. 9,957/- gross income from sale of irrigated crops. The average wages paid was Ksh. 755/- per crop cycle and input costs was Ksh. 554/-. Net income to the farmer was Ksh. 8,315/-. Total benefits per crop cycle was Ksh. 9,070/-

#### **Employment creation**

ApproTEC defines a job as that activity that occupies an individual for 150 days a year 5 hours daily. Those doing irrigation before have an average of 1.44 jobs on the farm which comprised of 0.76 on watering and 0.68 on other activities.

Of the 1.44 jobs, 0.71 are waged jobs while 0.78 were family jobs.

### **Desired promotion methods**

**First saw/heard:** 36% of the respondent first knew about the pump when they saw a live demonstration at the dealers premises with 2% seeing at the manufactures' premises. 25% of the respondents first knew about the pump through the Daily Nation newspaper. The upside down newspaper advert caught the attention of the readers. Word of mouth was third with 11% of the respondents for the first time. Fourth was truck demonstration with 9%, radio have 8% and agricultural shows 4%.

**Convinced to buy:** Live demonstrations at the dealers sites convinced 62% of the respondents ad word of mouth got 19%. Although the calendar insert done in the Daily Nation Newspaper was hardly a week old when the survey was carried out, it had convinced 2% of the respondents.

**Other Promotion seen/heard by the respondent:** Permanent demonstrations continued to be seen by clients long after they bought the pumps. This happened in 51% of the cases interviewed. Daily Nation advert was seen by 30% after buying the pump and 13% have seen or heard from friends, neighbours or relatives (word of mouth).

**Technology features:** In total 79% of the respondents like manual bit of the pump. Its low price have attracted 42% of the respondents while simplicity got 10%.

### Sources of capital to purchase pump

25% of the pump owners used funds from other businesses to buy pump. 23% used their salaries and 21% sold maize. Other sources of income included sale of coffee, milk, family funds, sale of irrigated crops, sale of livestock, retirement benefits and student allowances. Nobody used credit to purchase the pump.

### **Constraints**

38% of the respondents said that watering has been their major problem hence the decision to buy the pump. Very little income coming from the farm was given by 19%. These people want to increase their farm productivity by getting into the irrigation business.

Unemployment, is another major problem facing the zero age clients.

### Conclusion

Pump owners are not the very poor people within their locality. They provide employment to themselves and other around them starting up a money circulating situation in their surroundings. While they do not command a lot of influence in their area, they command a lot of respect due to their hard work and ability to adapt to changes and take up challenges. They are eager to try new ideas and take risks. Many of them are not mean and are willing to share what they know and have with others. Demonstrations in the farms and at the dealers sites should be intensified if these people have to be reached.

## **1.0 ApproTEC MISSION AND OBJECTIVE OF THE SURVEY**

ApproTEC's mission is to promote sustainable economic growth and employment creation in Kenya and other countries. It does these through designing, developing and promoting technologies, which can be used by dynamic entrepreneurs to establish and run small-scale enterprises. It is ApproTEC's belief that self-motivated entrepreneurs managing small-scale businesses are the most effective agents for developing the emergent economies and that it is hard for them to identify viable business opportunities, access the required technologies and widely market new products. To address the situation, ApproTEC uses a six-step approach.

The first step involves identifying high potential small-scale enterprise. Opportunities through market and sub-sector studies. Second is to design appropriate technologies that are required to utilize such business opportunities. Thirdly, ApproTEC trains private manufacturers to produce the technologies in large quantities and retailers to sell them to the potential entrepreneurs. Fourthly, demand is created for the designed technologies through vigorous media and field promotion programmes. Fifth, it offers back-up system through training, which aims at building the capacity of the enthusiastic small-scale business entrepreneurs to utilise the technologies better, market the products and enhance their business skills. The sixth step, involves monitoring the programme effectiveness, economic and social benefits attributable to the technologies. The Monitoring and Reporting Unit has designed a process of routine data collection at various levels, which are kept in a computerized database. The data is then analysed to provide information that acts as a feedback into the action cycle. This enables ApproTEC to learn and change the process of the project implementation and therefore improve performance. Periodically, the Monitoring and Reporting Unit makes extensive field surveys to assess the impact of the technology intervention in terms of new profits generated, new jobs created and other extra social benefits.

New jobs and increased family incomes through establishment of dynamic small micro-enterprises leads to sustained economic growth and development. This is the ApproTEC's mission. ApproTEC impact is measured using the added jobs and incomes accrued by the household after purchasing and using the technologies.

To measure the added benefits, there is need to establish the actual profile and status of the pump owners before they acquire technologies. A baseline survey or control groups could be used to establish such profile and status. However, in ApproTEC case, neither can baseline survey nor a control group can work. This is largely because it is not known who the actual client will be until they buy the technology and therefore baseline survey is not possible. On the other hand, it is not possible to have control group since this would mean denying some potential clients the chance of owning the pump, which can only be considered inhuman.

The zero age survey aims at achieving what would otherwise be achieved through a baseline survey or control groups. The results of the survey will form the basis for determining changes that take place on the enterprises in terms of sources of income, levels of new profits from the major sources and job displacements, which are attributable to the Super-*MoneyMaker* pump.

In order to capture the right picture of the clients before they claim any benefit from the pump, the sample selected for the survey comprised of people who bought the pump between 1<sup>st</sup> December 1999 and the 14<sup>th</sup> January 2000. Through this, it is hoped that the clients are still very new in the micro-irrigation business using the pump and that they have not had a chance to use their pumps long enough to experience and social economic impact. At this point, the "past" is still very vivid in their minds.

## **2.0 ABOUT THE Super-*MoneyMaker* PUMP**

The Super-*MoneyMaker* Irrigation pump is an evolution of the *MoneyMaker* that was an adaptation from a model developed in India. The pump was fully designed and developed by ApproTEC with Owner Operation and Maintenance (OO&M) concept in mind. The Super-*MoneyMaker* micro-irrigation pump was launched in October 1998 at Nairobi show where it proved to be an instant success. By the end of December 1999, a total of 3,647 pump had been sold through dealers located in over 75 places around the country. This gives a monthly average of 243 pumps for this period.

There are five manufacturers producing the pumps, 4 in Nairobi and 1 in Kisumu. ApproTEC has trained each of these manufacturers at a fee on the production of the pumps. ApproTEC personnel checks the quality of each pump as it leaves the production line. The quality of the pump (just like any other ApproTEC technology) is maintained and propagated by use of standard jigs and fixtures (tooling equipments) provided on loan by ApproTEC to each manufacturer after the training. ApproTEC provides a one-year guarantee from the date of purchase against any manufacturing defects to the pump owner.

The *Super-MoneyMaker* pump is foot operated and uses the principle of atmospheric pressure to create a partial vacuum. The partial vacuum allows it to lift water from a depth of 20 feet (6meters). It has a pressure chamber that creates a pressure head of 43 feet (13 meters). The pump has a total head of 43 feet (13 meters). On a flat surface it pushes water for a distance of 600 feet (200 meters). The pump has a maximum pumping rate of 1.5 litres per second, can power up to 5 sprinklers and irrigate up to 2.4 acres (1 ha). It weighs 20 kilograms. The pump uses a rigid suction pipe and a flexible pressure hose-pipe, which are sold as accessories by the ApproTEC dealers. In MicroPED<sup>1</sup> region, pump owners are trained on various aspects of enhancing the pump utilisation in order to increase its benefits.

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<sup>1</sup> MicroPED region covers the entire Central province of Kenya, Laikipia in Rift Valley and Embu, Mbeere, South, Meru, Meru Central & Meru North in Eastern Province.

## 3.0 THE SURVEY

### 3.1 Methodology

A detailed questionnaire was developed before the survey was conducted.

