
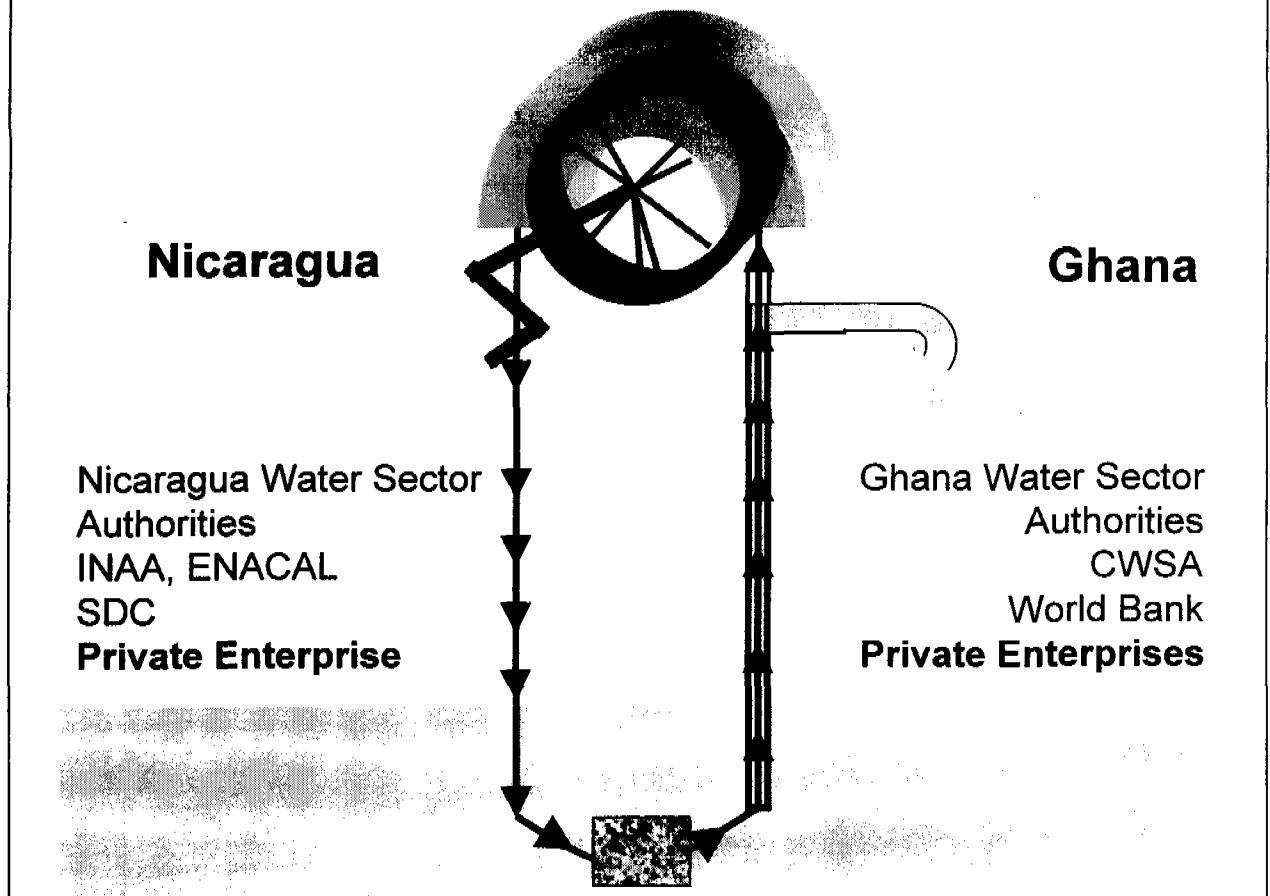


Progress Report to the  **Water and Sanitation Program (WSP)**
as referred to in Purchase Order 7107891 of World Bank Group, signed
2-Nov-1999

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Support Technology Transfer of Rope Pump



Progress Report on Phase 1 Period: October/November 1999

By: **Technology Transfer Division Bombas de Mecate S.A.**
Managua, Nicaragua
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Water and Sanitation Program

Terms of Reference for Bombas de Mecate

Background

The Government of Ghana launched the National Community Water and Sanitation Program (NCWSP) in 1991 to accelerate the increase in access of rural communities to sustainable water and sanitation services. This program is facilitated by the Government through the Community Water and Sanitation Agency (CWSA), with an active role of communities, NGOs and the private sector. Communities receive support to improve their services, however, they are responsible for the operations and maintenance of their facilities, drawing on the private sector for support.

In an effort to promote and strengthen the emergence of a sustained local market for handpump provision and servicing, NCWSP has standardized on four handpump types. These are the Afridev, Ghana modified India Mark II and Vergnet HPV for high lift pumps, and the Nira AF-85 for low lifts. Under the current practice, these pumps as well as their spare parts are procured through local agents of the pump manufacturers for distribution to the rural communities. However, the greatest challenge facing NCWSP has been in finding the most suitable approach for the importation and distribution of the pumps and spare parts on a purely private sector led basis. The problems associated with this could be solved if the pumps and their components were to be manufactured locally in Ghana, and if the consumers were satisfied with the pump.

