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PPP with local informal providers aimed at improving water supply in the peri-urban areas of Maputo, Mozambique

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Water supply in Maputo is quite unique in Africa as the service is provided not only by an incumbent operator contracted by the public authorities but also by a striking number of 450 small-scale independent private operators producing water through their own boreholes. These operators are mostly concentrated in peri-urban areas and provide services ranging from standpipe to private connections reaching more than 500,000 people. In order to extend the public service to the peri-urban areas where the conventional network is not present, a multi donor's funded project has implemented local PPP mobilizing these private operators and the national water assets management institution, FIPAG. This paper, after a brief description of the Maputo context, describes the setting up and the first monitoring results of these local PPP.

Informal water providers in Maputo

Ever since the 1950's, Maputo's population has been increasing at a rate of 5.4%, increasing the population of its capital, Maputo, to 2.0 million people. The public institutions in charge of water distribution have not been able to keep pace with this rapid rate of development.

The historical centre of Maputo - the "Cidade Cemento" - is located around the port and encompasses the business centre, administration buildings and residential districts. The peri-urban areas, in which 70% of people live, are characterized by poor urban planning and weak public service coverage.

Water services in Maputo are provided through a conventional network that transports water from a single large treatment plant, 30km from the city. This facility is a public asset, managed by FIPAG[i], a State-owned Asset Management Company. FIPAG has contracted a private company (Aguas de Mocambique) to manage water production and distribution under a 15-year lease contract. A regulator, CRA[ii], ensures that the contract is fairly balanced.

With 117,000 connections and 450 standpipes in working order, AdeM[iii] owns 37% of the water market in Maputo. Moreover, it is estimated that 26% of the population has access to the service through the resale of water by neighbours connected to the network. These resellers are not considered as operators as most of them are selling water obtained from illegal connections.

Due to the lack of balance between demand and service provision, a second type of operator emerged, especially in the most ill-served peri-urban areas: small private operators, so-called POP[iv], who themselves invest in small piped water systems, providing high standard drinking water to between a few dozen and up to a few hundred households. All these POPs are active in the informal sector and they do not rely on AdeM for water production, since they use their own borehole. There are approximately 450 such operators in Maputo and Matola. They serve half a million people, through 55,000 house connections and 450 standpipes. Their overall market share is 25%.