At the onset of the survey, 50 was set to be the least number of new pump owners who needed to be interviewed. In order to achieve the number, 60 were randomly selected based on their geographical distribution. This meant that each District got a fair share based on the past sale records of 15 months. The team managed to interview 53 entrepreneurs in 23 districts of Kenya. 43 from east of Rift Valley (Makueni, Machakos, Kitui, Thika, Kiambu, Maragua, Murang'a, Nyeri, Embu, Kirinyaga, Laikipia, Nyandarua and Nakuru districts) and 10 in Western Kenya (Rachuonyo, Kisumu, Bondo, Siaya, Kakamega, Lugari, Bungoma, Mt. Elgon, Uasin Gichu and trans Nzoia districts).

Head of Monitoring & Reporting Unit and the Monitoring and Reporting Assistant carried out the survey. The interview involved both qualitative and quantitative methods with the view of getting maximum feedback from the entrepreneurs. General observations and actual measurements were taken. Interviews were carried out in the homestead and on the farms so as to get clear estimates of the socio-economic status and profile of the owners.

The detailed questionnaire used is attached in Appendix 1. It covers the following areas:

- Location of owner, respondent and manager to be and their relationship,
- About the pump(s),
- Occupation of the owner and manager,
- Number of dependants, age bracket, marital status and education background of owner and manager,
- Promotion methods and pumps features which attracted the buyer,
- Sources of capital to purchase the pump,
- Income and expenditure profile of the owner,
- Irrigation activities before the pump was bought,
- Major crops currently grown, their acreage and income generated,
- Jobs on the farm before the pump was bought,
- Major constraints faced by the clients before buying the pump,
- Intended use of the pump and the main sources of water.

### 3.2 Dates the survey was conducted

The survey was carried out from the 24<sup>th</sup> January and ended on 26<sup>th</sup> February 2000 with three days break in between. The Micro-PED region was visited between 24<sup>th</sup> January and 15<sup>th</sup> February 2000 and Western Kenya between 16<sup>th</sup> February and 26<sup>th</sup> February 2000. The full itinerary for the survey is attached as Appendix 2.

### 3.3 Locations of the survey

There are five broad regions within the area where ApproTEC has actively been promoting the pumps in the last 3<sup>1/2</sup> years. These are: East, MicroPED, Nairobi, West and Outside. East region refers to all districts East of Nakuru (inclusive) district minus Nairobi and the Mt. Kenya region. MicroPED region refers to the 13 Districts around Mt. Kenya (Central province and part of Eastern Province). They include; Kiambu, Thika, Maragua, Murang'a, Kirinyaga, Embu, Mbeere, Meru South, Meru Central, Meru North, Nyeri, Nyandarua and Laikipia. Nairobi region covers the Nairobi

province while West region covers all district west of Nakuru and North Rift Valley. Outside refers to areas outside Kenya.

The 50 entrepreneurs aimed at the survey, calculates to 2.24% of those in the database at the time which was 2,2335. A larger sample of 60 (2.68%) was taken in order to get the 50 clients. In other surveys carried out earlier on, it was normally easier to trace client using the given description and the knowledge of the neighbours of the existence of the pump. However, the zero age survey was carried out at a time when the pump had hardly been used and thus neighbours knowledge of the pump was minimal.

At the time the sampling was done, MicroPED region had the highest number of pumps which were 868 which represent 38.84% of those in the database. It was followed by Western region with 638, (28.50%). Third was East with 621, (27.79%) and finally Nairobi with 51, (2.28%). There were a total of 58 whose destination were known outside Kenya which accounting for 2.60%.

Respondents were selected from each of the region based on the above numbers which were available in the database at the time. 26 were selected from Micro-PED region, 18 from West and 16 from East. None was selected from Nairobi (due to the associated difficulties in tracing farmers in Nairobi). None was taken from outside (due to practical and financial implications).

The sample area was then divided into 7 geographical cluster areas. This was not done necessarily using the above regionalisation but, the social-economic characteristics of the people and proximity of one area from the other. For examples, people with relatively similar market opportunities, comparable agricultural potential neighbour one another would be grouped together for uniformity. After data analysis, comparison would be made between people whose incomes are similar to those others in different cluster areas. These would mean that people with relatively similar levels of income would be considered in the same way irrespective of where they come from.

The cluster areas in administrative districts were:

- Cluster I Makuenim Machakos, Kitui and Mwingi with 12 (20%)
- Cluster II Thika, Kiambu, Maragua and Murang'a with 13 (21.7%)
- Cluster III Nyeri, Embu and Kirinyaga had 7 (11.7%)
- Cluster IV Laikipia, Nyandarua and Nakuru consisted of 10 (16.7%)
- Cluster V Rachuonyo, Kisumu, Bondo and Siaya had 5 (8.3%)
- Cluster VI Busia, Kakamega, Lugari and Bungoma with 6 (10%)
- Cluster VII Trans Nzoia, Uasin Gishu and Nandi had 7 (11.7%) pumps.

At the end of the survey, a total of 53 entrepreneurs were interviewed in the selected 7 geographical cluster areas out of the initial 60. These was higher than the 50 targeted for at the beginning of the survey. This therefore means that the sample size initially planned for was maintained and surpassed to stand at 2.4% of the pumps in the database as at the end of December 1999. The pumps seen were distributed as follows:

- Cluster I Makueni, Machakos, Kitui 8 (15%)
- Cluster II Thika, Kiambu, Maragua and Murang'a – 12 (22.6%)
- Cluster III Nyeri, Embu and Kirinyaga – 5 (9.4%)
- Cluster IV Laikipia, Nyandarua and Nakuru – 9 (17%)
- Cluster V Rachuonyo, Kisumu, Bondo and Siaya – 4 (7.5%)

- Cluster VI Kakamega, Lugari, Bungoma, Mt. Elgon (Busia substituted with Mt. Elgon) – 7 (13%)
- Cluster VII Trans Nzoia and Uasin Gishu – 8 (15%)

#### 4.0 PERSONAL PROFILE OF OWNERS AND MANAGERS

##### 4.1 Gender

##### 4.1.1 Owners

Ownership refers to the person whose name is given at the time of purchase. Of the 53 pumps seen, 92% (49) were bought by men so “owned” by men and 8% (4) by women. These are the names that appear in the ApproTEC database. However, it was found that the pump is regarded as a family asset and therefore the name given at the time of buying is that of the head of the family (man). Surprisingly, in many occasions, it does not matter who went to buy the pump since there were many situations where women actually went to buy the pumps but decided to give the names of their husbands.

##### 4.1.2 Managers

This is the person who oversees the day-to-day operations of the pump. The person is generally the one who eventually controls the income coming from its use. From the onset, it is important to note that the survey was conducted quite early in the life of the micro-irrigation business. It would therefore not provide a very good and clear picture of who the final manager would be. When the technology is very new, there is a tendency of the person who is perceived as the owner to take pride in it and thus shadow the person who will be managing and operating the business. Earlier surveys at 8 months and 14 months of age have given amore realistic and reliable picture since each of the pumps seen then had been in operation for a minimum period of two crop cycles and thus the excitement associated with pump would have diminished. For example the last survey data (28<sup>th</sup> June to 25<sup>th</sup> July 1999) indicated that 73% of the pumps were managed by women while men managed the rest 27%. The average age of the pump then was 8 months. During this zero age survey, 58% (31) of the pumps were to be managed by men, 30% (16) by women, 6% (3) combination of men & women. It was not possible to establish who will manage the other 6% (3) since, 2% (1) had not been put to any use and the other 4% (2) were yet to get home.

*The following table shows the gender distribution of owner and the manager*

<b>Gender</b>	<b>Owner</b>	<b>Manager</b>
Woman	92%	32%
Men	8%	32%
Women/Men		2%
Not known		4%

##### 4.2 Employment

For both the owner and the manager, the survey sort to establish the type of employment they are currently in. This was second levels. The first level broke the employment status into formal, informal and farmers. In the second level, the survey sort to break each of the three levels into further finer specific areas of employment. This aimed at establishing where most of the time and efforts are spent. This will act as basis for any shift after using the pump. It is an established fact that starting up a new business or major incremental in existing businesses

lead to displacement in employment from other areas either due to increased new income, dependability/reliability of the new income or other external factors which force people to change without necessarily making a choice, e.g. retirement. It is important for ApproTEC and other stakeholders to estimate the kind of displacement which take place once micro-irrigation is introduced in a farm through the Super-MoneyMaker pumps. These can only be possible if during the zero age survey, it is established the types of employment users are already involved.

