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GUIDELINES FOR
PROJECT MONITORING SYSTEM FOR PUBLIC UTILITIES PROJECTS

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GUIDELINES FOR
PROJECT MONITORING SYSTEM FOR PUBLIC UTILITIES PROJECTS

ABSTRACT

This paper introduces guidelines for a monitoring system which should be applied in all Public Utilities projects.

The system provides for presentation in appraisal reports of general indicators selected by the appraisal teams as being representative of key factors in the success of the project and the enterprise. Progress as measured by these indicators would be checked during project execution, and reflected in supervision reports.

Two annexes list examples of indicators which may be applicable in the Power and Water/Sewerage sectors. Suggested indicators for Telecommunications will be issued later.

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PROJECT MONITORING SYSTEM FOR PUBLIC UTILITIES PROJECTS

1. This paper attempts to set up the beginning of a flexible Public Utilities Project Monitoring System which is expected to develop and improve with experience. The basic elements of the proposed system as described below are a natural development of past Bank experience on appraisal, supervision and, more recently, operations evaluation work.

2. Appraisal reports usually contain: i) a number of key assumptions, or forecasts, regarding future developments (demand growth, revenues, expenditures, etc.), and ii) a number of goals or targets, to be achieved (labor productivity increases, connections, reduction of losses and outstanding bills, rate of return, etc.). In order to follow up in a more efficient manner both the accuracy of forecasting and the progress toward achievement of specified targets it has been generally agreed in the Bank that a Project Monitoring System should be developed in all sectors. The proposal is to select a few key indicators of performance in the course of appraisal, identify them in the appraisal report, discuss them with the borrowers during appraisal and loan negotiations, and follow up and report regularly on performance. This paper deals with such a system as it should begin to be applied in Public Utilities projects.

Monitoring System

3. About eight to ten key indicators will be selected in the course of appraisal to represent crucial features of the project and the borrower including construction, operation, management, organization, finance, training and other aspects. Some will be used to measure the achievement of agreed performance targets, others to check the development of significant forecasts. Both types should generally be present in every project. After preliminary discussion with the borrower during the appraisal, the indicators will be listed and clearly defined in a separate Annex of the appraisal report entitled "Monitoring Indicators". They will be further discussed, and agreed during negotiations. The borrower will agree to report periodically on all of the indicators as a part of its regular progress reports. If any of the indicators, particularly targets, are assumed by the borrower as obligations, they will be appropriately described in legal terms and made a part of the loan documents in the same way as in the past. At appropriate time intervals the Regional staff in charge of Project Supervision should report and comment specifically on the evolution of the indicators. It is expected that this information will eventually become part of the Supervision Summary reporting system applying to all projects in all sectors.

Indicators

4. In order to facilitate the appraisal teams' work we are attaching two Annexes containing some examples of indicators which might be appropriate in Power and Water/Sewerage projects. The list is only indicative and does not attempt to be complete. The staff concerned are expected to use their best judgment to further define the suggested indicators or include new ones which would apply better to specific projects. The appraisal report annex presenting the indicators proposed for each project should contain a definition for each one in enough detail to ensure that it will effectively, periodically, and as precisely as possible, measure the aspect of performance
in question. The forecast values of the indicators should also be shown in the annex, or a cross reference to another table in the report should be given.

5. As experience in the application of the Monitoring System grows, this paper and its attachments will be updated. In particular, after about a year of application a list of those Project Indicators which have been actually selected by the staff will be distributed.

6. As a final point, it should be emphasized again that the use of this monitoring system will only serve to highlight key project elements which are already a part of the appraisal and supervision process; thus its establishment should not entail significant extra work, nor would substitute existing practices regarding the use of particular covenants (e.g. rate of return) in loan documents, or of reporting requirements procedures.
Examples of Possible Power Sector Indicators

Remarks

1) As noted in para. 4 of the paper these examples are only indicative, the staff concerned are expected to use their best judgment to further define the suggested indicators or to include new ones which apply better to the projects. The appraisal report annex presenting the indicators proposed for each project should contain a definition for each one in enough detail to ensure that it will effectively, periodically and as precisely as possible measure the aspect of performance in question. The forecast values of the indicators should also be shown in the annex, or a cross reference to another table in the report should be given.

ii) Appraisal reports and reporting requirements always contain suitable plans for measuring performance on construction schedules, cost estimates and disbursement forecasts. Therefore no special monitoring indicators are given below for these aspects.

Staffing

1. Number of employees as related to specific targets (total or special categories such as engineers, accountants, etc.).