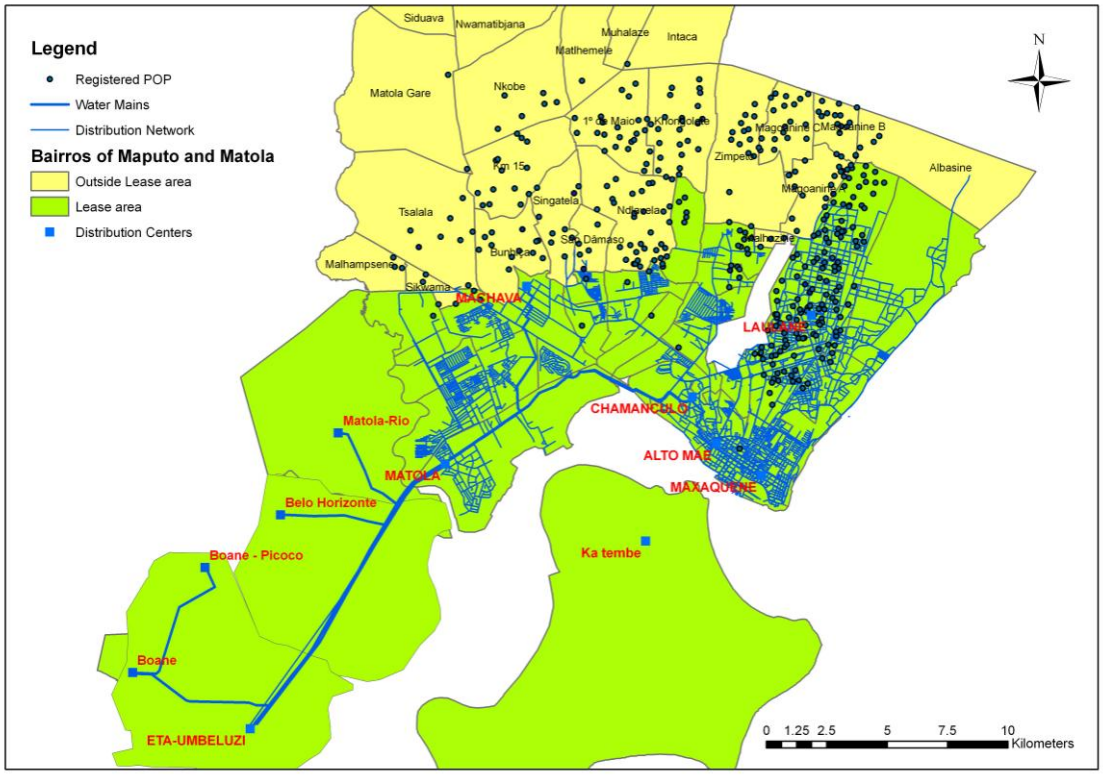


Figure 1. Map of Maputo and Matola (capital city) with location of AdeM network together with POP boreholes

Source: WEDC - Source

POPs are providing a high standard water service

POP characteristics and origin

All POPs have 4 common characteristics: i) they own their borehole and are independent of AdeM; ii) their investment is totally private, it does not come from a former project; iii) they are a truly private operator and not a community management operator; iv) they work without a written contract with the State or the water sector regulator (CRA).

They differ in many aspects, however:

- *Size and commercial strategy:* from the family with a borehole that sells some of the water to the neighbours through a standpipe located in the house compound, to the entrepreneur who manages seven small systems located in various *bairros* of the city and who serves several thousand people;
- *Infrastructure:* from a more modest system with only one borehole and a submersible pump that feeds a water tower and then distributes water through gravity, to more sophisticated systems that produce water from several boreholes using gravity and booster pumps to ensure network pressure;
- *Water distribution strategy:* from the operator using only "spaghetti" connections (see Box nº2) for his domestic water sales to the businessman investing in a structured network that covers a service area and then selling domestic metered connections with the water meter located on the client's premises, as in any conventional water distribution system.

These differences in size, level of investment and type of service are linked: a "small" POP will usually make a small investment and, if he provides a domestic connection service, this will be through a "spaghetti" connection with the profits being only supplementary income; an "entrepreneur" type POP, however, will have substantial infrastructure and focus on domestic connection services using a structured network.

Box 1. POP origin in Mozambique, Technical skills and financial resources came from the mining sector in RSA

The POP phenomenon came about from two main factors: the lack of government response to the very high demand from the population for better service and the existence of potential investors with the minimum amount of appropriate technical skills.

Interviews with the oldest POPs illustrate that they have a similar history: many of them were miners in South Africa who retired with a significant amount of money in cash. Upon returning to their home country, Mozambique, these former miners acquired land in the expansion areas of Maputo and installed basic facilities for their family there, in this case access to water through a borehole.

The initial investment (borehole and pump) was therefore not business-oriented. However, the capacity of a borehole covers much more than family consumption. Taking into consideration the scarcity of water and therefore the high demand, the POPs quickly identified a business opportunity (originally in order to support the cost of water production) which some of the most entrepreneurial and technically skilled former miners managed to develop into a real business relatively quickly.

Today, "new" POPs are entering the market with a profit-oriented objective. These new POPs acquire land that they do not necessarily occupy and delegate the operation to managers.