#### **4.2.1 Owners**

Of the 53 enterprises involved in the survey, 28% (15) of the owners were normally employed. Another 26% (14) were in the informal sector while the rest 45% (24) were practicing farming. The breakdown takes the areas of highest involvement for the owner. As indicated above majority of the pump owners (45%) were farmers and they bought the pump to enhance what they were already doing in their farms.

Out of the 28% in the formal sector, teachers took the highest number of 60% which is equivalent to 17% of the sample. Other specific areas of formal employment were; clinical officer (2%), Farm Manager with large commercial farms (2%), Machine operator (4%), Technicians. There were two unique areas of representation which were a pilot and a researcher with KEMRI each with 2%.

Most of these formally employed bought the pump with the intention of having somebody else manage it. Only a few were doubling as the managers (8%), otherwise the rest were managed by other people.

In the informal sector, owners were involved in a number of activities; 4% of those informal sector were retired teachers, where one of them was doing farming and the other was involved in a series of business, ranging from a butchery, maize meal to selling of paraffin oil to the locals. Beside these, other areas with bigger representation were, hardware shops and transport business each with 4%.

Other informal sector areas were each represented by 2%. They included; Matatu business, auctioneer, butchery, carpentry, milk bar, and welding.

#### **4.2.2 Managers**

For each of the pump seen, the survey sort to establish the person who will be managing the pump and the employment they are currently involved in. In most of the cases, the pump was already in use and thus it was not very difficult establishing who the manager would be. In 6% cases, it was not possible to determine who the manager of the business would be since in 2% case the pump had not been put into any use while in the other 4%, the pump had not reached home due to some logistic problems with the owner. In those cases where management was established, it was widely thought that the question of who will finally manage the pump may not have settled down completely to decide on the issue especially due to lack of enough information of its potential, energy requirements or the man was still hanging on the new technology before finally leaving it to the woman and the children. This was especially so when the situation on the ground and the data collected is compared to what has been found in the previous surveys when the pump had been used for an average of 8 months.

During this zero age survey, it was found out that, 79% of the managers depend on the farm for their day-to-day livelihood. This forms the majority of the category of the managers. Some of these managers were the actual owners of the farm and the pump while others were relatives to the owners and yet others were employees.

8% of the managers were formally employed elsewhere and thus used their spare time and the weekends to manage the pumps.

9% of the managers in the covered sample were self employed in the informal sector. Just like those formally employed, they were using their spare time, evenings and weekends to manage the pump operations.

6% of the pumps, it was not possible to establish who the managers would be once they are put into use.

70% of the managers were farmers and had control on what to grow. This means that, they were either the owners or closely related to the owner. 8% of the managers were employees and thus whatever they were going to do had to have explicit confirmation from the owner. Another 6% were teachers. This meant that, they were managing the pump in the evenings and over the weekends. 4% were involved in transport business and were finding it quite difficult managing the pump. However, they were spending parts of their weekends doing this or alternatively they would leave behind a comprehensive programme of what needs to be done by the operators when they are away.

Other areas which had 2% each were, Farm Manager, hardware shop and Matatu business. There were 2% teachers permanently employed by the micro-irrigation at present. It was not possible to establish the fate of 6% of the pumps until they are put to use.

*The table below shows the broad areas of employment for both the owner and the manager*

<b>Employment</b>	<b>Owner</b>	<b>Manager</b>
Farmer	45%	77%
Formal	28%	8%
Informal	26%	9%
Not known		6%

### **4.2.3 Relationship between owners and managers**

In order to establish the chain through which the benefits from the micro-irrigation business follows in the economic line, the survey sort to establish the actual relationship between the ownership of the pump and the manager.

The survey showed that 51% of the pumps were managed by the owners. As at the time of the survey therefore, up to 51% of those whose names appear on the database were the ones who were directly involved in the decision on how the pump would be used. An interesting aspect of the relationship was that all the women owners were managing their own pumps and therefore only the pumps which were bought by men owners whose ownership was distributed in other ways.

23% of the pumps were being managed by the wives of the owners. This means that, 23% of the men what need to be done with pump and at what time.

8% of the pumps were being managed by the sons of the owners. These were generally in situations where the pump was bought with the intention of creating job opportunities to a school leaver. In such situations, one would find that the pump is completely left in the hands of the leaver to manage, to decide on which crops to grow and look for their market. The parents would steer away from the operations and the management of the pump.

There were also 2% of pumps which were managed by the daughters.

8% of the pumps were managed by employees. They were directly answerable to the owner. In all this cases, the owner was living away from the farm and thus could only come occasionally to check how the pump was doing, otherwise the day-to-day running of the pump was in the hands of the employee.

4% of the pumps were managed by brothers to the owners. The pumps generally managed by brothers were not operating exactly like for the other relations. The farm would be a family farm and one of the brothers would buy the pump. He would give it to the brother who would in turn use it on their farm. The produce is then shared between the two brothers. Therefore the agreement would be that “I buy the pump, you provide the labour”. The brother owner would also buy most of required inputs.

*The table below shows the relationships between the owner and the manager*

<b>Relationship</b>	<b>Percentage</b>
Self	51%
Wife	23%
Employee	8%
Son	8%
Daughter	2%
Brother	4%
Not known	6%

### 4.3 *Dependants and Marital Status*

Income earned by either the owner or the manager of the micro-irrigation business would go towards the support of the beneficiaries who each of them support. The income earned currently are also going towards the support of the same. The survey intended to establish the estimated number of the direct beneficiaries that those who are involved in the pump business support.

In the survey, the dependent is defined as any individual deriving direct support from the owner or the manager of the pump. These would include, the spouse, children under 18 years old and getting support from the family<sup>2</sup>, children over 18 years either in school and getting support from the family, members of the extended families living/getting direct support from the family and parents who are supported by the family especially the very old ones. Generally the married people had more dependants than the single owners/managers.

#### 4.3.1 **Owners**

Of the 53 clients interviewed 91% were married, while the rest 9% were single. There were no cases of windowed owners. On average each of these had 3.38 dependants who were mainly their children. The most common number being 3 and the median was 3. The various levels of education for the dependants were looked at for the owners. It was found out that an average of 0.52 children were not going to school. There were 0.18 children in Nursery, 1.22 in primary, 0.30 in secondary and 0.10 in college. On average there were 1.8 children going to school. In 6% of the cases, it was not possible to get data on where children were going to school.

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<sup>2</sup> Some children are less than 18 years but support themselves by either being employed or have been given a piece of land from which they get income. Others have their own businesses. They are thus not considered in this survey as dependant on the family.

The following table gives a breakdown of the percentage of owners with specified number of children at various levels in school. It also gives the average number of children in the specified level.

No. Children	0	1	2	3	4	5	6	Blank	Average	Mode	Median
<b>Not going to school</b>	61%	21%	11%	2%	0%	0%	0%	<b>6%</b>	<b>0.52</b>	0	0
<b>No. Nursery</b>	77%	17%	0%	0%	0%	0%	0%	<b>6%</b>	<b>0.18</b>	0	0
<b>No. Primary</b>	45%	15%	17%	8%	4%	6%	0%	<b>6%</b>	<b>1.22</b>	0	1
<b>No. Secondary</b>	74%	13%	8%	0%	0%	0%	0%	<b>6%</b>	<b>0.30</b>	0	0
<b>No. College</b>	87%	6%	2%	0%	0%	0%	0%	<b>6%</b>	<b>0.10</b>	0	0
<b>Total in School</b>	<b>32%</b>	<b>8%</b>	<b>28%</b>	<b>8%</b>	<b>13%</b>	<b>4%</b>	<b>2%</b>	<b>6%</b>	<b>1.80</b>	<b>0</b>	<b>2</b>

*\*\*Note- Not going to school means that the dependants were too small to attend any of the stated type of schools. Otherwise it does not mean that the dependants were grown up beyond school going age.*

The mode column for all levels of school is zero. Comparing this with the average number of dependants (3), it be concluded that in most cases, the dependants could not be categorised in terms of going to school. Some of them are either members of extended family, parents or grown up children.

