

PN-AAH-044

EXECUTIVE SUMMARY

TARIFF STUDY FOR
TAIZ WATER AND SEWERAGE AUTHORITY,
YEMEN ARAB REPUBLIC

FOR

UNITED STATES AGENCY
FOR INTERNATIONAL DEVELOPMENT

DECEMBER 1977

HASKINS & SELLS

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CERTIFIED PUBLIC ACCOUNTANTS

1101 FIFTEENTH STREET, N.W.

WASHINGTON, D. C. 20005

December 28, 1977

Department of State
Agency for
International Development
Washington, D. C. 20523

Gentlemen:

Contract AID/NE-C-1234

Enclosed is the Executive Summary of our Report which presents the principal findings and recommendations of a tariff study for the improved Taiz water and sewerage systems. The prime objective of the study was to develop a tariff structure which meets certain social and equity needs of the public, as well as the financial requirements of the utility. This Executive Summary relates primarily to Volume 1 of our Technical Report; Volume 1 is being transmitted under separate cover.

Also being transmitted under separate cover is Volume 2 of the Technical Report, which presents the findings of the socio-economic surveys of Taiz which were commissioned under the contract.

We are pleased to present our findings and recommendations; the study participants would be happy to discuss this report with you in greater detail at your convenience. Please contact Mr. J.Gareth C. Stainer; London, telephone 01-248-3913 for arrangements in this regard.

Very truly yours,

Haskins & Sells

Enclosure

C/C - Mr. J.Gareth C. Stainer
Deloitte, Haskins & Sells,
Management Consultants
London, England

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INTRODUCTION

1. This summary presents the main findings and recommendations of the tariff study for the Taiz Water and Sewerage Authority , contained in volume 1 of the main report. The study was commissioned by AID contract AID/NE-C-1234, dated 14th May 1976.
2. The findings of the socio-economic surveys of Taiz commissioned under that contract are contained in volume 2 of the main report. It is hoped that a summary of these will shortly be made available as a separate document.
3. This summary follows the structure of the main report and discusses the following aspects of the study in turn:-
 - (a) the study objectives;
 - (b) our demand projections;
 - (c) the project costs;
 - (d) the aims of tariff policy;
 - (e) our tariff recommendations;
 - (f) a comment on the level of sewerage charges;
 - (g) recommended concessions on connection costs;
 - (h) the annual connection programme;
 - (i) legislative and administrative proposals.

Study Objectives

4. The objective set by the terms of reference was to develop a tariff structure for the expended water and sewerage systems which:-

- (a) provides access to improved services for all households at the earliest possible date (if necessary by offering concessions on connections costs);
- (b) sets the level of charges so that the poorest households are able to afford a satisfactory level of consumption, if necessary by offering concessionary tariffs;
- (c) generates sufficient revenues to provide for the renewal of the system, and to meet the agreed level of loan charges and repayments occurring in the period 1981 to 1990.

Demand Projections

- 5. We carried out socio-economic surveys of Taiz in July/August 1976 to determine the characteristics of the population and their use of water and sewerage services, and used this data to make projections of future demand for the first ten years of operation of the improved systems.
- 6. Because of considerable uncertainty about future development in Taiz we prepared three sets of projections based on future growth rates of 6%, 9% and 12% respectively.
- 7. We identified the likely growth in the number of establishments, the proportion connected to services and growth in the level of consumption per connection for each of the four main markets the Authority serves:-
 - (a) domestic;
 - (b) institutions;
 - (c) industry;
 - (d) commercial.

8. Assuming present connection costs remain unchanged, we estimate in our central projections that the total number of connections would increase to:-

	<u>Water</u>	<u>Sewerage</u>
1976	12,000	3,800
1981 minimum	18,100	18,000
1990 maximum	51,500	50,000

9. At the present price of water total consumption would increase to:-

('000 cu.m. per annum)	<u>1976</u>	<u>1981 Minimum</u>	<u>1990 Maximum</u>
Domestic	1,300	2,500	8,900
Institutions	7	13	25
Industry	31	58	137
Commercial	154	267	1,011
Approx. Total	<u>1,500</u>	<u>2,800</u>	<u>10,100</u>

However, uncertainty in the forecasting assumptions means that by 1990 total demand could be between 6.0 million and 16.4 million cu.m. per annum.

