Factors affecting the cost of water supply to Gauteng

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Abstract

The cost of water to Gauteng has continued to increase over time owing to new sources being more remote and due to cost inflation. The savings due to increased scale of supply and improved technology have been dwarfed. Methods of minimising the cost of water conveyance and distribution are discussed. Factors affecting the cost are documented and guides for supply engineers are given. The possibility of lower marginal costs being exploited for poorer sectors of the population is mentioned but demand management and pricing policy are not covered.

Introduction

Considerable research and discussion have taken place on the subject of water costs in South Africa in recent years. This is largely because of the policy set out in the Reconstruction and Development Programme (1994) to supply the bulk of the population with potable water. This paper attempts to establish the basic costs of water using Gauteng as an example. The different components of cost and how they effect prices are indicated. Costs may therefore be minimised so that, based on the law of supply and demand, the supply can be maximised.

Water supply could also be extended to those previously excluded especially if costs could be re-distributed by a suitable tariff structure.

One of the aims of the RDP is to supply everyone in South Africa with 25 l of potable water per day within a radius of 200 m of their residence. The cost of supplying the 12 m. people in South Africa who at present do not have clean drinking water is estimated to be between Rl bn. and Rl0 bn. Cost minimisation and optimisation are therefore important.

Some aspects of different water tariffs

The "cost" here is taken to be the cost to the supply authority. This may not be the same in total or what could be incrementally charged to consumers.

The tariff charged for water can influence the cost (consumer management effect), since it can influence the amount of water consumed.

There has been discussion on alternative tariffs to make water affordable to everyone. These include lifeline tariffs for the poor and progressive block tariffs with cross-subsidies for increasing consumption. In rural areas it may only be possible to charge the costs of operating and maintenance while capital recovery could be by cross-subsidy from urban areas. The financial implications are great.

It has been implicit in some discussions that the marginal cost of additional water could be lower than the average cost. The Palmer Development Group (1994) replace marginal cost by average incremental cost (AIC). It is shown that it is not always necessary that increased scale of supply reduces the cost nor that the incremental cost is much less than the average cost. At present most authorities charge average historic costs (AHC) which is, as the name implies, averaged over consumers to meet the costs incurred by the supply authorities.

Exactly what the marginal cost is, is subject to debate. On a new pipeline it is the extra cost of providing extra water, which (see **Appendix)** is 80% of the average cost per litre. In the case of an existing infrastructure it may be the cost of tapping new sources including all the associated engineering works. Then the marginal cost is likely to be more than the average historic cost.

The conflict between reducing costs due to increased scale and increasing costs due to sources further afield is discussed. For instance, whereas the average cost of raw water to the Gauteng area is about 39c/kl, the Lesotho Highlands Water Authority suggests that the marginal cost of raw water is R1.50/W, based on the furthest source for obtaining additional water.

Triebel (1994) indicated that because water supplies in South Africa are by monopolistic authorities, they have no inducement to charge marginal costs. He assumes that the marginal cost is less than the average total cost. However, he suggests that tariffs could range from subsidised lifeline tariffs through to full cost recovery at market worth by consumers who can afford it. The different tariffs suggested by Asmal (1994) are broken down into a stepped tariff ranging from *50c/kl* to 35Oc/kl. Triebel (1994) suggests a social tariff for consumption of less than 30 l/capita-d with the normal tariff applying up to 250 l/capita-d and an excess tariff above this figure. The costs to industry would be more difficult to determine.

The use of stepped tariffs for cross-subsidisation is a relatively new idea whereas the use of increasing tariffs for minimising the use of limited resources has been applied in Gauteng when droughts forced the restrictions on the use of water.

Water tariffs in South Africa are generally based on one or more of the following (Lumgair, 1994):

Per *kl* of consumption
Per erf
Erf area
Connection size
Per connection
Function of zone

Figure 1 shows the influence of the three major technical factors on the cost of a water scheme. For example, the cost of water is a function of the volume delivered as well as the peak rate of flow.

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