The median of the total in school indicates that most of the owners had few dependants in each of the given school levels. Primary school level has the highest average and median for owners in the sample. In terms of types of schools, 70.5% of the owners took their children to private primary schools and 43.4% to public primary schools. 45.3% of the owners did not have children going to primary schools while it was not possible to establish the status of 3.8%.

None of the owners took children to a private secondary schools. All the 22.6% of the owners who had children in secondary schools took them to public schools. 73.6% of the owners did not have children in secondary schools while it was not possible to establish the status of 3.8% of the owners.

### 4.3.2 Managers

Of the 53 pumps involved in the survey, it was not possible to establish who the managers of three pumps would be. It was not possible to get the detailed information about school going dependants as it was for the owners. This was especially difficult where the managers were employees. However, since 51% of the pumps were owner managed, 23% managed by wife, (a total of 74%) it means that the categorization of the dependants would not be very different from that of the owners since these are one and the same people. Difference arises where the manager is the son, daughter, brother or the employee since each of them has a different profile of dependants. But as mentioned above detailed data on the various school levels they have each attained was not collected.

On average each manager had 3.06 dependants in their households. Like the owners, the most common household size was 3.

## 4.4 Education level and age bracket

The survey intended to check the level of education which the owner and the manager had attained at the time. This was classified in primary, secondary, college and university education. The same was done for the managers. These was thought to be useful especially in terms preparing promotional messages for the target clients. The higher the level of education the more leverage there is in the use of English and Kiswahili as promotional language. The age bracket would also give a guide on the kind of clients ApproTEC is dealing with and thus be more focused.

#### 4.4.2 Owners

On the 53 entrepreneurs involved in the survey, only 17% did not have secondary education. They had attained primary school level. The rest 83% had attained up the secondary school level with 6% having University education, 42% had trained in a tertiary college and 36% had completed secondary school education but had not taken further specialised courses at college level.

Most of the owners were within the 21-30 years bracket. This formed 34% of the sample. This group was closely followed by the 31-40 years bracket which had 30%. Third was 41-50 years age bracket with a smaller percentage of 17% and those over 50 years of age with 9%. Lastly was those with less than 20 years with 4%. This could be the reason for the low number of dependants per household.

#### 4.4.2 Managers

Of the 53 pumps seen, 60% of their managers had up-to secondary school education with 36% having done up-to secondary level, 23% college and 2% up to University levels. 32% had primary school education while it could not be established the level of some 6%. In terms of age bracket, managers within age 21-30 years comprised 34% followed closely by 31-40 years who comprised 30%. Third was age group 41-50 with 17% then those over 50 comprising 9% and lastly less than 20 years with 4%. The age group of 8% of the managers could not be ascertained.

*The following tables shows the education status and age bracket of pump owners and managers*

Level of education	Owner	Manager
<b>Primary</b>	17%	32%
<b>Secondary</b>	36%	36%
<b>College</b>	42%	23%
<b>University</b>	6%	2%
<b>Blanks</b>	0%	8%

Age Bracket	Owner	Manager
<b>&lt;20 yrs</b>	0%	4%
<b>21-30 yrs</b>	36%	34%
<b>31-40</b>	36%	30%
<b>41-50</b>	28%	17%
<b>&gt;50</b>	17%	9%
<b>Blanks</b>	0%	8%

## 5.0 INCOME STATUS AND WEALTH INDICATORS

Knowing the kind of income and having a general picture of the wealth status of the pump buyers would assist ApproTEC to target clients better and to address the issue of employment creation better.

### 5.1 *Current Income generation activities*

Introduction of the pump in the farm would lead to changes in the pattern of income generation for the household. This is because it may lead to start up of micro-irrigation as a business on the farm which may eventually turn to be one of the major income generation activity. For those who were already engaged in irrigation before, introduction of the pump would lead to increase in intensity and area under irrigation which would then lead to increased income generation activities. ApproTEC hopes that the displacements would be positive where they would lead to better use of the resources available and increased output on the farm. However, situations may also be found where the pump came in because the individuals had been displaced from other lucrative sectors (especially cases of retrenchment currently going on in many organisations and public sector) and therefore in order for these individuals to occupy themselves and generate income they opt to purchase the pump. Whichever the case, this survey aimed at establishing the main sources of incomes just before buying the pump and the amounts of the most three important sectors is generating.

#### 5.1.1 **Main sources of income**

In order to understand the owners well, the survey aimed establishing the main sources of income and the approximate amount that they get from various sources. Up-to three most important sources were considered.

Some individuals had many forms of sources which gave a lot of money that were difficult to quantify. Other owners come from influential families whose network of income generation is hard to establish. These individuals were earning more than Ksh. 1,000,000/- from these various sources in year. They have been grouped together in the analysis without specifying the actual amount. However, there were some who had few sources of income but the total income ended up being over a million Kenya shillings. These have been classified together with the earlier categories.

The three most important sources of income were found to be businesses, salary and farm income (sale of crops). Dairy has been considered separately from the other farm incomes although it is generated at the farm level so that it becomes possible to differentiate between income from crop production and animal production.

*The following table shows the percentage of household income from various sources*

<b>Source of income</b>	<b>First Source</b>	<b>Second Source</b>	<b>Third Source</b>	<b>Total %</b>
<b>Farm Income</b>	35%	28.3%	20.7%	<b>84.80%</b>
<b>Business</b>	22.6%	5.7%	5.7%	<b>34.00%</b>
<b>Salary</b>	24.5%	9.4%	0%	<b>33.90%</b>
<b>Dairy</b>	11.3%	8.9%	5.7%	<b>25.90%</b>
<b>Family</b>	0%	0%	3.8%	<b>3.80%</b>
<b>Student allowance</b>	1.9%	0%	0%	<b>1.90%</b>
<b>Retirement benefit</b>	1.9%	0%	0%	<b>1.90%</b>
<b>Many</b>	1.9%	0%	0%	<b>1.90%</b>
<b>Renting out Oxen</b>	0%	1.9%	0%	<b>1.90%</b>
<b>Blank</b>	0%	24.5%	52.8%	

### 5.1.2 Amount in Incomes generated

In this analysis, gross income is used rather than the net. This is because, it is difficult to establish the cost of earning a salary while it is relatively easy to establish the cost of running a business and thus establish the net profits. Gross income for both cases gives allows for a fair comparisons between the two cadres.

On average, households earned Ksh. 303,634/- gross income per annum from the most important source of income. The most repeated earning was Ksh. 120,000/- and the median was also Ksh. 120,000/- for the entire sample. From the second most important sources, households earned an average of 130,000/- with a mode of Ksh. 18,000/- and a median of Ksh. 30,000/-. The third most important source of income gave households an average of Ksh. 36,993/- with a mode of Ksh. 5,000/- and a median of 12,000/-.

The earnings were skewed with 79% of owners earning less than Ksh. 500,000. This is demonstrated by the value of the standard deviation. For the most important source of income, the standard deviation (SD) was Ksh. 760,000/-, the second had an SD of Ksh. 416,478/- while the third source had Ksh. 61,714/-.

In order to get a picture of the levels of earning of individuals, they were divided into 5 broad categories using their gross incomes. Category 1 comprised of owners whose gross annual income exceeded Ksh. 1,000,000/-. They formed 15% of the sample. Category 2 comprised of owners whose gross income range is Ksh. 500,000/- to 1,000,000/-. They made up 6% of the sample. Category 3 comprised of households earning an average annual income income of Ksh. 250,000/- and Ksh. 500,000/-. These categories had 11% of the respondents. Category 4 were earning between Ksh. 100,000 and Ksh. 250,000/-. These were represented by 32% of the sample. Finally category 5 had 36% of people whose gross annual income was less than Ksh. 100,000/-.

68% of the owners earn less than Ksh. 250,000/- gross income per annum. 34% of the owners earn less than Ksh. 100,000/- gross per annum. All those earning more than Ksh. 500,000/- were either holding senior positions (in government or organisations they work for) or had large businesses/farms (this is the case in Rift Valley). None of the in this category was doing irrigation before.

