

Costs of rural point sources in Mozambique

Analysis of Unit Costs of 2010 Contracts

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WASHCost

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The first objective of this document is to analyze the values of contracts signed by the government in 2010. The second objective is to analyze the average costs per province and the cost variation from 2009 to 2010.

Introduction

Under the Collaborative Agreement of IRC and DNA (2009) for the implementation of WASHCost Mozambique, financial information from water infrastructure improvement contracts were requested from DPOPHs through SINAS. Complete information was received from 115 contracts signed in 2010 (see Table 1). The majority of contracts were for borehole rehabilitation (40%), and construction (38%), followed by supervision contracts (22%). Despite many rehabilitation contracts, the number of new construction contracts (787) is higher than the number of rehabilitation contracts (484). The number of supervision contracts (729) is close to the number of construction contracts (787), reflecting that the majority of construction contracts are being supervised. The data presented here is from the entire country (except Maputo Province).

Apart from the 44 contracts indicated in Table 1 there are another 35 contracts (for construction) and 7 (for rehabilitation) with incomplete information (missing either the contract amount or the quantities of boreholes). No contracts were signed for the construction of shallow wells.

Table 1 Collected data

Activity	Nº contracts	Nº Boreholes	Overall amount
Construction	44	787	216,321,340
Supervision	25	729	23,862,520
Rehabilitation	46	484	21,148,175
TOTAL	115	2.000	261,332,035

Boreholes

Using Table 1 it is possible to calculate the average cost of new boreholes (total amount divided by the N° of boreholes), which is **275.000** Meticaís (rounded off).

This is the average cost and it is important to understand the variations found. As indicated by the circle in Figure 1, the majority of contracts have a cost between 200.000 and 450.000 meticaís (Annex I). The construction contracts in 2010 were in the provinces of Inhambane, Manica, Nampula, Niassa, Sofala and Tete. Some of these contracts need to be analyzed in more detail:

Point 1 in Figure 1 represents Machaze district in Manica province. This area is known for problems of large depths and the risk of negative boreholes, which increases the costs.

Point 2 in Figure 1 represents the province of Inhambane, in the districts of Jangamo and Panda. These areas are also known as risky for negative boreholes and therefore also have high costs.

Point 3 in Figure 1 represents the district of Manica, province of Manica, It is a contract for the construction of 80 boreholes. The low cost is due to the size of the lot.

The majority of the signed contracts in the current years are "only positive boreholes"; which means the risk of a negative borehole is with the contractor.

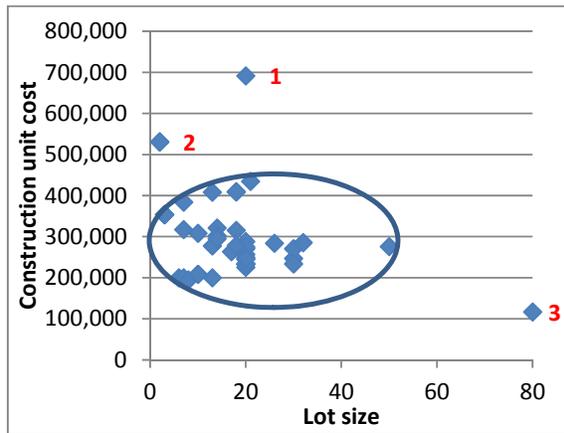


Figure 1 Cost of borehole construction related to the size of the contract. The circle indicates the interval with normal costs

Special Case:

There is an international organization which works in the northern part of the country and has signed 3 contracts in 2010 for 50, 60 and 40 boreholes respectively, in total 150 boreholes. These boreholes cost on average 485.000 meticaais. However, these contracts have different procurement procedures, different technical specifications and somewhat different maps of quantities. For this reason, these boreholes are not included in the calculations of average cost. Including them increases the average cost to 308.000 meticaais.