POP's technical solution: a very cost-effective modular model

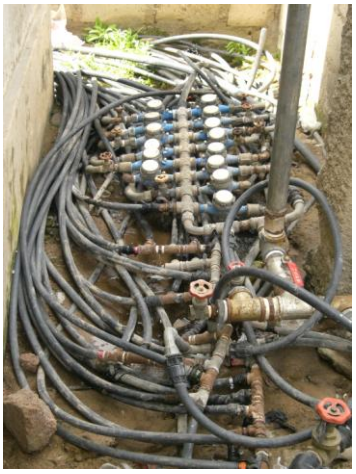
POPs in Maputo have developed their technology based on their field experience and have designed their own technical model with the following characteristics:

- Water production is carried out through a borehole and submersible pump;
- There is no chlorination of water;
- Water reservoirs consist of modular HDPE[v] tanks of 5 to 10m3 installed on reinforced concrete or a metallic superstructure;
- Water distribution networks are in HDPE, the maximum diameter is 2". Pipes are buried less than 40cm down in earth streets. 60% of the networks are structured with one principal loop;
- The connections are generally equipped with a meter which is situated either at the bottom of the water tower in the case of spaghetti connections, either in boxes where there is a concentration of meters or on the client's premises;
- 80% of the networks have a standpipe alongside the water tower.

The main rationale behind these technical choices is risk mitigation: investment is made step by step, based on the growth in demand. The initial investment necessary for starting the business is very limited.

Box 2. 'Spaghetti' connection

Typical of the service provided by the POPs, this is a domestic connection made of a small diameter pipe (3/4" HDPE) that runs from the water tank to the client's house. If it is metered, the meter is located at the head of the pipe. The client provides the connection materials (i.e. tube, meter and fittings). The main advantage (for the provider) is that the client bears the cost of all physical losses and is therefore highly motivated to check and protect "his" pipe.



Photograph 1. 'Spaghetti' Connection

Photograph 2. POP compound

Tariff and competition

Water is sold at the same average price of 1 US$ per m3 regardless of whether it is provided to a private connection or standpipe. The connection cost – which is paid for by the consumer – averages 96 US$ and consists in two components: the connection fee paid to the operator and the purchase of materials for the connection (pipe, meter, plumbing and fitting elements).

For comparison purposes, the average water tariff for AdeM is 0.56 US$ per m3 but there is a minimum charge of 5 m3. This minimum consumption segment is charged at 0.46 US$ per m3. The connection fee to the conventional network amounts to 120 US$.

Competition between POPs is based on the connection fee and not on the water tariff, which is generally quite uniform over a given area. Those operators entering the market will generally apply the same tariff as the existing POPs in the same area.

This market is very competitive. In each district, there are a dozen POPs competing for the same customers. They expand their network, trying to capture customers ahead of other POPs. There does not exist any "water mafia" limiting the number of suppliers in a specific area.

Informal service providers

70% of all POPs are very small informal businesses (350 of them have fewer than 100 connections and represent only 22% of the market share) and only a few dozen of them have transformed into a more formal water distribution company (50 businesses manage more than 200 connections and they represent 48% of the POPs' market share).

Until 2009, none of them had a proper contract with the government or a proper license to sell water. They were just known by local authorities as water operators and taxed as local businesses by the Municipality.

To a large extent, this informal status has been a key element of their success. When Mozambique emerged from a long civil war in 1992, the government was not in a position to promote or regulate local investments in the water sector. The first investments were made by a few individuals, according to their perception of the customer demand. They did not follow a technical or a commercial model established in an office. This low level of regulation has been key in the development of an innovative service provision model.

Figure 2. POPs competing in the same market in Maputo (overlapping network)

Formalizing the informal service providers

Maputo Water Supply Project

The Maputo Water Supply Project is implemented by the asset management company (FIPAG) and funded by the European Union, the European Investment Bank, the French Development Agency and the Dutch cooperation. It was launched in 2007 and consists of three components:

- Component 1: Increasing the water treatment and transportation capacity;
- Component 2: Reducing losses and expanding the conventional network;
- Component 3: Supplying water to those peri-urban areas not served by the conventional network.