Project Costs

10. We estimate the basic capital costs (in 1977 prices), including remedial work to the existing system, well drilling, engineering design costs and costs of the distribution network undertaken by NWSA, but excluding inflation, to be as follows:-

water system	\$21,896,500;
sewerage system	\$22,986,800;
total	\$44,883,300.

These costs were used in our "base case" analysis.

11. We do not agree with the inflation rate assumptions made by Hazen & Sawyer. Firstly we consider that a rate of 10% per annum is too high for foreign costs and suggest an allowance of 8% per annum. Secondly we consider that the increase in local costs is likely to exceed 25% per annum. We

discussed local inflation rates with the Central Bank of Yemen and were told that they envisaged inflation continuing at between 40% and 50% per annum for the next five years.

12. We estimate that, including inflation at the above rates, the total nominal cost of the project will be \$71,038,100 - an increase of 58%.

13. It was agreed with USAID that we should review the implications of providing finance for the project in the following three ways:-

- (a) entirely as equity;
- (b) in the ratio 65 debt:35 equity;
- (c) \$10 million as equity and the rest as debt.

We used the central of these assumptions as our base case since AID viewed this as the most likely financial structure.

14. At AID's suggestion we assumed that additional loans would be provided on the following terms:-

- (a) five year grace period;
- (b) repayment over 15 years in equal annual instalments;
- (c) interest at 5% per annum, accrued during the grace period;
- (d) all debt servicing payments due in foreign currency.

15. We estimated the future operating costs of the two systems using a formula provided by Hazen & Sawyer which related costs to our forecasts of the numbers of connections served and (for water) the volume of water consumed.

16. Uncertainty in the loan terms, in the basic capital costs of the systems and in demand means that the revenue required to break even could vary between 60% and 120% of the level forecast in our central projections for the water system and between 84% and 114% for the sewerage system.

Aims of Tariff Policy

17. In determining our recommended tariff structure we have taken into account the following aims:-
- (a) to improve health, by increasing the availability of water and flush toilets to encourage improved hygiene and reduce bacteriological disease;
 - (b) to conserve the available water resources, since the capacity of the current project is limited and would be expensive to extend further;
 - (c) to increase general welfare, in terms of employment and real income, by making sufficient water available to industrial and commercial consumers to encourage economic development, and by increasing productivity by reducing days lost through sickness;
 - (d) to redistribute income, by charging a lower tariff to small consumers, often poor households, to encourage at least a minimum level of water consumption; by subsidising the monthly sewerage charge out of water sales revenues; by subsidising the costs of connection for poor households in order to increase the number with satisfactory services; and by providing free public services for poor households who are unwilling or unable to connect;

- (e) to generate sufficient financial resources to meet the loan interest and repayment obligations of the Authority, and to provide for the renewal of the system.

Tariff Recommendations

18. We recommend that the water tariff for households, small businesses and institutions (hospitals, schools, etc.) should be (in 1977 prices):-

3 Rials/cu.m. for up to 10 cu.m./month;

6 Rials/cu.m. over 10 cu.m./month;

and that there should be no monthly fixed charge. For manufacturing industry, construction sites and electricity generation all consumption should be at the higher rate.

19. We recommend a stepped tariff structure for water to:-

(a) minimise costs to small consumers (often the poor households);

(b) encourage consumption of a minimum quantity of water;

(c) discourage wasteful use;

(d) contribute to sewerage costs.

20. We believe this tariff is reasonable in relation to present prices, given the greater availability and better quality of water from the improved system, and will reduce present levels of expenditure for poor households at present buying from vendors.

21. We also recommend that the monthly sewerage charge (in 1977 prices) be set at 20 Rials per connection for all consumers; this is less likely to deter use of the service than a charge based on full costs.