The rope pump (bomba de mecate) has proven to have a high level of acceptance from consumers in Nicaragua and other countries of Central America. Thousands of pumps have been produced and installed by the private sector and purchased by communities, often without any external subsidy. Consumers appreciate the pump for its efficiency, reliability, low cost and availability in the local market. Of particular interest in Nicaragua has been the role of the local private sector in manufacturing and marketing the pump. One company in particular, Bombas de Mecate, has taken the lead in this process. The Swiss Development Agency, COSUDE, has played an important role in supporting Bombas de Mecate in producing technical standards for the pump, marketing it within and outside of the country, and developing a program for the transfer of technology from this company to other southern partners.

CWSA, in its quest for finding a solution to the pump and spare parts importation and distribution problem in Ghana has come across the Nicaraguan-manufactured rope pump. A CWSA delegation made a short visit to Nicaragua in May 1999 (funded by the World Bank supported CWSP-1 project, see Annex 1 for trip report (here not included)). Based on this review, CWSA is convinced that the pump is appropriate for the rural population in Ghana, and is low-cost and suitable for local manufacture. CWSA would like to launch local manufacturing

in Ghana, initially by supporting several local manufacturers by purchasing a number of pumps, installing them and training communities, and evaluating the experience with a view towards scaling up.

CWSA, within the framework of the NWCSP, would like to introduce the manufacturing, marketing, purchase and use of the rope pump in Ghana. As a first step, CWSA would like to purchase 100 rump pumps from local manufacturers to install in communities.

Bombas de Mecate

The rope pump company, Bombas de Mecate S.A., started operating in 1990 and formalised its structure in 1991. The impact of the rope pump has justified the combined efforts of the Nicaraguan Institute for Aqueducts and Sewage System (Instituto Nicaraguense de Acueductos y Alcantarillado - INAA), The Swiss development Agency (COSUDE) and the Technology Transfer Division of the Rope Pump Company (Bombas de Mecate S.A.), to make available to other developing countries the technology transfer programme of the rope pump. The Technology Transfer Division of the rope pump has become an additional activity, supported financially mainly through COSUDE in its initial phase. The activities undertaken by Bombas de Mecate under this contract have been priced purposefully low as a promotional measure.

Objectives of Project The objective of this project is to provide technical assistance to the Ghanaian private sector, in close coordination with CWSA, to:

- start up production of the rope pump in the country
- develop a marketing program
- produce an initial lot of 100 rope pumps,
- install the pumps and train communities in their operation and maintenance,
- evaluate, document and disseminate the results to the region (English and French.)

In addition, these activities are to be documented and translated in order to further extend the knowledge sharing with the Francophone countries of the region.

Project Outputs

Capacity of at least two Ghanaian private sector manufacturers strengthened and with capacity to produce and market the rope pump.

1. One hundred rope pumps produced in Ghana
2. Pumps installed in communities and caretakers trained for their operation and maintenance
3. Report in English and French describing the technology transfer experience and the evaluation of the results and the evaluation of their performance in communities.

Duration

The project is expected to last for a duration of about 18 weeks.

Description Phase 1. Preparation of rope pump production in Ghana.

Specific outputs of phase 1.:

- 1.1._ Technical assistance via correspondence and communications with Ghana from Nicaragua:
 - Support provided to CWSA in establishing criteria to select suitable manufacturers in Ghana, assistance in selecting the manufacturers and setting up the initial contract;
 - Verification of availability and compatibility of materials and standards between Ghana and Nicaragua (ie. PVC pipes and others);
 - Support in preparing some of the initial production equipment in Ghana, including first prototypes of wheel ;
- 1.2. Technical assistance via 2-week mission of two Bomba de Mecate company staff to Ghana:
 - Verification of production sites (assistance in selecting 2 private producers)
 - Provision of 100 pistons and ceramic pieces
 - Support to start-up production
 - Visit to providers of raw materials (truck-tires, metal, ceramic, PVC, etc)
 - Visit to some communities to assess conditions for marketing and training program
 - Coordination meetings with CWSA
 - Advise manufacturers on management, promotion and after-sales aspects
- 1.3. Provision of 10 Technology transfer manuals to WSP
- 1.4. Progress report to WSP on activities, including a proposed outline for the final report.

Chronologic report of activities performed within Phase 1.