*The following table shows the average gross income made by each category from the three main income sources and the average annual net income*

<b>Income Category</b>	<b># in the category</b>	<b>% in the category</b>	<b>First source (gross)</b>	<b>Second source (gross)</b>	<b>Third source (Gross)</b>	<b>Total (gross)</b>
<b>Category 1</b>	8	15.1%	2,015,000	1,053,333	144,775	2,946,500
<b>Category 2</b>	3	5.7%	421,667	135,000	28,517	585,183
<b>Category 3</b>	6	11.3%	318,958	112,393	16,054	411,280
<b>Category 4</b>	17	32.1%	119,074	49,156	15,000	172,397
<b>Category 5</b>	19	35.8%	36,285	17,921	7,100	44,552
<b>Average</b>			<b>303,634</b>	<b>130,419</b>	<b>36,993</b>	<b>405,358</b>

### 5.1.3 Control of income

Control of the generated income is an important factor in a household. From the past surveys it had been found that the person managing the pump controls the income generated from the use of the pump. This survey aimed at establishing how the control of income was before the acquisition of the pump in order to establish whether owning of the pump leads to any shift in the control. Apart from checking on who is managing the pump, other factors were put into consideration during the interview in order to arrive to the conclusion. Some of the factors considered were, the level of sharing information among the household, ownership of the work, attitude, appreciation of the technology, identification of problems and benefits, understanding of the procedures among others.

75% of those interviewed said that the income is under the control of the owner. This is the person whose name appears in the database. The rest 25% are under the control of the Manager to be of the pump.

It was noted that owners with higher incomes would want to control the pump themselves. As the income became smaller, the percentage of the managers controlling income increased.

## 5.2 Landholding

The survey aimed at getting the size of landholdings in three folds. In the first instance the area currently under irrigation, second potential area for irrigation and thirdly the total land size for the owner. On the land under irrigation, there was an average of 0.10 acres (0.04096 ha) being irrigated. There was a maximum of 0.50 acres with close to two thirds not irrigating (62%) before.

In terms of potential area for irrigation there was an average of 1.58 acres. Maximum potential area was 11 acres with the most repeated figure of 1.00 acre. Median for landholdings was 1.00 acre while the standard deviation was 1.804 acre.

The average total land owned by a household was 31.21 acres. This figure is highly affected by those with large farm sizes in the drier parts of the country. Otherwise the most repeated total landholding was 2 acres with median being 4 acres. The maximum land size was 1,000 acres and the smallest was 0.07 acres. The standard deviation for the total land size was 147.231.

High potential areas are densely populated and the land size is smaller, when compared with the low potential areas with smaller population density. Other areas with low population density were North Rift Valley where cereals and dairy farming are the main cash activities on the farm. In these areas, the landholdings are very large.

## 5.3 Housing

The type of houses and the ownership of the same gives an indication of the wealth of the individual. Two thirds of the houses occupied by the owners were owned by themselves. This was followed family owned, which accounted for 30%. Company houses, rented ones and those staying in schools took 2% each.

On the walls, 34% of the houses were made of stones, and 30% from mud. There was 25% pump owners living in timber houses and 6% on soil stabilised block houses. A minority 4% lived in brick houses and 2% were made from iron sheets. In some parts of Rift Valley, some houses are made from mud although the owners are quite wealth and could afford a stone house or timber. These houses are generally made following the traditionally accepted materials and method by the community.

Three different types of roofing are used by the pump owners. 93% were made of iron sheets, 6% grass and 2% were made of tiles.

The following table shows the percentage number of houses made from different materials

Ownership		Walling		Roofing	
Type	Percentage	Type	Percentage	Type	Percentage
Self	64%	Stone	34%	Iron sheet	92.5%
Family	30%	Mud	30%	Grass	5.7%
Company	1.9%	Timber	24.5%	Tiles	1.9%
Rented	1.9%	Soil Blocks	5.7%		
School	1.9%	Brick	3.8%		
		Iron sheet	1.9%		

#### 5.4 Farm assets and other household

62% of the pump owners keep cattle. The maximum number any individual was found to have was 40 with the most repeated number being zero and a median of 2. The standard deviation for cattle is 7.487. The distribution of cows was quite uniform across the country without any area dominating over the other. However, in terms of numbers, there were higher numbers in marginal areas and the Rift Valley areas. In the marginal areas cattle mainly kept are beef animals while in the Rift Valley areas, are dairy cattle. All cattle kept in the Central part of the country were dairy.

32% of the pump owners kept either goat or sheep or both (shoats). There were very few cases of people keeping shoats in the Central Kenya mainly due to the small pieces of land and the economic value associated to them on a day to day basis. There were no cases where shoats were looked upon as income generating entity by the owners. The maximum number kept by any owner was 30 with a median and mode of zero. The standard deviation is 7.638. 30% of the pump owners were found to have a television set.

8% of owners had solar panels while 21% got their electricity from the mains.

11% of the owners had some piped water although none was using this water for irrigation. It was mainly for domestic use.

17% of the owners had vehicles.

## 6.0 MAIN EXPENSES FOR THE HOUSEHOLD

Data on the main types of expenditures the households are currently involved it was taken.

These would then be used in future to compare whether there is any change in consumer behaviour pattern in terms of expenditures. They were taken in terms of priority so as to get a picture of what the clients consider to be their biggest challenges to survival.

In the first priority list, the main expenditure was catering for domestic chores. 43% of the clients interviewed said that this was their main expense. This included, clothing, house utensils, normal consumables generally bought from the shops and other miscellaneous expenses.

The second main expense was paying the school fees. 26% of the clients interviewed said that this was their main expense. They said that the cost of school fees even in public schools has become very high thus taking the biggest share of their income.

Third was expansion of the business. This is especially so for the young people who are new in business or those who are slightly wealthy and can still afford to expand onto what they currently have. Some people have expanded the area they have been farming while others have invested in other areas like keeping dairy or engaging in irrigated agriculture. 15% of the clients were using most of their income for expansion.

Some 6% of the clients used most of their income to buy basic food like maize and beans. This was their main expense.

Other areas that ranked number one in expenses were servicing loans and savings. For 3.8%, it was not possible to establish their mode of expenditure.

In the second priority expense, domestic spending topped the list with 34% of the clients. These was followed by payment of school fees. Food took the fourth position with 15% of the clients sitting it as the second most important expense was the extended families. Some of this people were staying with some close relatives or their parents.

When looking at the third level of expenditure saving become predominant with 25% of the clients making some savings. This was followed by domestic spending with some 15% of clients interviewed. Medical care and food had 13% each clearly indicating the place medical care takes in the households. Extended family had a share of 8% of the clients considering it as the third most important way of spending their income. Paying of school fees was sited by some 6% of the clients interviewed as the third most important way of spending their income. Other areas whose clients income are expended on are expansion of their current activities, other investments and renting of land. Each of this had 2%.

*The following table shows different kinds of expenditures, priority given and the percentage response*

Type of expenditure	% 1 <sup>st</sup> priority	% 2 <sup>nd</sup> priority	% 3 <sup>rd</sup> priority	Total %
<b>Domestic</b>	43.4%	34.0%	15.1%	<b>92.50%</b>
<b>School Fees</b>	26.4%	20.8%	5.7%	<b>52.90%</b>
<b>Saving</b>	1.9%	13.2%	24.5%	<b>39.60%</b>
<b>Food</b>	7.5%	15.1%	13.2%	<b>35.70%</b>
<b>Expansion</b>	15.1%	7.5%	1.9%	<b>24.50%</b>
<b>Medical Expense</b>	0.0%	0.0%	13.2%	<b>13.20%</b>
<b>Extended family</b>	0.0%	5.7%	7.5%	<b>13.20%</b>
<b>Loan Servicing</b>	1.9%	0.0%	0.0%	<b>1.90%</b>
<b>Renting of land</b>	0.0%	0.0%	1.9%	<b>1.90%</b>
<b>Other Investments</b>	0.0%	0.0%	1.9%	<b>1.90%</b>
<b>Not established</b>	3.8%	3.8%	15.1%	<b>22.70%</b>
<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	

## 7.0 CROPS CURRENTLY GROWN

The three most important crops currently being grown were looked into. They were taken in order of priority such that the most important crop for the farmer was taken as number one, the second priority crop as number two and so on. In a number of situation it was not very clear from the farmer which among some two crops was of higher priority. In such situations, the two crops were recorded together since they occupied the same status in the farmers' preferences.