Rehabilitation

Rehabilitation is done on boreholes which are not currently working¹. Eight hundred and ninety seven (879) rehabilitations were undertaken in the provinces of Gaza, Inhambane, Nampula, Tete e Zambézia. The average cost is about **44.000** meticaais.

From Figure 1 above and the annex II, it is possible to see that there is a large variation of costs, with the majority between 20.000 and up to 90.000 meticaais (Annex II). These variations may be caused by the type of work: rehabilitation works are not the same for all boreholes because each one requires a specific type of intervention to be carried out.

The most expensive contracts (point 1 and 2 in Figure 2) were both in the province of Inhambane, where deep boreholes are required, increasing the cost of replacement.

¹ In the financial-technical language, this is called CapManEx, costs or large replacement / substitution.

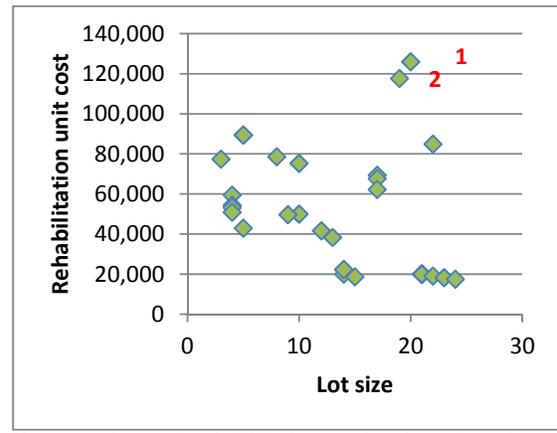


Figure 2 Cost of rehabilitations related to the size of contract. The circle indicates the interval with normal costs

Supervision

These activities are undertaken to supervise the contractor's works during the construction period. The average cost of the 729 supervisions carried out in the provinces of Inhambane, Manica, Sofala and Tete is rounded off to **33.000** meticaais.

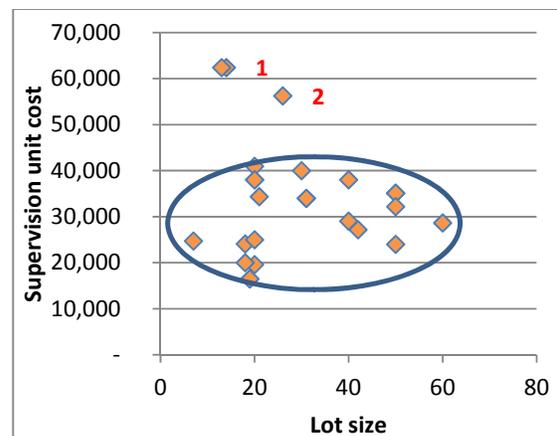


Figure 3 Cost of supervisions related to the size of the contract. The circle indicates the interval with normal costs.

Figure 3 illustrates the costs of contracts vary between 20.000 and 40.000 meticaais (annex III). There are however some outliers:

Point 1 of Figure 3 represents districts in Inhambane province. Point 2 of Figure 3 represents the districts of Sussundenga and Gondola in Manica province. The reason for having a higher unit price is not yet established.

Table 2 Prevision of costs from 2011 up to 2015 for constructions and supervision, with 2010 as base year

	Year	2010	2011	2012	2013	2014	2015
	Índex	1.00	1.08	1.1664	1.2597	1.4693	1.5869
Construction	Average cost	275.000	297.000	320.760	346.418	374.138	404.058
	Maximum*	450.000	486.000	524.880	566.865	612.225	661.185
	Minimum*	200.000	216.000	233.280	251.940	272.100	293.860
Supervision	Average cost	33.000	35.640	38.491	41.570	44.897	48.487
	Maximum*	40.000	43.200	46.656	50.388	54.420	58.772
	Minimum*	20.000	21.600	23.328	25.194	27.210	29.386

* Indicative amounts

Table 3 Prevision of costs from 2010 up to 2015 for rehabilitation, with 2010 as base year