- Up to November 10th: Preparation. Interchange of information with CWSA on dimensions of PVC-pipes used in Ghana.
Design and Manufacture of molds for the pistons to be brought in to Ghana.
Production of pistons and production of glazed ceramic pieces to be brought in.
Preparation of series of 10 manuals in English and French.
- Sunday 14th Arrival at Accra. Received by Mr. VanEss (Technical director CWSA)
- Monday 15th Welcome meeting with Mr. Peter Sackey (General Director CWSA) and Mr. Robert VanEss
Program meeting with Mr. Robert van Ess and Peter Akari (World Bank)
Visit to the workshop Trans Mech Industries Ltd in Accra.
Visit to the workshop ENTESEL (Engineering & Tech. Services Ltd) in Tema
Visit to GRATIS (Ghana Regional Appropriate Technology and Industrial Services)
- Tuesday 16th Meeting with Jennifer Sara en Peter Akari. (Both World Bank)
Search for materials available on the local market.
Meeting with representatives of the two workshops and Gratis in CWSA.
Introduction to experiences and characteristics of the rope pump through video's, overheads etc.
- Wednesday 17th The workshop ENTESEL in Tema has been chosen to start production.
prototypes for surroundings of Accra, a second workshop will be visited in Kumasi.
Start production at ENTESEL. Search for existence and prices of prime materials. First production-jigs made.
- Thursday 18th Program meeting.
Technical assistance at ENTESEL workshop.
Journey to Kumasi.
- Friday 19th Kumasi: Meeting at Regional VWSA office. Director Mike Adjei.
Visit to Workshop of Dan Oduro, Metal Fabrication & Engineering Works. (Dealers in Hand pumps and gas stoves.)
Visit to workshop ADDOMETs, Addoh Welding & Metal Works.
Visit to small rope pump workshop at Bekwai, 30 km south-West from Kumasi.
Meeting with representatives of the first two workshops visited. Introduction to experiences and characteristics of the rope pump through video's.
- Saturday 20th Journey to Tamale. Visits to Communities on the road.
Tamale: Meeting with Francis K. Awindaogo. Regional Director (Northern Region) of CWSA.
Visit to Workshop Goodman and Sons Co. Ltd.
Field trip to rural area; Zoggo at ± 40 km North East of Tamale in the Saveluga district.
- Sunday 21th Journey to Sunyani. Visits to Communities on the road (Tereso e.o.).
15:30 Meeting with Jennifer Sara and François Münger. (Both World Bank.)

- Monday 22th 16:30 Report meeting with François Münger.
Participation in the inauguration of the national CWSA workshop on budget and planning.
Journey to Accra. Visits to Communities on the road.
Coordination meeting with Mr. VanEss at Accra. The Tamale workshop is chosen as the second workshop to produce rope pumps. Representatives from Tamale are invited to come over to Accra.
- Tuesday 23th Meeting with Peter Akari and Robert VanEss.
Meeting with representatives of the Tamale workshop at CWSA.
Introduction to experiences and characteristics of the rope pump through video's, overheads etc. Technicians of Tamale workshop participate in production and installation during period Wednesday to Friday.
Follow up to production prototype at ENTESEL.
Visit to polyethylene processing fabric at Tema
Meeting with General Manager of Interplast, PVC pipes fabric.
- Wednesday 24th Meeting with Robert VanEss and Peter Akarari.
Meeting with representatives of the Tamale workshops in CWSA.
Introduction to experiences and characteristics of the rope pump through video's, overheads etc.
Follow up to production at ENTESEL.
- Thursday 25th Meeting with Robert VanEss, Peter Akarari and François Münger
Preparation of installation first prototype. Acquisition of some of several tools and parts needed for installation.
- Friday 26th Installation first prototype at Obdey, 50 km North West of Accra
Meeting at CWSA with representatives of the Tema and Tamale workshops with presence of Robert VanEss and Peter Akari. Discussion, interchange of information, explanation of the different phases of the project
Preparation for leave.

I Introduction

The present assignment had been preceded by a mission of CWSA to Nicaragua in May 1999 as described in the Terms of Reference. This report reflects the opinion of the Technology Transfer Division of Bombas de Mecate S.A. and does necessarily agree with the opinions of all persons and institutes involved. The observations and recommendations included are focussed toward an optimum progress in the second and third phase of this process and are included as well as part of the learning process for future activities in other countries.

II Selection process of Workshops

About a month before arrival the “Criteria for enterprise selection” had been discussed and interchanged. Based on these criteria a total of four workshops had been selected in Accra and Kumasi. The available time for this selection process proved to be relatively short. CWSA invited in a letter dated 25/10/99 several workshops to present their financial and technical characteristics, willingness to participate and their willingness to participate financially in this endeavour.

The first workshop visited on Monday morning 15th of November was Trans Mech Industries Ltd in Accra. A well-equipped workshop, specialized in rebuilding of diesel and gasoline engines, repair of crankshafts etc. They had some relation with CWSA through the production of spare parts for the traditional handpumps. However, this workshop did not have any relationship with rural public and in our view not accessible for clients from rural area. Rope pump production activity would be a secondary activity in this setting. No relation was found between their present activities and possible rope pump production.

Monday afternoon the workshop ENTESEL (Engineering & Tech. Services Ltd) in Tema was visited. Relatively optimum conditions were found. A workshop with a similar number of laths and milling-machines but as well a department directed to the production of agriculture equipment. All basic tools to start rope pump production were present plus enough space to produce and keep stock in future. Tema is situated at about 30 km East of Accra near the industrial centre and the harbor.

On Friday the 19th November the Workshop of Dan Oduro, Metal Fabrication & Engineering Works (Dealers in Hand pumps and gas stoves) was visited in Kumasi. This workshop did not present any condition to be incorporated as one of the rope pump production centres. No space, no accessibility, no relation to rural population.

As a second last minute option in Kumasi the workshop ADDOMETTS, Addoh Welding & Metal Works was visited. This workshop has at times a working relation with CWSA through installation of handpumps and upgrading of hand-dug wells. A workshop without the required space and not accessible for rural population. About a dozen Mark II pump cylinders with pistons and some pump heads of dubious origin were found. This workshop neither presented favourable characteristics for rope pump production.

However, Kumasi or surroundings must be considered as one of the places where rope pump production should be started. A new process of selection of possible rope pump production workshops should be started.