Of the most important crops, Maize had 43%. The other most important crop for the clients who have newly acquired the pump was Tea with 8%. Coffee and Kales were each grown by 6% while beans, groundnuts and tomatoes were each grown by 4%. Other crops of important to the clients were cabbages, french beans, macadamia, maize and beans, nappier grass and potatoes each with 2%.

In the second priority crops, Beans were leading with 13% followed by kales with 8%. These were followed by the combination of beans and cowpeas which had 6%. Other crops of secondary importance were maize and onions each with 4%. Most of the other crops which

included, bananas, cabbages, carrots, cassava, coffee, millet, mangoes, potatoes, sugar snaps, tomatoes and wheat had 2%.

Some clients grew certain crops at tertiary level. In each case there were 2% of clients. These crops were coriander, kales, maize, mangoes, millet, onions and sweet pepper.

It is worth noting that the crops mentioned above are only those grown for income generation purpose. Those grown purely for household consumption were not considered. This would make it possible latter on to make the comparison between the changing pattern of the cash crops being grown before and after buying the pump.

*The following table shows the percentage of clients growing different crops at different priority level.*

<b>Crops</b>	<b>1<sup>st</sup> priority</b>	<b>2<sup>nd</sup> priority</b>	<b>3<sup>rd</sup> priority</b>	<b>Total</b>
Maize	43%	4%	2%	49.00%
Beans	4%	13%	0%	17.00%
Kales	6%	8%	2%	16.00%
Tea	8%	0%	0%	8.00%
Coffee	6%	2%	0%	8.00%
Tomatoes	4%	2%	0%	6.00%
Beans & cowpeas	0%	6%	0%	6.00%
Onions	0%	4%	2%	6.00%
Groundnut	4%	0%	0%	4.00%
Potatoes	2%	2%	0%	4.00%
Cabbages	2%	2%	0%	4.00%
Millet	0%	2%	2%	4.00%
Mangoes	0%	2%	2%	4.00%
French beans	2%	0%	0%	2.00%
Macadamia	2%	0%	0%	2.00%
Maize & beans	2%	0%	0%	2.00%
Nappier grass	2%	0%	0%	2.00%
Carrots	0%	2%	0%	2.00%
Cassava	0%	2%	0%	2.00%
Sugar canes	0%	2%	0%	2.00%
Sugar snaps	0%	2%	0%	2.00%
Wheat	0%	2%	0%	2.00%
Bananas	0%	2%	0%	2.00%
Coriander	0%	0%	2%	2.00%
Sweet pepper	0%	0%	2%	2.00%

## 8.0 IRRIGATION BEFORE BUYING THE PUMPS

Of the 53 owners interviewed, 38% were doing irrigation before buying the pump. On average these farmers were irrigating 0.23 acres (0.0942 ha) of land without the pump. Their potential area for irrigation is 1.33 acres (0.545 ha) while the average land size is 5.23 acres (2.14 ha).

On average the area under irrigation for the entire sample was 0.10 acres (0.04096 ha) with the potential area under irrigation being 1.58 acres (0.647 ha). The total average land size was 31.21 acres meaning that those who were not involved in irrigation before had far much higher land than those already doing irrigation and heavily depended on the rain-fed crops. All those doing irrigation before were using buckets to convey water to their fields. Apart from the method being very tedious, only limited piece of land is irrigated using the method. Of the 38% entrepreneurs doing irrigation before, only 30% of them considered irrigated crop as the main crop in their farms. Apart from one person who was previously growing French beans, all the others were growing crops for the local market. These included, kales (*Sukuma Wiki*), cabbages and tomatoes. Of the three, tomatoes and kales were preferred each being grown by 4% of the clients.

40% of the 38% doing irrigation before considered the irrigated crop as a second priority crop. Out of these, 38% had another irrigated crop taking the first priority meaning that the other 62% considered the irrigated crop as a second priority crop. In the second priority category the crops grown were, onions, tomatoes, kales (*Sukuma Wiki*), sugar snaps and carrots. Kales dominated this category. In the third priority category the irrigated crops included, kales, sweet pepper, onions, coriander and cabbages. These were grown by 25% of the 38% doing irrigation before.

Kales are dominant in each category due to their common use with *Ugali*, a staple food in Kenya. It is grown for the local market and in most cases the amount grown does not allow the farmer to take it to the market but rather the consumers buy directly from the farm. There were some few instances where buyers were institutions. These was found in 4% situations of the total sample, which represent 10% of those doing irrigation.

### 8.1 *Income generation from irrigation*

#### 8.1.1 **Irrigating before**

38% of the sample were doing irrigation before they bought the pump. Some considered this as a business while majority were irrigating for subsistence purposes.

On average, the gross income earned from sale of the irrigated crops amounted to Ksh. 22,867/- per season. The production costs which included costs of planting materials, fertilisers and pesticides amounted to Ksh. 1,328/-. Wages paid per cycle was Ksh. 1,813/-. These means that the average net profit for the entrepreneur per crop cycle was Ksh. 19,726/-. Total benefits which includes the wages plus profits by the farmer are Ksh. 21,539/-. For a year with an average 2.34 crop cycles, the average total benefits received at the farm by those doing irrigation before would be Ksh. 50,401/-.

#### 8.1.2 **The entire sample (every pump sold)**

For every pump sold, on average owners were making Ksh. 9,957/- gross income from the sale of the irrigated crops. The average production costs for each pump sold (fertiliser, planting materials and pesticides) was Ksh. 554/-. The average wages paid through watering per season were Ksh. 755/- while the net income per crop cycle was Ksh. 8,315/-. The total

benefits for the entrepreneur and the wages worker was Ksh. 9,070/- per crop cycle. In one year, the total benefits would be Ksh. 21,224/-.

### 8.2 *Irrigation jobs on the farm.*

ApproTEC defines a job as that task which occupies an individual for 150 days a year, 5 hours daily. On average each household doing irrigation before created 0.76 jobs on watering alone. Other irrigation related activities (land preparation, harvesting and marketing) were creating 0.68 jobs thus in total there 1.44 jobs on the farm which were related to irrigation work.

Some of these jobs were done by the family members while others were performed by waged labour. 0.71 jobs were performed by the family and 0.73 by the waged workers.

## **9.0 DESIRED PROMOTION METHODS AND PHYSICAL FEATURES OF THE PUMP**

ApproTEC has been involved in various methods of creating demand for the Super-MoneyMaker pump since it was introduced in the market on October 1998 at the Nairobi show. The different methods have complemented each other in sending various messages to the potential buyer and thus convincing them to buy. However, some of the methods have worked better than others in getting to many people but others may have worked better in convincing the people to make the decision to buy. Some other methods have continued to fascinate customers long after they have bought the pump and have always pointed this to their friends who want to invest in the micro-irrigation pump. It was one of the intention of this survey to bring out these various methods as they are seen by the buyer in terms of which one they saw first, which one convinced them to buy and lastly other methods which they have seen latter. Data was collected for each of the criteria has been analysed in the same way.

The other aspect that the survey intended to establish are the physical and technical features which the client like about the pump. This would be very important in any improvement of the pump and in future designs. This knowledge serves as the interface between the consumer and the designer where the designers gets to understand and appreciate the consumers taste and preference.

### *9.1 Promotion Methods*

#### **9.1.1 How the owner first came to know about the pump**

Most of the people first saw the pump in a demonstration outside the dealers' shops. There were 36% who gave this as the first time ever. 2% had seen at the pump manufactures premises. This was followed by the newspaper advertisement which had 25%. The owners attention was captured by the upside down advert in newspaper. Third in line was word of mouth which scored 11%. These are generally people who saw the pump with a neighbour/relative or were told about it by others who had seen it elsewhere and thought that it could be of help to them.

