

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

Conclusion

1. In Thailand, water treatment plants with collection works from surface sources are subject to economies of scale related to their sizes or capacities. The relationship between design capacity and investment costs; or production capacity and OMR costs can be described by the derived equations presented in Chapter Four. Results show that there is a very high correlation between these variables. Equation (4.2) for non process part with low value of coefficient of correlation shows that costs of some construction activities are not subject to economies of scale factor. The costs of these items such as intake special structures, non process part and pipeline systems are significantly effected by other factors. The results of economies of scale factors are in the acceptable range, especially the one for process part is equal to value derived by Orlob et al (1958).

It should be emphasized of the magnitude of some major construction and OMR component costs for further recommendation. In the investment costs, cost of COAG-SEDI-RSF unit contributes 31.2 % of the process part and cost of lodging houses contributes

30.8 % of non process part. In OMR cost, salary is the major item. Salary contributes 39.5% and 85.8 % of production and service part respectively or it contributes 56.9 % of total OMR cost. Power contributes 33.9 % and 9.3 % of production and service part respectively or it contributes 24.7 % of total OMR cost. Chemicals contributes 15.9 % of production part or 9.9 % of total OMR cost. Maintenance and miscellaneous contributes approximately 8.5 % of total.

2. Design period for treatment plant used by PMSD is 10 years. This design criterion appears to be quite appropriate since the results of optimal design period with interest rate of 8 % for both arithmetic and geometric rate demand range for 9.8 to 9.9 year.

3. Acceptance of demand function $D = 28.23 P^{0.6}$ is permissible even through the value of R is low ($R = 0.33$) This is because size of sample is quite large ($N = 331$), and large degree of freedom ($\phi = 329$), value of R is not significant in the given confidence interval. By substituting value of P = 400 and 104,000 person, it was found that water demand rate is in the reliable range of 74 to 179 lpcd. which is suitable for urban and rural communities.

4. Constructed rate schedules were hypothetically calculated for one year period revenue requirement. The Procedures did not follow the manual suggested by AWWA because of different environmental conditions. For setting up new rates for real existence, incremental block rate policy was recommended. By using

this policy, it is found that poor families can receive adequate amount of water without much financial burden. Also there is an incentive to large customers to use water carefully as unit prices increases with increase in consumption and hence loss will reduce. Anyway, the rates should generate gross revenue in long term planning sufficing to provide adequate service, maintain and replace of the system.

Recommendation

The results give a clear picture of current water works practices in urban areas of Thailand. Followings are the recommendation extracted from this study for improvement in urban water works.

1. Using ground water sources

It is often found that quality of ground water is quite acceptable. The only treatment required is chlorination. Thus, it will reduce costs of 31.2 % of the process part for COAG-SEDI-RFS unit, raw water transmission pipe-line systems, and approximately 5 % of the production part for chemicals.

2. New system managements.

There are individual 166 existing water works. For new system, there will be about 80 water works according to provincial condition. Each water works will have several branches. The branch water works will require only executive and production

work to maintain the function and contact with customers. The works in service part will be proceeded by the headquarter. This system is possible because the number of new connections in each local area shown in Appendix F is not much and can be done by the headquarter regularly. When number of customers is quite large, the full scale of the branch may extend. It will reduce costs 32.2 % of the production for manpower and 30.8 % of non process part for lodging houses.

3. There will be a program carried out for providing an incentive in using tapped water in urban and rural communities.

It was found that leakage in urban pipe line systems was tremendously large. The leakage in pipe line systems in Udon Thani and Ubon Ratchathani are recommended for further study as to investigate the problems and how to solve them.