The same afternoon of Friday the 19th November a small rope pump workshop at Bekwai, about 30 km south-west from Kumasi, was visited. This visit was merely an exploration visit. The objective was not that much related to the selection of production workshops. On the second floor of a building a small workshop was found. With help of a Dutch "Volunteer" a total of 17 wheels for rope pumps was made and two rope pumps already installed. Important expenditures had been made on advertisements on radio, television and news papers, and as proof a full colour poster was shown with the so called "VICTORY PUMP" Ghana. The rope pump visited was out of order. Basic components as the guide box and the pistons were of the 1980 generation. The rope pump firm in Nicaragua received information and documented similar experiences out of over a dozen African countries with even official aid receipt through Dutch, British or Belgium development cooperation.

On Saturday 20th of November in the afternoon the workshop Goodman and Sons Co. Ltd. in Tamale was visited. Although a visit to Tamale was not programmed in our initial scheme and neither the selection of a workshop in Tamale, as Accra and Kumasi were prioritized. The regional Director (Northern Region) of CWSA was informed on our mission and the remote possibility to start rope pump production in Tamale, as no workshop could be selected in Kumasi. The Goodman workshop showed all elements necessary to start rope pump production. The basic tools are present. Enough space and accessible. Good relation with rural area. In the following days the decision was taken by the direction of CWSA to include the Tamale workshop as the second to start production of rope pumps. Next Monday technicians of this workshop were invited to come over to Accra and participate in the prototype production at the Tema workshop.

On the first day, Monday afternoon of the 15th of November, GRATIS (Ghana Regional Appropriate Technology and Industrial Services) was visited in Tema as well. GRATIS is a state institute and will be transformed into a Foundation. The mission was received by the Executive Director Kwame Prakan Sante, the Deputy Director and the Head of the Technology Transfer Division. GRATIS is a well equipped highly qualified training centre with activities all over Ghana and relations with a high number of workshops. GRATIS offered support in the initial phase to the selection process of the workshops. The role to be played by Gratis was subject of discussion in this meeting. Even the production of rope pumps by GRATIS as a commercial activity was considered. During this meeting and later on, the role of GRATIS in the quality control process of the production of rope pumps has been subject of discussion.

In our perceive the role of GRATIS will be rather small, as quality control on technical items is just a small item of the whole process of rope pump introduction. Evaluation and quality control of technical subjects related to efficiency, wear or installation requires familiarisation with the product which takes several years. Even more important are aspects related to social acceptance and water & sanitation which are not that much related to the general activities of GRATIS.

However, quality control will be a predominant factor in the success of the introduction process of the rope pump in Ghana. This quality control requires some technical background but more important are factors related to social acceptance and water & sanitation circumstances. For example; a cheap, efficient, easy to repair hand pump does not make much sense if women any way go to the river with their children to wash clothes and the children will drink this water. Many other examples can be mentioned which don't have any relation to technical details but can make a hand pump intervention totally worthless. This report expresses a high need for

quality control in which even GRATIS could play a predominant role, but this will require openness towards a broader view on this subject.

In the third phase quality control will be one of the main activities of the Bombas de Mecate mission. In order to make local quality control possible in future, additional activities and familiarisation with the product will be needed. GRATIS provides technical support to both selected workshops in Tema and Tamale.

Considerations on the selection process:

- The number of pre-qualified workshops was too small. However, the two workshops selected can be considered as relatively optimum to start production. A broader preselection would not necessarily have brought up better starting conditions. At both workshops highly enthusiastic reactions were found.

- The selection of a provider of a product by a state institute is normally done through public tenders or similar procedures. Although a public tender is not very applicable to this selection process of workshops who are given the possibility to start rope pump production, a similar procedure should be worked out in future. The criteria used to be selected will not only be economical criteria, this makes it relatively difficult to establish the rules for a tender. The selected workshops will be various steps ahead to their future competence, this will give them advantages and economic profit once a market is established. In this Ghana case the selection can be considered as totally by chance without what so ever economical interest by any involved party.

III Technical assistance.

Technical assistance started on Wednesday afternoon 17th of November at the ENTESEL workshop in Tema. General information had been given during the visit on Monday and the meeting at CWSA on Tuesday. The preparation of the production-jigs was started, based on the manuals of technical drawings, the production photo-manual and additional technical drawings and photos for the production of these jigs were brought in. The production-manuals showed to be very useful.

For the production of the guide, an already with PVC-pipes armed ceramic piece was brought in which easily was copied with local standard PVC-pipes.

On Tuesday the 20th, the technicians of the Tamale workshop were incorporated in the production process in Tema. They participated in the production and later on, on Thursday in the installation of the first rope pump. Agreement between the two workshops was established to give additional support to the Tamale workshop if necessary.

To both workshops a set of pistons and glazed ceramic pieces were handed over to be able to produce 50 rope pumps each. The pistons were produced in Nicaragua based on the characteristics of the PVC pipes used in Ghana. Pistons of 1", 3/4" and 1/2" inch were handed over, in a combination for 25, 15 and 10 rope pumps applicable at depths up to 11 metres, 21 metres and 35 metres respectively. A complete set of technology transfer documents was handed over to each workshop.