Component 3 is dedicated to supply water outside AdeM Lease Area, where most households rely on existing POPs. The main objectives of this component are to: i) increase the coverage (with a special focus on poor households), ii) improve service quality and iii) introduce regulation in peri-urban water sub-sector.

The project implemented the following methodology: i) Issue formal licenses to POPs fulfilling some service quality standards, ii) Invest in infrastructure to complement the existing coverage within the project area and iii) Lease these infrastructures to some POPs.

Developing PPP with the POP

The project started by developing prerequisites to create an enabling environment between the POP and FIPAG:

- **Establishing formal relationships between POPs and the government institutions.** The challenge lay in convincing the 450 POPs to enter into discussion with the public institutions (thus losing their informal status and becoming more visible) and in demonstrating to the public institutions that negotiation is possible with informal operators with suitable standards and rules. Ultimately, most POPs were to be registered as Independent water providers. This licensing process proved to be difficult. Most POPs agreed to have the Ministry of Health checking water quality, but argued strongly on the details of the licence especially the validity period which was set to five years.
- **Adjusting the balance between public and private investment in each new system.** This is crucial, as a "turnkey" investment for a private operator removes all possible initiatives and thus the project loses the added value of a very proactive partner. In contrast, the POPs have limited investment capacity and would be deterred by having to make a high initial investment on their side.

- **Choosing the appropriate risks and task sharing** in order to reassure the operator (the uncontrolled risks are well regulated within the contract) whilst, at the same time, reassuring the public institution that the operator will provide a service within the prescribed standards.

Box 3. 'OBA' subsidy

Contractually, the operator has to install the secondary network himself and to connect the clients with his own funds.

As an incentive for him (a) to invest in network expansion and (b) to serve poor customers with cheap connection fees, the project provides a subsidy for each additional connection installed within two years. It is an OBA subsidy (Output Based Aid).

He can claim this OBA from FIPAG on a monthly basis. FIPAG will commission these connections and pay the subsidy within 45 days.

Developing an innovative lease arrangement

The project worked on the development of a Lease contract for the operation, management and development of public infrastructure built within the project framework and owned by FIPAG. The main tasks of the operator are to manage the infrastructure, develop the secondary network and connect all those clients expressing willingness for private connections.

During the preliminary phase, an exhaustive survey of the project zone was conducted in order to select the areas with low water service coverage. Boreholes were then drilled in order to confirm availability of the water resource.

The small water distribution system constructed includes: a borehole, ground storage tank, water tower, a primary distribution network and electro-mechanical equipment (mostly pumps). The water distribution network was designed based on an indicative service area for which the population was estimated through house enumeration using satellite images. The design of the network also included the secondary network, although this was not built initially.

Photograph 3. "FIPAG" system in Zimpeto

It is the operator's responsibility to install the secondary network in order to best respond to the existing demand for water. Whilst he has no obligation to follow the design, he must respect technical specifications for pipe laying. In order to support his investment, the operator receives an OBAvi subsidy per each connection constructed which is then verified by FIPAG. This subsidy covers part of the connection cost (and is therefore a subsidy for the population as they have to pay a subsidized connection cost) and part of the investment on the secondary network.

The operator must therefore invest his own money in order to put the small system he is leasing into operation. His revenue comes from water sales and the connection fee charged to the clients, as well as from the subsidy paid by FIPAG once they have commissioned the connections. His expenses include investment in the secondary network and private connections, operating costs and a lease fee paid to FIPAG based on the volume of water produced. The subsidy is valid for the first two years of the contract and was designed so that positive operating cash flow could be achieved during the second year of operation at the latest.

The operator is fully responsible for infrastructure management (operation and maintenance), its development and all commercial aspects (client management). FIPAG is responsible for disbursing the

subsidy within a timescale set out in the contract and providing adequate water resources (should the operator exceed the borehole capacity he can request additional water resources from FIPAG through additional boreholes or water in bulk). The water tariff is fixed in the contract.

In October 2010, 3 small systems had been in operation for one year and 13 were to follow.