	Year	2010	2011	2012	2013	2014	2015
	Índex	1.00	1.08	1.1664	1.2597	1.4693	1.5869
Rehabilitation	Average cost	44.000	47.520	51.322	55.427	59.862	64.650
	Maximum*	90.000	97.200	104.976	113.374	122.444	132.240
	Minimum*	20.000	21.600	23.328	25.194	27.210	29.387

* Indicative amounts

Costs for the coming years

An analysis of the 2010 contract costs leads to the question: what are the amounts to be used for planning in the coming years? Inflation is the decrease of market value or purchasing power². As found in the Mozambican Briefing Note E-01 (2010), the inflation in our country is high and when planning for coming years, inflation is an important factor. Table 2 shows us the multiplication indexes of projected inflation for 5 years taking into account the year 2010 as the base and an average of 8% annual inflation³. The costs will always vary depending on specific factors⁴ which influence the marking of costs. The minimum and maximum costs are indicative. Zones such as Machaze and inner part of Inhambane may have costs above the indicated amounts (in table 2 e 3).

The costs were calculated taking inflation into account. The average construction cost for the base year is 275.000 meticaís, the maximum is 450.000 meticaís and the minimum is 200,000 meticaís. Multiplying these costs by the annual index, we have the above (in table 2) illustrated amounts foreseen for 5 years.

The average cost of supervision in the base year is 33.000 meticaís, the maximum is 40,000 meticaís and the minimum is 20,000 meticaís which were also multiplied by the index.

The table 3 (above) also shows the average rehabilitation cost for the base year is 44.000 meticaís, the indicative maximum cost is 90,000 meticaís and the minimum is 20,000 meticaís. Multiplying these costs by the inflation index provides values for the coming years.

Average Costs of the boreholes per Province

Table 4 Average costs in construction of boreholes per province in 2010

Province	Quantity	Average Cost	% National cost
Inhambane	40	377.893	137%
Nampula	62	288.437	105%
Tete	260	280.246	102%
Sofala	151	278.797	101%
Manica	220	261.056	95%
Niassa	54	202.372	74%
National	787	274.868	

Although the average cost for construction, supervision and rehabilitation of boreholes in the country is 274.868 meticaís, there are some provinces that have much higher or lower costs, in relation to the average practiced in the country (not all provinces have data).

² In <http://pt.wikipedia.org/wiki/Inflação>

³ In Briefing Note Mozambique F01

⁴ In Briefing Note Mozambique C01

In 2010, the average costs for construction were higher in Inhambane (137% above the national value) and cheaper in Niassa (74%). Note that both provinces had a limited number of boreholes drilled in 2010, and were a small sample. The main difference in cost is probably linked to depth of the boreholes⁵.

Table 5 Average costs in the boreholes rehabilitation per province in 2010

Province	Quantity	Average Cost	% National cost
Inhambane	76	98.427	225%
Nampula	22	84.882	194%
Gaza	110	56.430	129%
Tete	70	20.467	47%
Zambézia	206	20.195	46%
NATIONAL	484	43.695	

Regarding rehabilitation costs (table 5), Zambézia province has the majority of rehabilitations and with lower costs. These contracts are mostly carried out using provincial investment and the state budget. Inhambane is the most expensive due to the depths of the boreholes and the hand pumps.

Table 6 Averages costs in the supervision of boreholes per province in 2010

Province	Quantity	Average Cost	% National cost
Manica	188	37.614	115%
Sofala	243	31.987	98%
Tete	170	31.460	96%
Inhambane	103	29.740	91%
Nampula	25	24.270	74%
NATIONAL	729	32.733	

Regarding supervision in 2010, there was only one province which was more costly than the national amount (Manica). Nampula was cheaper with only 74% of the national average.

This data is presented in details in the annex IV.