Basic technical knowledge plus experience and initiative made it easy to give continuity to this production process. Several experience facts had to be explained as part of this technology transfer process. The combination of local capacity, documentation and the Nicaraguan

experiences brought in, worked smoothly without mayor problems. There is not much doubt about it that both workshops will be able to produce a good product. Training on installation in Nicaragua and later on in Ghana will be the next step to assure a good product.

IV Availability of materials and technical capacity

The technical feasibility of the production of rope pumps in Ghana has practically been proven.

Metal ware:

The metal ware required for production is general available. However the 3/8" rods normally used for the construction of the legs in the family well rope pump where to thin to be used. These should be replaced by 1/2" inch rod which makes the family well rope pump practically equal to the extra strong rope pump

Tyre cuttings:

The tyre cuttings for the prototype were produced by a non-experienced person within ten minutes at a cost of almost 3 US\$. Old truck tyres can be found in high quantities all over the country. These truck tires are used by local artisans to produce "rural shoes", although through lack of time they could not be visited. Once production of rope pumps at a bigger scale is started a market for this product will be developed and the cost will go down to the Nicaraguan price of 0.30 US\$ per pare.

Guide box, glazed ceramic piece:

The local production capacity of the glazed ceramic piece could not be studied within the present mission. There are ceramic workshops present and they will be visited in the third phase. As an alternative for the production at short term the presence of a glazed ceramic isolator used in the electricity posts has been investigated. These are widely used although it could not be established if they are available on the free market.

The production of the concrete block including ceramic piece and PVC-pipes is easily possible.

PVC pipes and accessories:

The PVC pipes made by Interplas are of the required quality, these are based on the British Standards (3505BS). The wall thickness is therefor a bit higher (As in Nicaragua US-Standards) which makes the pipes a bit sturdier which is OK. PVC-pipes of other brands are found on the market as well. In the production of these other pipes a different standard is used for the wall thickness, the outside diameters are the same. These inside diameters fluctuate from one pipe to the other and the inside walls are not smooth as required for the use in the rope pump production. Even the Interplas pipes require selection before purchasing them as these pipes at time have a small shrimp just before the start of the jacket, this is normal procedure applied in Nicaragua as well.

Pistons:

The pistons for the first 100 pumps were brought in from Nicaragua. The prime material used in Nicaragua is reprocessed polyethylene. In Tema a fabric which produces crates made of

polyethylene was visited. The prime material polyethylene is thus available in the country. Later on it should be confirmed if virgin polyethylene is available on the free market as well.

The moulds made in Nicaragua to make the pistons can be made with the laths available in both workshops although some tricks in the production of these moulds have to be explained. The extruder needed to inject the plastics can be copied by both workshops as well. During the second phase (training in Nicaragua) this has to be one of the subjects to be incorporated in the programme. Other prioritizing made it not possible to visit local small workshops specialized in the injection of plastics, this will be included in the programme for the third phase if still necessary.

Rope.

In Nicaragua a 5-mm polypropylene fibre rope is used. This is the same material from which sacks are made. The advantage of this raw material is that this rope does not become smooth with use, which avoids sliding on the wheel. When installing, the ends are attached by braiding. Knots are not used as they are difficult to untie when tautening the rope or for repairs.

In Ghana another very good quality rope was found in the market and widely available, made of polypropylene, but the material is a phylum instead of a fibre, causing the rope to be smoother. The thickness of the rope to be used is the one of 6 mm diameter. The as well available 4 mm thickness rope must be considered as too thin. However, this smoothness can affect in future in some way the functioning of the rope pump. The braiding traditional used to attach the ends together, could slip away but experience will tell and another nut can be used. The same smoothness can cause sliding of the rope over the wheel, but this effect will not be noticed during the first years as the tire cuttings still are completely covered with rubber and only will have effect in the ranges with a maximum weight of the water column such as 11 metres with a 1" inch pumping pipe and 21 metres with a 3/4" inch pumping pipe. The fact that a 6-mm rope will be used as the standard will influence positively on the lifespan of the rope and thus the maintenance required. In other words, no fundamental problems are expected.

V Price Calculations.

A price calculation is made, based on prices found in and around Accra. The prices in Tamale are expected to be about 15% higher.

Wheel structure.

The prices of metal ware used in the rope pump production could be compared. The standards available on the market differ from those in Nicaragua. In general the metal ware (rods, angle irons etc.) is a bit cheaper (around 5 %) as in Nicaragua. However, the available standards are thicker as those used in Nicaragua and therefor more expensive.

The overall effect on the cost of the wheel is minimum and results in about 1 US\$ extra for the production in Ghana.

PVC pipes and accessories

The cost of the PVC pipes is the same as in Nicaragua, excluding taxes in both cases. The accessories are more expensive. The overall effect will be about 2 US\$ extra for the production in Ghana.

Rope.

No comparison could be made yet. The on the local market widely available rope is imported and relatively expensive. The rope to be used will be a 6-mm diameter rope which is more expensive as the 5-mm rope used in Nicaragua. Rope should be purchased in bulk. The overall extra costs will be slightly higher by about 1.5 US\$.

Additional costs.

Additional costs are found in daily used tools, paint etc. In general these costs will be the same as those found in Nicaragua.

Labour cost.

