

WHAT ROLE FOR THE CONSULTING ENGINEER

DAVID O LI OYD Managing Director, Halcrow-Balfour Ltd.

SUMMARY

This paper discusses the fundamental changes that have, and are taking place, in the role and uses of environmental and public health consulting engineers to help provide services for the benefit of recipient communities. Reference is made to the shortcomings of some of the present procedures, and comments are presented on the changes which could lead to overall benefits to users.

INTRODUCTION

The requirements for the provision of adequate water and waste services throughout the world remain undiminished and undiminishing. The aspirations of people for the acquisition of these benefits rightly ever increases, all too often beyond the capability of local, regional or central government financial and technical resources; the capacity of international agencies; or the willingness of donor countries.

Detailed dissertation on the existing situation in the world is inappropriate in this paper but Table I indicates the overall magnitude of 60% of the 2,300 million people living in the developing world being without any adequate or safe drinking water and rather more with no sanitation at all. The investment needed for the correction of this situation was originally quoted at about £60,000 million. This is approximately 120 years of capital expenditure at the current UK rate or 70% of the replacement value of the present UK assets of similar services.

CONSULTING ENGINEERING

It is perhaps a reflection on the profession that many people have no clear idea of what Chartered Engineers do, and even less what Consulting Engineers are. The British Association's definition of a Consulting Engineer is

"A person possessing the necessary qualifications to practise in one or more of the various branches of engineering who devotes himself to advising the public on engineering matters or to the designing and supervising the construction of engineering works, and for such purposes occupies and employs his

own office and staff, and is not directly or indirectly concerned or interested in commercial or manufacturing interests such as would tend to influence his exercise of independent professional judgement in the matters upon which he advises."

The field of engineering is so wide that consulting engineers are bound to specialise to a greater or lesser degree.

Consultancies exist in almost every professional discipline; from economics to engineering; chemistry to combustion; and management to marketing; to name but a few. They are generally active in two broad fields of service. They can provide authoritative and unbiased advice based on their knowledge and experience purely in an advisory capacity. In addition, they can act as design, executing and supervising agencies for specific projects.

In the former role they are probably acting in the 'purest' possible professional way, and the roles of consultants, as we know them today grew from these specialist beginnings. In the latter role, the consultant acts within prescribed and specified limits, and it could be construed that they merely operate as an extension of the existing establishment of the clients administration. The edges between these two distinct functions, tend to become blurred, and most commissions contain an element of each role.

THE ROLE OF THE CONSULTING ENGINEER

Conventional

The conventional role of the Consulting Engineer normally results in the provision of a series of defined steps linked to the "Project Cycle" as used by many funding agencies. (See Appendix). These include (i) Pre-feasibility study, (ii) Feasibility Study, (iii) Design, (iv) Tender Document Preparation, (v) Supervision of Construction. Although rare project examples exist of a different consultant being retained for each stage, normally at least 2 firms will share the project work and commonly 3. This situation may have arisen because more consulting engineers are available, but a more likely reason is that the increasing involve-

ment of more countries with international funding agencies has led to greater pressure to "spread the work around".

Is such division of consulting engineering project involvement efficient in man power and financial resources? It can be argued that the use of different firms produces better designs but on close examination this argument regularly fails. Almost inevitably a multiplicity of firms, results in design services being duplicated; overheads increased; and mobilisation payments being incurred more than once. Each firm, at each stage, will wish to reassure themselves that the overall project concept and design is correct (indeed their terms of reference will probably require them to do so) all at additional cost to the client.

The current pattern of the "Project Cycle" can also lead to inflexibility to the clients disadvantage. A project may take many years to come to the fruition of detailed design and construction supervision, by which time the Feasibility Report can be out of date. Anticipated development may not have happened, or even be planned any longer, but the provision of infrastructure services has already been embodied in miles of bureaucratic reports at all administrative levels of government and funding agency. A consulting engineer would be failing in his duty if he did not propose changes, but would probably make administrative enemies (to his disadvantage) even though the final project would benefit more needy people.

Current practices could result in Consulting Engineers becoming mere design agents on many projects to the detriment of both themselves and their clients. A return towards greater mutual client/Agency/Consulting Engineer trust; Wider involvement at all project stages; and less division of services between separate firms would reduce many project overall execution times and costs.

Less Conventional

The more traditional role of the consulting engineer as referred to previously has widened in recent years by providing services to clients in differing ways. The relationship between Client and Consulting Engineer must be clearly understood, however many other parties may be involved in any "package", so that the personal and professional integrity of the latter is preserved for the benefit of all.

Recent examples of less conventional roles for consulting engineers include:-

- (a) A pilot study including the inspection, cleaning, renovation and recommendation of remedial measures for the sewerage system of a large Indian City under

World Bank finance.

The Client, a Metropolitan Development Authority engaged an Indian Contractor together with the services of a British Consulting Engineer, who in turn employed a British Water Authority and a British specialist contractor as sub-consultants/contractors.