Word of mouth was followed by truck demonstration which scored 9%. Fifth was radio which was first heard by 8% of the owners who eventually bought the pump.

Agricultural Shows took the sixth position with 4%. Those who saw the pump at the show were very excited especially when they noticed that children can operate easily as the adult does.

During the 16<sup>th</sup> January 2000, a calendar was inserted the Sunday Nation newspaper (2% of the people saw the pump for the first time ever on this calendar and they went ahead and bought).

In 4% of cases it was not possible to establish the first way through which the pump was seen.

#### **9.1.2 Promotion method that convinced the owner to buy the pump**

After seeing or hearing about the pump for the first time, some clients were completely convinced that they needed to have one in their farms. However, for others this created interest and desire but no action was taken to buy.

Majority to the owners were only convinced to buy the pump after they saw it in action. 62% of the owners got convinced on buying the pump after they saw a live demonstration at the dealers shops. Word of mouth followed with 19%. This generally happens where neighbours/relatives had bought the pump earlier. Third was truck demonstration which

convinced 6% of the owners interviewed and then shows with 4%. Other promotion methods which convinced the potential buyers to invest in the pump were, the Calendar insert on the 16 January, 2000 Sunday Nation, the Daily Nation Advertisement and demonstrations on the farm by the promotion assistant. Each convinced 2% of the owners.

### 9.1.3 Other promotion activities seen/hear by the owners

There is need to establish the extent to which the different promotion methods are actually seen by the people. In peoples mind, it is very clear which promotion activity they saw/hear first. It is also quite clear to them about the method which appealed most and the one that made them reflect on to their own individual situation and thus they bought the pump. However, either before or after they bought the pump they may have seen other activities. Those which they saw before could be that they were as appealing as the one that finally convinced them. On the other hand, they could have been very appealed but due to other factors, the person did not buy the pump. The message just reinforced the client wish of owning a pump. For those which they saw after buying the pump, they could have been very exciting and in some situations clients said that they learnt some ways of operating the pump after they had bought the pump by seeing a demonstration. This was especially the case with the use of sprinklers. During the survey, respondents were asked to give two other methods apart from the first and the one that convinced them. On the first one, Permanent demonstrations topped the list with 51%. It was followed by Daily Nation advertisement with 30%, then word of mouth with 13%. Some other 2% had seen at the ApproTEC office and 4% were blanks.

In the second promotion activity that had been seen/heard, the permanent demonstration was still leading with 13% followed by the Daily Nation advertisement which scored 11%. The other three were word of mouth, truck demonstration and demonstration on the farm which had 6%, 4% and 2% respectively. 64% were blanks (had not seen/heard in other ways).

*The following table shows various promotion methods and their effectiveness*

On going Promotion activities	First to be seen/heard	Decision to buy	Other promotion activities seen/heard	
			First	Second
Dealer demonstration	36%	62%	51%	13%
Word of mouth	11%	19%	13%	6%
Newspaper advert	25%	2%	30%	11%
Truck demonstration	9%	6%	0%	4%
Radio	8%	0%	0%	0%
Shows	4%	4%	0%	0%
Calendar insert	2%	2%	0%	0%
On-farm demonstration	0%	2%	0%	2%
ApproTEC Offices	0%	0%	2%	0%
Blanks	4%	4%	4%	64%

## 9.2 Technology and Physical features of the pump

As indicated earlier, it is important for the designer to get the feedback of the technology from the consumers of the service. Apart from the quality of the service offered, consumers are attracted by the methods through which they get the service, the physical look of the technology, cost effectiveness and efficiency, ability to use the available resources and any added advantages. Such advantages as providing exercise facility to the operator were not initially set to be part of the package, but nevertheless, the consumers feel happy that the

pump also provides it. The respondents were asked to give any three features about the pump which appealed to them when they were buying the pump and even after buying the pump. The answers given were recorded in the order in which they came with the assumption that this followed the order to priority.

The fact that the pump is manually operated and thus does not require any fuel or electricity ranked very high with 47% of the respondents giving it as factor number one. 28% gave it as second priority while 4% gave it as the third. This implies that 79% of the respondents were happy with the pump being manually operated.

Second on the list was the price of the pump. 34% the respondents gave this as the most important consideration. 8% gave it as the second and none as the third. It was therefore given by a total of 42%. Simplicity of use was given by 6% as a major consideration while another 4% gave it as a second consideration. None gave it as a third feature.

*The table below gives the various features and the priority consideration for each.*

Technology and physical features	Percentage score in order to priority			Total Score
	First priority	Second priority	Third priority	
<b>Manually operation</b>	47%	28%	4%	79%
<b>Low price</b>	34%	8%	0%	42%
<b>Simple to use</b>	6%	4%	0%	10%
<b>Require limited energy to operate</b>	2%	2%	0%	4%
<b>Easy to operate (No skill required)</b>	2%	0%	0%	2%
<b>High performance rate</b>	2%	0%	0%	2%
<b>High quality pump</b>	2%	0%	0%	2%
<b>Easy to maintain</b>	0%	0%	8%	8%
<b>Portable</b>	0%	9%	0%	9%
<b>Blank</b>	6%	32%	88%	

## 10.0 PURCHASE OF THE PUMP

In order to determine the profile of the owners ability to invest on the pump and how difficult it is for potential clients to invest in the micro-irrigation business using the Super-MoneyMaker, two pieces of information were sort during the survey. The first one was intended to give an indication on the actual source of income from which the owner got the money to buy the pump. The other one was to get some estimates of the range of the percentage the cost of the pump would be of the total annual income of the household. From the on-set, the ranges had been set and therefore what the survey intended to do was to place each individual case within some bracket. Each of the item is covered separately here below.

### 10.1 Sources of capital to purchase the pump

Depending on what various owners do to earn a living, there are quite varied sources of income to purchase the pump. Those who are formally employed mainly resorted to saving their salary a little at a time until they raised the Ksh. 5,490/- required. There are those who combined some salary savings with farm income. Owners whose income is from the farm depended on the same to buy the pump.

Quarter of the owners (25%) depended on other businesses to buy the pump. This was closely followed by salary which had 23% of the owners. The source from which many owners got capital from was sale of maize with 21%. Other sources had less than 10%. They included, sale of coffee, dairy (sale of milk), family sources, sale of irrigated crops, sale of livestock, retirement benefits, student allowance and a combination of salary and farm income.

Interestingly, nobody used credit to buy the pump. This does not by any way suggest that the pump owners do not use credit facilities. In at least 4% of the cases owners admitted to have taken some loan from Institutions which they were repaying. However, they all expressed difficulties involved in repaying their loans because of the high interest rates which way above the normal profits one would hope to get from a business. There was a particular case where the pump owner had initially refused to disclose his identity due to some unpaid loan which had almost made his lorry to be taken away by the auctioneers in late 1999. Another owner had installed solar panel in the homestead using loan facility from one of the Micro Finance Institutions. However, there was no evidence that people were taking loans to buy the pumps.

*The following table shows various sources of capital to buy the pump*

Source of capital	Number	Percentage
Business	13%	24.5%
Salary	12%	22.6%
Sale of maize	11%	20.7%
Sale of irrigated crops	4%	7.5%
Daily (sale of milk)	3%	5.7%
Family	3%	5.7%
Tea	2%	3.8%
Coffee	1%	1.9%
Sale of livestock	1%	1.9%
Retirement benefit	1%	1.9%
Salary & farm income	1%	1.9%
Student allowance	1%	1.9%
<b>Total</b>	<b>53%</b>	<b>100.00%</b>

## 10.2 Percentage range of Super-MoneyMaker price to the annual income

When considering the price of the pump a figure of 7,000/- was adopted for the calculation. This was in order to cater for the additional costs which go into buying the accessories. In order to use the pump adequately a suction pipe of 6 meters is required which costs Ksh. 360/-. One also needs a 60 meter long pressure pipe which costs, Ksh. 1,080/-. These would add up to Ksh.1,440/-. Therefore, in order for the owner to put the pump into use they would require Ksh. 1,440/- in addition to the Ksh. 5,490/- which gives a total of Ksh. 6,930/-. This excludes the transportation costs of the items to the farm. Other farmers are using longer pipes than the 60 meters while others are using shorter and of smaller diameter pipes. There are those who have bought the sprinklers (ranging from 1 to 4) but the number is small. For majority of the pump owners the cost of the pump and its accessories amounts to less than 5% of their annual income. These comprised of 51% of the interviewed owners. Only 6% of the owners who said that the cost of the pumps for them was more than 75% of their annual income.