The wages paid in Nicaragua are around 20 to 50 % higher as those found in Tema, while those in Tamale are about 25 % lower as in Tema. However, it is premature to make definite calculations as experience, qualification, and the combination of skills and responsibilities will also influence in the wages paid. (For example; a driver and experienced rope pump installer with financial responsibilities will receive a higher salary.) The production costs in Tema therefor could be a few dollars below those in Nicaragua and in Tamale even below those in Tema.

Conclusions and considerations on production costs.

The production costs depend as well on quantities produced and the continuity in the production. Several taxes will influence in the production costs as well. In Nicaragua, for example, no VAT taxes are paid for materials used in the production of equipment/machinery used in rural area. Prime materials in Tamale are slightly more expensive as in Tema while salaries in Tamale are lower as in Tema.

The production costs in Ghana will be practically the same as in Nicaragua. The mayor factor which will influence the value to be payed by the public is the number of pumps produced. This factor can make a difference up to 15 US\$/pump. A workshop producing 200 pumps a month will be able to offer the product much cheaper as the one with a production of 20 pumps/month.

Sound competence will of course have a healthy influence on the prices. However, production in only the workshops in Tema and Tamale is not enough to establish this competition. An additional workshop in the region of Kumasi could be in place.

During the introduction process toward the private sector (user) the workshops will offer their product at the lowest possible price to be able to sell and open the market. This price is of course a good reference. Some danger could arise in case rope pumps are only purchased through the state sector as there are not enough competitors (yet) and prices can be driven up.

Installation cost.

The installation costs are mainly governed by the distances to be covered. Specifically the 'of the road' kilometres can be quite expensive. Installation is done by two persons.

Installation will take place in hand dug wells and in drilled wells. On handdug wells prepared for the installation with a Nira pump, the rope pump can be installed as if it were a drilled well. In these cases a few additional accessories are used which will influence the total price a bit. (Additional approx.10 US\$). The installation costs will be in the range of about 10 US\$. The

training in installation and maintenance of representatives of each community will require some additional time.

VI Promotion.

This theme has been subject of discussion during different meetings with CWSA representatives, World Bank representatives and the present mission. No clear strategy has been worked out so far.

As background should be mentioned that in Nicaragua during the first three years the rope pump was exclusively sold to the private sector. The high social acceptance (through its specifications such as high efficiency, easy maintenance and low cost) brought the water and sanitation sector in the game. The promotion through the participation in fairs/exhibitions (Industrial, Rural Development, 'Water' etc.) with the different rope pump designs was part of this process. In other words, a general knowledge of the product by the public was reached before the more sensitive water and sanitation projects started.

Within the framework of the present project one hundred rope pumps will be produced and installed in communities as a very important step of the introduction process of the rope pump. However, it is a new product, the population is not acquainted with it and the pumps will be installed rather disperse as it is a small number over a big area. In this setting, follow up or promotion to these communities c.q. rope pumps must be incorporated. The first bicycle scared the people off but now a day every user knows how to fix a tire or find a workshop to do the job. This barrier, of getting acquainted with the product, has to be taken as fast as possible. In the beginning by training in installation and maintenance at each of the 100 rope pumps installed, as well as follow up to these pumps within the present programme and a general promotion to create awareness on the existence of the product. This process of creating awareness is part of the demand responsive approach which is adopted in this water and sanitation programme.

Parallel the private sector (producer) should start his promotion programme for two main reasons.

- 1) Create awareness on the existence of the product at the general public, private sector users, communities, agriculture sector, etc. The rope pump users should know where they can purchase spare parts or technical assistance if required.
- 2) The private sector needs to open markets at different sectors to be sustainable.

From the Terms of Reference for Urs Heierli's Sabbatical (New Delhi 1999): "Marketing and Development: Reaching the poor and meeting their needs", we copy here: "It is possible that promotion, as well as the setting up of the market channel may initially be subsidised by a development agency. It is a typical phenomenon of an informal market that nobody can or wants to invest into promotion, because the opening of a market also calls in the competitors and "copiers". The investment made by one person or a company is therefore not a recoverable item. However, it is important to introduce "branding" into the promotion in order to assure quality standards and in order to make the channel profitable."

This is exactly the case in Ghana (promotion investment is not recoverable). The rope pump is in the public domain and can freely be copied. In (only) the initial phase the promotion by the

private sector should receive financial support. This is part of the more general strategy to make the product generally known in such a way that a market is created and competitors and “copiers” come in the market. The theme “quality standards” and “branding” is not yet covered this way but has to be treated separately. This is part of the third phase of the present assignment as well. This promotion is bound to the name of the workshops and will give them in future of course an advantage on possible competitors, in other words the investment is not totally lost in case the introduction in Ghana is successful.

This whole panorama of support to the private sector can be focussed from another direction as well. All parties agree on the fact that promotion is necessary. The producer (workshop) has a need and is willing to work on promotion. Spending made on promotion has to be incorporated in the selling price to be sustainable as a producer. Promotion made by the producers itself has a good chance to be effective. If we consider that the main part of the financial resources involved are canalized by one actor in this initial phase than it makes not much difference if promotion activities are subsidized directly or are incorporated in the selling price of the producers.