Borehole Cost Analysis 2009 to 2010

The 2009 costs have been published⁶. The construction, supervision and rehabilitation costs of boreholes changed from 2009 to 2010. This could be due to variables such as the budgets made available for different activities in 2010, the

⁵ In Folheto Informativo Moçambique D01

⁶ In Folheto Informativo Moçambique C01

locations where these activities took place, as well as geological and road access characteristics. These factors have a significant influence on cost variations.

Table 7 Variation of boreholes costs from 2009 up to 2010

Activity	Average cost 2009	Average cost 2010	Change
Construction	255.132	274.868	7.7%
Rehabilitation	53.455	43.695	-17%
Supervision	36.016	32.733	-9.1%

According to table 7, there was an increase of 7.7% in the cost of borehole construction from 2009 to 2010, which is within schedule, as the provision was approximately 8% (taking the inflation index into account).

There was a decrease of 9.1% in the supervision costs from 2009 to 2010. Although there was provision for an 8% increase, the opposite occurred. This might be explained with the quantity of existing contracts in the 2 years (16 contracts in 2009 and 25 contracts in 2010), as well as the number of supervisions carried out (687 supervisions in 2009 and 729 in 2010). The other reason for this decrease may be an increase in market competition.

Regarding rehabilitation, there was a decrease of about 17% from 2009 to 2010. This decrease might have been caused by the number of existing contracts in the 2 years (18 contracts in 2009 and 46 contracts in 2010), as well as the number of rehabilitations carried out in 2 years (222 rehabilitations in 2009) and (484 rehabilitations in 2010). In this case, the sample is completely different, which can have influence in the average costs. In this case, the sample of 2010 is more representative.

Cost Drivers

The analysis presented in this document has established the average national costs of boreholes. The key question is why; what are the cost drivers? There are several determinants of borehole construction costs, three in particular:

1. **Procurement**- the kind of customers, procurement procedures applied, national versus international bidding, payment for the negative boreholes, and so on.
2. **Bill of Quantities** – variations in the cost of items on the bill of quantities e.g. different costs for mobilization and hand pumps.
3. **Technical issues** – Several items may be considered, but the key cost driver is the depth of the borehole.

More details on cost drivers of boreholes will be discussed t in other briefing notes.

Conclusion

115 contracts signed in 2010 were examined. The following average costs were determined:

- Borehole construction: 275.000 mt
- Rehabilitation: 44.000 mt
- Supervision: 33.000 mt

Costs will fluctuate, but variations above the normal range were found in Machaze and the inner part of Inhambane.

Using the foreseen inflation, indicative costs were demonstrated for the years 2011 to 2015.

Construction costs in Inhambane Province are 37% above the national average and 26% below the national average in the Niassa Province.

Rehabilitation costs are lowest in Zambézia, and supervision costs were found to be lowest in Nampula. The highest construction and rehabilitation costs were found in Inhambane and the highest supervision costs were found in Manica.

There was a variation of costs in construction, supervision, and rehabilitation of boreholes from 2009 to 2010:

Construction of boreholes: increase of 7.7%

Supervision of boreholes: Decrease of 9.1%

Rehabilitation of boreholes: Decrease of 17%.

What is WASHCost?

WASHCost is a 5 year duration Project which is intended to research the costs inherent to water supply, sanitation and hygiene services in the rural and peri-urban areas in Mozambique.

The aim of the Project is to place relevant information to decision makers about unit costs which can be used in the planning and budgeting processes.

It is a programme of the Mozambican government placed at the National Directorate of Water in the Department of Rural Water. Globally managed by IRC International Water and Sanitation Centre.

www.washcost.info/Mozambique

Publications in series C (Costs):

- Moz Briefing note – C01: Costs of rural point water sources – analysis of unit costs of 2009 contracts
- Moz Briefing note – C02: Costs of rural point water sources- analysis of unit costs in 2010 contracts

Publications in the series E (Economy):

- Moz Briefing note – E01: Inflation in the last 10 years
- Moz Briefing note – E02: Exchange rate in the last 10 years
- Moz Briefing note – E03: PPP, definitions and implications