22. The base water tariff of 3 Rials/cu.m. covers the full costs of production and protects the Authority from uncertainty in the forecasting assumptions; the 6 Rial higher rate and the step at 10 cu.m. is intended to achieve the maximum possible reduction in the sewerage charge without constraining water consumption for small households and to minimise the total cost of both services for small and medium consumers. Any further steps in the water tariff would reduce the contribution to the sewerage charge and could defer the consumption level at which customers pay the full costs of waste water disposal.
23. Whilst the Authority may wish to defer implementing our tariff recommendations in full until the system improvements are completed, we suggest that some interim increase in water tariffs is desirable to cover the existing production costs, and to reduce the eventual increase from the present level to the recommended level.
24. We also recommend that tariff levels should be revised when tenders are received for the project and financing terms agreed. Thereafter they should be reviewed at least annually, and possibly more frequently if high rates of inflation continue.

Comment on Level of Sewerage Charges

25. At present few households or businesses pay for sewerage service. A charge of 20 Rials/month for the improved service might be a deterrent to connect to the system. We have therefore considered whether further reductions in the level of charge would be feasible.
26. A 5 Rial reduction in the level of charges could be achieved by either:-
- (a) reducing the capital costs of the sewerage system by 30%; or

- (b) increasing equity funds from \$8 million to \$16 million, either by increasing the total equity or by diverting equity from the water system; or
- (c) paying debt charges of £0.4 million per annum from 1981 to 1990 out of central government, municipality or Taiz Co-operative funds; or
- (d) providing additional loans of \$4 million to fund 50% of the costs of extending the secondary collection system.

27. We do not know whether such changes are feasible, but if additional funds are required from within Yemen we suggest that changes in the rates and coverage of the existing sales taxes might be considered.

Recommended Concessions on Connection Cost

28. To encourage a high proportion of households and businesses to connect to improved services we propose the following concessions on the cost of connection:-

- (a) extended payment plan: payment over two years at 28 Rials/month for water, and 30 Rials/month for sewerage;
- (b) concessions to poor households to reduce costs to the same level relative to income as households with average incomes; for example:-
 - (i) poorest 10%: 100% concession;
 - (ii) poorest 11% to 20%: 70% concession;

- (iii) poorest 21% to 30%:
35% concession;
- (c) we also recommend that shared connections should be permitted.

29. These concessions are:-

- (a) necessary if a sufficient proportion of households and small businesses are to be connected to achieve the health objective;
- (b) a better and more practicable method of helping poor households than concessions on monthly service charges.

30. The introduction of these concessions will require an extension and formalisation of the interview procedures used at present by the Taiz Co-operative to assess eligibility of individual households. We believe that it is possible to form a sufficiently accurate judgement of household incomes in this way, but for administration of the policy to be practicable the number of alternative grant levels should be limited.

Annual Connection Programme

31. To achieve sufficiently high levels of connections to the improved systems to achieve the public health benefits, the Authority should:-

- (a) increase the number of water connections by 5,500 between 1976 and 1980;
- (b) maintain an annual rate of at least 3,000 water connections between 1981 and 1990;

- (c) increase the number of sewerage connections by 10,000 between 1976 and 1981;
- (d) maintain an annual connection programme of at least 2,700 sewerage connections between 1981 and 1990.

32. Since not all households will wish, or be able to afford, to connect to improved services, even with the concessions we have proposed, this connection programme includes the following provision of free public taps and toilets in poor areas of Taiz:-

	<u>Taps</u>	<u>Public Toilets</u>
1976	55	46
1981	130	160
1990	190	290

Legislative and Administrative Proposals

33. We recommend that the Authority or the municipality should reinforce the commercial policy outlined above by taking the following action:-

- (a) controlling all alternative water sources to ensure that the water supplied is of an adequate quality, and closing those which could be a hazard to public health;
- (b) closing all private sewerage systems which do not meet appropriate standards of design or maintenance;
- (c) enacting legislation to improve public hygiene, give occupants of rented property or temporary structures access to adequate services and control the wasteful use of water.

34. These actions would require the Authority or the municipality to undertake the regular inspection of alternative water and sewerage systems, and to develop appropriate administrative sanctions (fines, disconnection) to enforce the public health legislation.