Promotion activities to be covered are:

CWSA

- Creating awareness on the existence of the rope pump as one of the options in available hand pumps as part of the demand responsive approach.
- Creating awareness on the existence of the rope pump as one of the options in available hand pumps within other actors and organizations in the water and sanitation sector. (NGO's, Bilaterals, Multilaterals, etc.)
- Follow up to the first 100 installed pumps as part of promotion and to catch what so ever unforeseen detail in the acceptance of the technology.

Private sector (Workshops Tamale and Tema).

- Follow up to the first 100 installed pumps
- Own handdug well
- Demonstration rope pumps to be used in expositions, fairs, conferences etc.
- Participation in fairs/exhibitions
- Advertisement-boards to promote the product.
- Advertisements
- Documents describing the product and its installation and maintenance, posters', brochures, leaflets, etc.

VII Support to the private sector.

The document “REQUIREMENTS TO START PRODUCTION OF ROPE PUMPS” included in the set of documentation on technology transfer presents an estimate of the financial requirements to start up rope pump production from scratch and bring it in two years into a sustainable situation. The initial capital required is estimated at 55.000 US\$ while during this period a total of 900 pumps will be produced. This estimate is based on several suppositions.

Two other reference figures should be mentioned in the context of this discussion. The installation of one hundred rope pumps at a cost of around 100 US\$ in place of 100 traditional pumps at a mean cost of around 800 US\$, subsidized at 95% makes a difference of above the 65.000 US\$ which will not be spend already in the first 100 rope pumps installed.

In Ghana about 25.000 traditional hand pumps can be found at a mean initial investment cost of 800 US\$ makes this a high investment. The maintenance structure to keep these pumps working has a cost in the range of 100 US\$ per pump per year. In other words, the installation of 100 rope pumps represents a yearly saving to the system of around 10.000 US\$ as the maintenance costs of rope pumps are minimum.

Taking into account these previous numbers than we can see that the support to the private sector is not that much a financial problem. The problem is how to structure it and how to give it the necessary guidance in order that the money is invested in the correct way.

A general applicable and workable solution should be worked out which is clear to all parties and eventually can be copied to other regions or countries. The strategy here presented will be based on "future contracts" and a bank-guarantee in case the producer does not accomplish with the signed agreements.

With reference to this financial support we will distinguish the short term which includes production and installation of 50 pumps by each workshop, the following "intermediate" phase designed here for the production of 1500 pumps, followed by a high scale production and free market system.

Short term; production and installation cost for 50 pumps.

SHORT TERM. COSTS PRODUCTION 50 PUMPS	
Production cost 50 pumps at 70 US\$ each	\$3,500
Jigs, moulds etc.	\$200
Tools various	\$100
Electric drill and generator for installation	\$1,000
Installation costs at 10 US\$/pump	\$500
Training on installation and maintenance at 10 US\$/pump	\$500
Transport for installation at 0.16 US\$/km with a mean of 200 km/pump	\$1,600
Pickup, four wheel drive, second hand.	\$13,000
Follow up visits to installed pumps	\$800
Publicity: Leaflet, advertisements	\$800
TOTAL	\$22,000

These short term costs will be covered in the following way:

COST RECOVERY SHORT TERM, PRODUCTION 50 PUMPS	
Acquisition 50 pumps through CWSA program at 120 US\$ per pump	\$6,000
Installation costs	\$500
Training	\$500
Transport for installation and follow up	\$2,000
Disbursement from CWSA/World Bank program (pickup)	\$13,000
TOTAL	\$22,000

The selling price of 120 US\$/pumps covers in this way initial costs to be made by the workshops.

Once full scale production is reached the selling price will drop below 90 US\$/pump.

The disbursements for the acquisition of the pickup by each workshop is necessary in the initial phase for acquisition of prime materials and the installation of the pumps. Installation has to be done by the workshops in presence of the communities and CWSA representatives. The disbursement for the pickup will be done under the condition that agreement will be reached on a second production phase of 750 pumps each. If this programme closes after the installation of the 100 pumps, the workshops will reimburse 8,000 US\$ each, the worth of the pickup taking into account its use and other transfer costs.

Of the total amount of 22,000 US\$, at short term a first payment of 18,000 US\$ will be made and a second of 4,000 US\$ after the installation of the pumps. Small adjustments could be made if the estimated distances vary with the above made estimate. The pumps installed on drilled wells can be slightly more expensive (around 10 US\$) because of some additional accessories.

A next intermediate phase is described here to get to a totally independent production by the two workshops. This phase is considered to cover 18 months with a production of 750 pumps by each workshop.

In this phase the workshops have to produce their own pistons and solve the production of the ceramic piece for the guide box.

INTERMEDIATE PHASE. COSTS AND INVESTMENTS	
Administration: Desks, Archive, Computer and printer, Paper, preprinted invoices, etc	\$3,500

Publicity:	
- Construction own handdug well	\$500
- Bill boards	\$700
- Advertisements 100 US\$/month	\$1,800
- Demonstration rope pumps to be used in expositions, fairs, conferences etc.	\$500
- Participation in fairs/exhibitions 3 X 300 US\$	\$900
- Documents describing the product and its installation and maintenance, posters, brochures, leaflets, etc.	\$500
Extruder	\$500
Moulds 4x	\$200
Tools various used for injection	\$50
Kiln and Tools various	\$2,000
Welder	\$360
Tools various used to process metal ware	\$700
Stock	\$3,000
TOTAL	\$15,210

The presented figures are based on estimates and the existing situation found in both workshops. This intermediate phase requires a commitment of the CWSA program to purchase a total of 1500 rope pumps (750 each workshop.)