Recruiting successful operators

The selection of the operators was conducted in two phases: elaboration of a shortlist and evaluation of the financial proposals from the pre-selected operators.

The shortlist was established by considering activity criteria (the number of small systems owned by the operator and total number of clients served) in order to select the operators with a minimum revenue. As these operators were informal, it was pointless to ask for formal documents, such as income or tax certificates, and the best indicator was the total number of clients. The combined criteria of the number of small systems and total number of clients proved also to be a good indication of the financial capacity of the operator (he managed to build several systems) and his development strategy (the project was interested only in entrepreneur-like operators developing this activity as a normal business and not as a secondary source of revenue).

In the first phase, the financial proposal considered only the water tariff charged to the population, with the lease fee and the OBA already having been set in the bidding documents. However, during the second phase, the regulator (CRA) fixed a uniform water tariff for all small systems and selection of the 13 other operators was based on a cost indicator that combined the lease fee and the OBA subsidy.

Each financial proposal was validated by a business plan developed by the operators. Although a great challenge for informal operators, the development of the business plan proved invaluable as the competitors were able to identify their costs; plan their investment needs (and thus their financial resources) and assess their revenue. It was also useful for the bid evaluation team as it enabled them to evaluate the proposals (realistic unit costs, coherent investment plan) and discard any that were unrealistic.

Outcomes after one year

The starting point

In August 2009, three operators were each allocated a small system, as well as an indicative service area for a 5 year lease contract. Within the service area, the operator does not benefit from a monopoly clause and any other POP is authorized to connect people within the area. The main objective is to keep competition ongoing, as an incentive for performance. The operator must invest rapidly in order to capture a large market share. He must provide a reliable service in order to keep his clients.

The three areas to be serviced are different: 1º de Maio is a semi-rural peri-urban bairro with low population density; Magoanine A is more urbanized but of a smaller size; whereas Zimpeto is quite urbanized (even though it has very few tarmac roads).

Outcomes after just one year

After one year of activity, the three operators had connected around 2,000 households (exceeding expectations by 10% and reducing the implementation time by half) and invested their own funds into 37km of pipes (exceeding expectations by 70%). The following table describes the various outcomes.

Table 1. Result indicators

Indicator description		Indicator description	
Total population in the service area (inhabitants)	11,648	Water tariff (€/m3)	0.45
Investment made by the project (€)	351,488	Meter rental fee (€/month)	0.37
Length of primary network invested in by FIPAG (meters)	7,644	Connection fee (€/connection)	25
Length of secondary network initially planned to be invested in by POP (meters)	23,440	Amount of the OBA subsidy (€/connection)	60 to 110
Length of secondary network actually invested in by POP after 1 year (meters)	37,200	Lease fee paid by POP to FIPAG (€/m3)	0.06 to 0.09
Number of connections initially planned after 2 years	1,824	Water losses in %	38
Number of connections actually built after 1 year	2,080	Collection rate of invoices in %	86
Total water production since beginning (m3)	199,576	Average sales (in litres/capita/day)	50

Success and failure

Rapid development of the network and in the number of connections

The two following graphs illustrate the development of the connection rate and the secondary network.

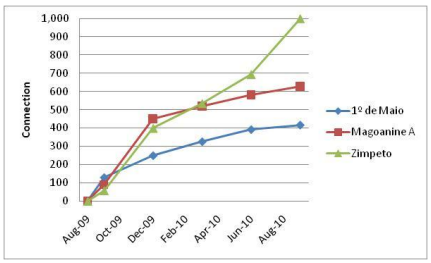


Figure 4. Number of connections

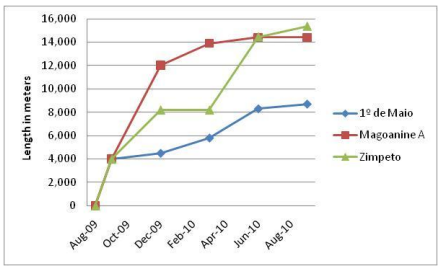


Figure 5. Length of secondary network

Additional comments:

- Each operator has a different development strategy: 1º de Maio system has a slow but constant development rate, whereas the Magoanine A operator invested massively in the secondary network at the beginning and is now focussed on connecting clients. Zimpeto developed the secondary network in two phases and maintains a high connection rate.
- The ratio of secondary network to connections (between 15 to 20 meters/connection) is higher than that designed (from 7 to 17 meters/connection). The ratio is aligned to the population density of the bairros (the higher the density, the lower the ratio) in which the systems are located. The difference between the measured ratio and the design ratio stems partly from the fact that some operators have extended their network outside the planned area.
- The strong development of the secondary network is all the more interesting in that the operators had to invest their own money, thus showing greater investment capacity on their part and real confidence in the sustainability of the business (otherwise they would have minimized their investment).
- This high development rate is also the result of FIPAG's disbursement capacity which proves very efficient (the contractual deadline is 45 days, but FIPAG manages to pay the OBA subsidy in 30 days).

NRW[vii]*: the operators' unexpected weak point*

Unexpectedly, the non revenue water is relatively high given the small size of the systems; the recent completion date; and the strong incentives in place for the POP to limit leakage of water that they produce themselves. Factors contributing to this high NRW could be:

- The high level of illegal connections, a common practice in non-urbanized areas;
- Poor data collection from, and management of, metering;
- The poor quality of the meters (the cheapest on the local market);
- Leakage at the connection point (particularly at the saddle connection, which is the connection point between the main pipe and the small pipe of the private connection).

Lessons learned

Identified key success points for the local PPP

- The investment ratio per capita (including the OBA subsidy) ranges from 37€ to 72€.
- Quick implementation: Once the pilot phase is completed, the setting up of new water systems in peri-urban areas can be reasonably achieved within one year. This provides an efficient response to filling a gap in water service coverage in areas not covered by the conventional network;
- Service improvement: the clients obtaining services from "PPP" operators have access to an improved service in terms of pressure, price and service reliability;
- Serving the Poor: the OBA-subsidy has facilitated the Poor to access the service.

Replicability and scaling up?

At the light of the mitigated outcomes of various international PPP during the past ten years, these local PPPs appear as an efficient solution to extend the water service to non served areas and to the poor customers. The challenge is to create the adequate "enabling environment" and mobilize efficient financial tools to boost the operators' confidence and interest (typically OBA type subsidy).

The amazing development of POPs in Maputo has been facilitated by access to a cheap groundwater resource. This enabling factor is not a prerequisite, as it can be substituted by the main water utility supplying POPs with bulk water. Such a partnership has been successfully implemented in Burkina Faso by ONEA (Hydroconseil providing technical assistance and AFD funding the project) and in Kenya by Athi Water Board (Morel et al. 2008).

The scaling up of such PPP to small towns is another challenge as the capacity to pay is more limited than in peri-urban areas of large cities. Such local PPP requires a higher share of public investment in order to attract private operators. Such PPP exist in Mauritania in hundreds of small towns.

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Note/s

[i] FIPAG: Fundo de Investimento e Patrimonio de Abastecimento de Água. Under the auspices of the Ministry of Public Works and Housing, it has an on-lending agreement with the Ministry of Finance for all public investment in the urban water sector.

[ii] CRA: Counselho de Regulação de Água, is an independent regulating body designed to ensure there is a balance between service quality, consumer interests, and the economic sustainability of water systems.

[iii] Águas de Moçambique: the private operator.

[iv] Pequenos Operadores Privados. Literally, Small Private Operator.

[v] HDPE: High Density Polyethylene: plastic material used in the construction of pipes and water reservoirs.

[vi] OBA: Output Based Aid, see Box nº3 for description.

[vii] Non Revenue Water: water that has been produced and "lost" before it reaches the customer. Losses can be real (through leaks) or apparent (for example through theft or metering inaccuracies).

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