- (b) The design of water supply schemes; the procurement and transportation of materials; the direct employment of local labour and plant for construction; the supervision of plant installation; and project commissioning in a West African State. The project financiers (UK Overseas Development Administration) approved a "turn-key operation" by the Consulting Engineers because the low level of commercial and development activity within the country made the employment of civil engineering contracting companies entirely uneconomic.
- (c) The secondment of individual engineering staff at all levels to recipient Government Departments overseas with the retention of individual pension rights and limited financial recognition of the support afforded them by head office.
- (d) The assessment, study and site trial in a number of less developed countries of solar powered low head pumping installations, under direct World Bank financing.
- (e) The establishment of joint formal legal entities by groups of consulting engineers and/or other consultants to offer clients and funding agencies one "contractor" in contrast with the rather loose, ill defined consortium, joint ventures etc of the past which could give rise to feelings of impermanence and lack of resources. A recent water resources project in a Middle Eastern country encompassed engineers, systems analysts, chemists, agriculturalists, economists, hydrologists and hydrogeologists all engaged within the confines of one consulting engineering company.

Fees

Good advice demands fair reward. Remuneration for consulting engineering services can be based on many formulas, including; lump sum, percentage, man month rates, etc. Whatever method of payment is adopted due allowance must be made by Clients for the hidden assets that lie behind the directly visible staff employed on the project work. The full experience available within any larger firm and that readily available to most smaller organisations has to be paid for, as do overheads etc. If margins are cut too much in project fee negotiations on a continuous basis, standards of service and design will inevitably fall.

CONCLUSION

This paper is by conference organisation direction - short. The outline ideas expressed can be developed during discussion. Suffice it to say that there is a continuing need for consulting engineers who can provide professional skills,

realising that their mission is to serve the worlds needs and not to remake it in their own mold. It is to be hoped that they can continue their work in an atmosphere of increasing mutual trust and decreasing bureaucracy.

T A B L E 1

Numbers of people in the developing world (excluding China) without clean water and sanitation in 1980 (Comprehensive Report on the Decade for the UN General Assembly)

<u>Population (million)</u>	<u>Without reasonable access to clean water</u>	<u>Without adequate disposal facilities</u>
Urban 703	177 (25%)	331 (47%)
Rural 1612	1143 (71%)	1399 (87%)
Total 2315	1320 (57%)	1730 (75%)

APPENDIX

Abstract from "The World Bank Project Cycle" by Warren C. Baun, Finance and Development, December 1978.

"Bank lending has become increasingly development-oriented in terms of borrowing countries, development strategy, sectors of lending, and project design.

In terms of countries, lending has been directed increasingly toward the poor and less developed countries in Asia, Africa, and Latin America.

In terms of development strategy, the so-called trickle-down theory, which assumed that the benefits of growth would eventually reach the masses of the poor, has been replaced by a more balanced approach, combining accelerated growth with a direct attack on poverty through programs to raise the productivity and living standards of the rural and urban poor.

In terms of sectors, the emphasis has shifted from basic infrastructure (roads, railways, power) and industry to a more comprehensive program aimed at growth, provision of basic services, and better income distribution. While infrastructure continues to be important, lending for agriculture and rural development, urban sites and services, water supply and sanitation, education, population, and nutrition has been introduced or expanded greatly.

In terms of project design, greater attention is given in all sectors, both new and traditional, to income distribution and employment, impact on the environment, development of local resources and institutions, training of local personnel, and overcoming social and cultural constraints".

THE PROJECT CYCLE1. IDENTIFICATION

Selection by Bank and borrowers of suitable projects that support national and sectoral development strategies and are feasible according to Bank standards. These projects are then incorporated into the lending program of the Bank for a particular country.

2. PREPARATION

Borrowing country or agency examines technical, institutional, economic and financial aspects of proposed project. Bank provides guidance, and makes financial assistance available for preparation, or helps borrower obtain assistance from other sources (one to two years).

3. APPRAISAL

Bank staff review comprehensively and

systematically all aspects of the project. This may take three to five weeks in the field and covers four major aspects: technical, institutional, economic, and financial. An appraisal report is prepared on the return of Bank staff to headquarters and is reviewed extensively. This report serves as the basis for negotiations with the borrower.

4. NEGOTIATIONS

This stage involves discussions with the borrower on the measures needed to ensure success for the project. The agreements reached are embodied in loan documents. The project is then presented to the Executive Directors of the Bank for approval. After approval the loan agreement is signed.

5. IMPLEMENTATION AND SUPERVISION

The borrower is responsible for implementation of the project that has been agreed with the Bank. The Bank is responsible for supervising that implementation, through progress reports from the borrowers and periodic field visits. An annual review of Bank supervision experience on all projects underway serves to continually improve policies and procedures. Procurement of goods and works for the project must follow official Bank guidelines for efficiency and economy.

6. EVALUATION

This is the last stage. It follows the final disbursement of Bank funds for the project. An independent department of the Bank, the Operations Evaluation Department, reviews the completion report of the Bank's Projects staff, and prepares its own audit of the project often by reviewing materials at headquarters, though field trips are made where needed. This ex post evaluation provides lessons of experience which are built into subsequent identification, preparation or appraisal work.