The selling price during this stage will be 100 US\$ per pump, 10 US\$ above the to be expected selling price, this leaves an additional 7,500 US\$ to each workshop. The other 7,500 US\$ will be covered by the workshops from the margin between production cost and expected selling price.

To allow the workshops to make the required investments part of the to be purchased rope pumps have to be prepaid in the initial phase of this intermediate phase to assure sufficient liquidity at the workshops. To assure that this additional money received by the workshops really is inverted in the items it was meant for, they could be asked to present (copy) invoices on these items. To assure on the other hand that the workshops really deliver the agreed pumps at the foreseen dates a bank guarantee could be signed by the workshops which gives (CWSA) the right to withdraw a certain amount of money if delivery is not accomplished.

Example of disbursements for the intermediate phase.

Trimester	1 Trim	2 Trim	3 Trim	4 Trim	5 Trim	6 Trim.	TOTAL
Disbursement	\$25,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$75,000
Pumps delivered	125	125	125	125	125	125	750

After this intermediate phase, a free market system should work and selling price should lower slightly below 90 US\$. During all the phases the workshops should work on promotion and open market to the private user as well.

VIII Recommendations and programming.

Recommendations and programming for the second phase.

- Selection of the representatives of each workshop. (As soon as possible.)
- Assure passports for each representative, entrance visa for Nicaragua is not needed anymore. (As soon as possible.)
- Agreement with involved parties on financial support toward the workshops. (As soon as possible.)
- Revisit first installed rope pump and make necessary adjustments. (As soon as possible)
- Start production of 10 rope pumps each workshop and finish production of the production-jigs. (As soon as possible.)
- Agreement on promotion programme CWSA.
- Departure from Ghana on Friday 29th of January. Training program from Monday 1th of February to around the 9th of February.
- Selection of the 100 wells where rope pumps will be installed in a combination of 50, 30, 20 for the depth's up to 11 metres, 11 - 21 metres, 21 - 35 metres. Indicate the type of well: hand dug, handdug and prepared for a Nira pump, and drilled well (indicate diameter casing). (Before 29th of January.)
- Include copying design and local production of extruder in Ghana
- Include copying design and local production of kiln (oven) in Ghana.
- Include training of the installation of rope pumps on handdug wells already prepared for installation of other brand pump or to replace other brand pump.

Recommendations and programming for the third phase.

- Production of 50 pumps in each workshop after return technicians from Nicaragua.
- Installation of 20 pumps each workshop before start third phase.
- Include ceramics and plastic injection again in the third phase.
- Technical assistance mission to Ghana programmed provisionally from March 20th until the 7th.

General recommendations.

- Open the option to support start of production at a third side. (Kumasi for example.)
- Start discussion and reach agreements on the implementation of the before described intermediate phase to get to independent production.
- Continue discussion on quality control and "branding".
- Stimulate durable relation between Ghanaian and Nicaraguan rope pump producers.

IX Some final remarks on barriers.

Through the whole process of South-South technology transfer serious **visa** problems were encountered. These have been resolved so far using what so ever method including the intervention of the Swiss Ambassador in Nicaragua or the extra intermediate stop in a Europe to get permission to aboard an aeroplane to Ghana. Since October 1999 this situation has partially been resolved as Ghanaian citizens don't need an entrance visa anymore for Nicaragua. The agreement between the World Bank and the Technology Transfer Division of the rope pump firm required a general liability insurance. It showed to be (totally) impossible to acquire this insurance with worldwide coverage in Nicaragua. A way out was found through a European insurance company, who offered this insurance with worldwide coverage with exception of the United States and Canada, and covering exclusively activities performed in the context of a World Bank contract.

X Outline final report.

The final report should be a manual for other countries or regions on the introduction process of the rope pump. In case the introduction in Ghana is not (that) successful it should analis in detail the circumstances or conditions which disturbed the introduction process of the rope pump technology. For example, which of the activities applied in Nicaragua but left out in the Ghanaian introduction process were crucial.

The themes to be included in the final report after successful introduction are presented below. In this case it should be merely a promotional document. It should be written for and understandable by, specifically policy makers in rural water provision with a background based on the traditional handpumps. The document should be somewhat glossy, easy to read without the pretension to be complete but with emphasize on South-South technology transfer.

Neither this report could explain how useful where the direct contacts so far in the two missions from Ghana to Nicaragua (at policy level) and from Nicaragua to Ghana (at technical and strategy level). Even the prepared set of technical drawings and the photo-manual showed to be very useful but the secret is every time again in the details which can only be explained in the personal contacts.

Experts in writing and on the specific subjects should be incorporated to write this final report

Draft Content FINAL REPORT:

Background/Introduction

The rope pump technology in the context of general handpump technologies.

The rope pump technology transfer activities

Water & Sanitation strategies (Health, Epidemiology, Cost-effect relations)

The Ghana initiative

Applicability of the DRA.

Technical and financial description of the introduction process

Participation of, and agreements with the private sector

Role of the State Water & Sanitation sector.

Social and cultural conditions to be taken into account

(Recommendations?)