It was found that for a bout 30% of the owners, especially those who used their salary to purchase, it was not possible to raise the entire amount of Ksh. 5,490/- at once. They had to save for at least two months. Some had contemplated asking the dealers to be allowed to carry the pump on credit then pay slowly thereafter, but this did not work out. Cases that worked out were those where the owner would pay for the pump while still with the dealer and only carry it home after they had completed paying. There was a case where a teacher spent half of her salary and had to sell some potatoes to get to the desired amount.

Majority of cases were those where the owner bought the pump but had to use an old pipe generally of lower diameter until they harvest the first crop or get money from other sources in order to afford the other accessories. This means that, while majority of the owners showed that the price of the pump was less than 5% of their annual income, there were so many other areas which required expenditure from the pump owner that it was not very easy spending the money on the pump.

Those in formal employment wanted ApproTEC to consider selling the pump on hire purchase so that more people who may not be in a position to make some small savings over time can take advantage of it.

A cheaper pump would also serve this group of people.

*The following table shows percentage of owners and the percentage range of their annual income equivalent to the pump price.*

<b>Percentage Annual income range</b>	<b>Number of owners</b>	<b>Percentage</b>
<b>Less than 5%</b>	27	50.9%
<b>5% to 10%</b>	15	28.3%
<b>11% to 20%</b>	4	7.5%
<b>21% to 40%</b>	3	5.7%
<b>41% to 75%</b>	1	1.9%
<b>Over 75%</b>	3	5.7%
<b>Total</b>	<b>53</b>	<b>100.0%</b>

## 11.0 LANNED PUMP OPERATION AND SOURCES OF WATER

### 11.1. Panned operation

#### 11.1.1 First priority

There are various reasons why people bought their pumps. Of the 53 respondents, 85% were intending to use the pump for irrigation as a first priority. 8% wanted to use the pump for household out of which two thirds wee also going to use the pump for irrigation. For 2% livestock was the first priority. It was not possible to establish priority use for 6% of the respondents.

#### 11.1.2 Second Priority

In the second priority pump usage preference, 9% were considering using it to feed livestock. 7.5% were going to use the pump domestic purpose while 2% for the sale of water. 81% of the respondents did not have a second use for the pump.

#### 11.1.3 Third Priority

Of the 53 respondents only 6% had a third use for the pump. This was feeding their livestock.

*The table below shows various uses that farmers want to put the pumps into*

Use of the pump	First priority	Second priority	Third priority
Irrigation	85%	0%	0%
Domestic (House use)	7.5%	7.5%	0%
Livestock	2%	9%	5.7%
Sale of water	0%	2%	0%
No other or could not establish	5.7%	81%	94%

### 11.2 Sources of water

Almost all the respondents had one source of water. 2% had two sources from where they could utilise the pump. 47% of the pump users had rivers as their sources of water. Wells will serve 40% were intending to use dams while lake and drum had 2% each respectively. Those using drums were getting from other places transport to their farms where they would use pump to pump.

*The table below shows the various source of water that farmers intended to get water from*

Source of water	First Use	Second Use
River	47%	
Well	39.6%	2%
Dam	3.8%	
Drum	2%	
Lake	2%	
Could not establish	5.7%	98%

## 12.0 MAIN CONSTRAINTS

During the interview constraints were grouped into two categories. Those that affect the farmer on the farm and when selling and those that affect the farmer in the general life.

### 12.1 *On the farm*

38% of the respondents said that watering was their main problem. Majority of them had tried irrigating using the bucket and found it to be difficult, cumbersome, very frustrating and could only cover a small portion of land. This they did not find commercially feasible. They therefore opted to buy the pump.

The second most important problem was reduced income from the farm. Many farmers who were interviewed complained that the income from the farms have been going down especially because the farm sizes are now small and thus can only grow limited amount of crops. They therefore needed to increase the productivity of the farm through irrigation. 19% of the respondents expressed this problem.

Third in priority was farm being idle. 11% of the respondents said that part of their farms were either permanently idle or at certain times of the year when there are no rains, the farm remain idle. They therefore opted to buy the pump so as to initiate some activities within the idle portion or to make sure that the farm remained productive throughout the year, with or without the rains.

Another important problem given by the respondents was that over time, income from the conventional cash crops have been going down. Examples of coffee and tea were given with coffee being hard hit. Some 10 years ago, income from these crops was reliable, enough and dependable. Thereafter the situation has changed such that the income is no longer reliable (sometimes it takes long before payments are made), not dependable (do not know when payments will be made and do not know the amount to be paid). The amount is also not enough since a lot of deductions are made in the respective factories leaving the farmer with very little money. The farm inputs bought through either the tea or coffee societies are quite expensive. Farmers complain that the prices for these inputs are inflated.

This problem was given by 8% of the respondents.

Other constraints which were cited by the farmers included expensive labour and limited area under irrigation each scoring 6% of the respondents. The cost of labour made it difficult for the farmers to engage in any meaningful irrigation business without an enhancing technology. Erratic rain, renting land, cost of motorized pumps, lack of vegetables and farm management were also given as problems that affect the clients before they buy the pump on the farm. Each of this was given by less than 5% of the respondents.

*The table below shows the constraints faced by the owners on the farm and the percentage response*

<b>Constraints</b>	<b>Response</b>	<b>Percentage</b>
Watering	20	38.19%
Less income from the farm	10	19%
Farm is idle	6	11%
Poor market from cash crops	4	8%
Expensive labour	3	6%
Limited area under irrigation	3	6%
Erratic rain	2	4%
Renting land	2	4%
Cost of motorised pumps	1	2%
Lack of vegetables	1	2%
Farm management	1	2%

### *12.2 Constraints in general life*

The most cited constraint in general life was unemployment with 17% of the respondents.

These people look at the pump as a means of creating employment.

Other constraints given as facing people in their general life were poor infrastructure, seasonal rivers, water being far, unreliable source of income each with 6%. Oldage was given by 2% of the respondents as a constraints in their way of life.

*The table below shows the constraints faced in general by the pump owners and the response*

<b>Constraints</b>	<b>Respondents</b>	<b>Percentage</b>
Unemployment	9	17%
Poor infrastructure	3	6%
Seasonal rivers	3	6%
Water is far	3	6%
Unreliable sources of income	3	6%
Oldage	1	2%

## 13.0 CONCLUSION

Majority of the pumps are managed by the owners, their spouse or children.

The survey also reveals that many of the pump owners are not the absolutely poor Kenyans. They either have a family to turn to for help or they have some form of sources of income which provide income to buy pumps. 28% have formal employment and another 26% are in the informal sector. However, these people create a lot of employment in the farm with the technology. Operators are hired and other activities in the farm are also undertaken by the hired people. The process sets in place a money circulating process in the area thus improving the economic situation of all involved and their households.

Pump buyers are not the illiterate people. Majority of them have formal education which in most case include secondary school education. English and Kiswahili could be used to reach them without a lot of difficulties. Many of the owners are between 30 and 40 years of age and thus have a lot of energy and vigour. These people are eager to try new ideas and take risks. Many of them are not mean and are willing to share what they know and have with others. While they do not command a lot of influence in their areas, they command a lot of respect due to their hard work and ability to adapt to changes and take up challenges.

Close to two thirds of the people buying the pump are initially dependant on the rain-fed crops whose market and prices have dropped. This has made to think of ways of enhancing farm productivity through growing crops during dry seasons and many of them are thinking in the line value crops.

The pump owners generally own some piece of land or the people they buy for have some piece of land which they can use. Some few depend on the family land but have plans to get out to some rented land once they get enough income.