TERMS OF REFERENCE

FOR

A DESKTOP STUDY ON WATER DEMAND MANAGEMENT FOR AN INDUSTRIAL AREA IN MALAYSIA

Assoc. Prof. Dr. Abdul Hamid b.Hj. Mar Iman

1. INTRODUCTION

This section explains further aspects related to OBJECTIVES (iii) and (iv) of the TOR from NAHRIM. They are to be integrated into other objectives specified in the TOR.

2. OBJECTIVES

The objectives specify the followings:

(iii) Determining the extent to which the demand of the area can be reduced through

 optimum demand management, and the cause-effect implications that this will have

 on all consumers and/or industries within the area considered;

(iv) Analyzing the cost-benefit of the proposed effective demand management.

3. SCOPE OF WORK

The case study is Johor Bahru. Industries will be chosen from the food industry, electronic industry or/and other high water consumption industries, of a reasonable area-size within this area. Then, the issues to be addressed are:

Developing water optimality theory under water management mechanism

Determining the cost-benefit gained from the effective demand management.

4. General Methodology

4.1 Optimum Demand Management of Industrial Water

4.1.1 Optimal Water Use Concept

Optimal water use can be determined in different ways using different concepts. Perhaps, the most important ones are those of economics. Assuming that the technology and accepted water quality, water pricing are known, optimal water demand takes into account the followings:

1. Efficient water use: where the water value of marginal output (MVP) of a firm is equal to the marginal cost of water use to produce that output (MCP), that is, MVPW = MCPW. This will determine how much water should be used to produce the marginal value of product at the existing water rate and market conditions of a firm’s output.
2. Utility-cost optimal quotient (UCOQ): where the optimal level of industrial water use is determined at the tangential point between total utility curve of water use and firm’s water budget constraint. This will determine how much water should be used to optimize the product utility of a firm well as to satisfy the firm’s budget for water bill.
3. Optimal production’s water ratio (OPWR): That is, the level of water use at the optimal production level of a firm. Optimal production is the production at the lowest point of a firm’s long-term average production cost. This will determine how much water should be used at the lowest level of long-term total average cost of a firm.

4.1.2 Related Data Issue

To address the optimality concept above, the following questions are to be answered: What is efficient water use? How is utility of water use measured? What is firm’s level of budget constraint? What is firm’s optimal production?

Many of these questions need a field study. However, where a field study is not possible, we can only establish the theoretical framework of management of optimal water demand.

* + 1. Expected data/information and output

Efficient use of water is related to engineering, behavioural, and economic aspects.

|  |
| --- |
| Aspects of Water Use Efficiency |
| Engineering | Behavioural | Economic |
| Water use re-cycling, Cooling water recirculation, rinsing, water distribution equipment, etc. | Water use habits (baseline study), size of firm, worker characteristics, level of education, type of use, etc. | Marginal water pricing, average water pricing, water tariffs, , MVPW = MCPW concept, UCOQ, OPWR |

The current water use level will be compared with the theoretical water use levels from the above water economic analysis to determine whether or not water use reduction is possible. In terms of implications, in case water reduction is possible, the following outputs can be expected:

♦ The amount of saved quantity of industrial water demand;

♦ Additional total physical production that can be generated from water-savings for a

 particular industry type.

4.2 Cost-benefit of Optimal Demand Management of Industrial Water (ODMIW)

4.2.1 The Concept

Cost-Benefit Analysis (CBA) estimates and totals up the equivalent money value of the benefits and costs to the community of ODMIW option to establish whether it is worthwhile.

The option is considered worthwhile if the total benefits from its implementation to whomsoever it accrues exceed the costs of that option. For this, we need a consistent set of methods for measuring benefits and costs of the option. Some technical issues of CBA have not been wholly resolved even now but the fundamental presented in the

We will include both economic CBA and financial CBA.

The economic CBA approach is “with” and” without” option while the financial CBA approach is quantification of direct benefits and costs of the option.

4.2.2 Data/information issue

What are the benefits and costs of the proposed option? Since field data collection is very limited, we will not embark on both the “economic” CBA and “financial” CBA in an empirical way. Rather, a review of past research in other countries will be the principal approach to the analyses.

4.2.3 Related data/information

The financial benefit-cost analysis includes the following eight steps:

(i) determine annual project revenues;

(ii) determine project costs;

(iii) calculate annual project net benefits;

(iv) determine the appropriate discount rate (i.e., weighted average cost of

capital serving as proxy for the financial opportunity cost of capital);

(v) calculate the average incremental financial cost;

(vi) calculate the financial net present value;

(vii) calculate the financial internal rate of return; and

(viii) risk and sensitivity analysis.

4.3 Other Baseline Aspects

Although this study only focuses on water demand, it will not complete without regard to other related aspects such as water supply, pricing, characteristics of industries included in this study and local demography of the study area. Therefore, some baseline information and/or data will be required to complete the study.

5.0 Time Schedule and Budget

These will be basically based on library search of information at various places, potentially, but not limited to: (1) Sultan Ismail Library; (2) National Library; (3) University Malaya; (4) International Islamic University; (5) UTM City Campus.

A brief time-table of activities and the estimated cost as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Activity |  | Cost (RM) |
| 1. | Travelling for literature review |  | 2,500 |
| 2. | Data collection |  | 1,000 |
| 3. | Consumables |  | 800 |
| 4. | Some computer equipment repairs |  | 200 |
|  | **Total** |  | **4,500** |

**[Fadzlin…saya kena sakit belakang yang teruk….nanti saya tambahkan sedikit lagi..]**