2. Number of employees per 1,000 connections.

3. Number of employees per MW installed in:
   3.1 Hydro generating plants
   3.2 Thermal generating plants.

4. Number of employees in transmission per Km of line.

5. Number of employees in distribution per GWh sold at distribution level.

6. Training indicators as referred to specific targets (participants, successful, kept in company, etc.).

System Operating Characteristics

7. KWh sales (by category).

8. Number of connections (by category).

9.1 Connections per 100 population in service area (define the area; urban/rural, breakdown is desirable where possible).
9.2 kWh sold per connection.

9.3 kWh sold per capita.

10. MNA of transmission and distribution transformer capacity / total generating installed capacity.

11. Generating plants availability by plant (hours or % per year - separate planned and accidental outages).


13. Peak demand (usually 30 minutes).

14. Load factor.

15. Thermal plant utilization by plant (energy generated / total energy capacity minus planned outages).

16. System reserve margin (define as adequate to the characteristics of particular system).

17. Transmission line faults in number per year per 100 Km at different voltage levels or transmission line outage time in circuit Kms (per voltage) per year.

18. Distribution faults per year and per 100 Km of distribution line.

19. Average BTU's per kWh generated.

Financial Indicators

20. Rate of return.


22. Debt/equity ratio.

23. Debt service coverage.

24. Net plant investment per MW of generating capacity (plant revalued as necessary, exclude work in progress).

25. Average net plant investment per GWh sold (plant revalued as necessary, exclude work in progress).

26. Average depreciation rate (annual depreciation charge / average gross plant excluding work in progress).
27. Weighted average repayment period of debt outstanding at year end.

28. Weighted average interest rate on debt outstanding at year end.

29. Operating revenue per unit of value of gross plant (total operating revenue ÷ gross plant excluding work in progress).

30. Operating revenue per connection.

31. Average revenue per kWh sold (total and by consumer class).

32. Cash operating expense per unit of value of gross plant (exclude depreciation).

33. Total operating expense per kWh sold.

34. Total employment cost per employee (salaries, wages, benefits).

35. Fuel cost per million BTU (US$ and local currency).

36. Number of average days bills outstanding (bills outstanding x 365 ÷ total billing for year).

37. Revenue effectiveness index

\[
\text{Revenue effectiveness index} = \left( \frac{\text{Revenue Collected}}{\text{Average Revenue Billed per kWh}} \right) \div \left( \frac{\text{Gross kWh Generated}}{\text{Gross kWh Generated}} \right)
\]

38. Internal cash ratio

(net operating income plus depreciation less debt service, less changes in non-cash working capital, less dividends, taxes, etc. ÷ gross plant investment, including work in progress.)
Examples of Possible Water/Sewerage Indicators

Remarks

1) As noted in para. 1 of the paper these examples are only indicative, the staff concerned are expected to use their best judgment to further define the suggested indicators or to include new ones which apply better to the projects. The appraisal report annex presenting the indicators proposed for each project should contain a definition for each one in enough detail to ensure that it will effectively, periodically and as precisely as possible measure the aspect of performance in question. The forecast values of the indicators should also be shown in the annex, or a cross reference to another table in the report should be given.

ii) Appraisal reports and reporting requirements always contain suitable plans for measuring performance on construction schedules, cost estimates and disbursement forecasts. Therefore no special monitoring indicators are given below for these aspects.

iii) Technical indicators are shown below separately for Water and Sewerage. Financial indicators are not differentiated.

A. WATER

Staffing

1. Number of permanent employees against targets (can be total or broken down by category such as: production/treatment, meter reading, billing and collecting, engineers, accountants, etc.).

2. Employees per 1,000 connections (excluding construction labor).

3. Employees per mgd produced, or sold or other parameters.

4. Number of people trained per year in agreed program (actual vs. agreed or other measure).

System Operations

5.1 m$^3$ of water produced.

5.2 m$^3$ of water sold.

5.3 \[
\frac{\text{Water Produced} - \text{Water Billed}}{\text{Water Produced}} \times 100 = \%
\]

6.1 Total number of connections.

6.2 Number of metered connections.
6.3 Number of connections by category and % metered, i.e. residential, industrial, etc.

6.4 Number of public hydrants, number of hydrants metered.

6.5 Number of new connections (total or by category).

6.6 Number of new street hydrants.

7.1 Connections per 100 population in area.

7.2 Number of people benefited directly.

8. Water billed/capita in area.

9. Water billed/connections (and/or by type of connection).

10. Peak day production.

11. Number and length of periods of no pressure or reduced pressure (separate for system as a whole, and specific parts).

11.1 Average daily hours of service, if intermittent.

11.2 Pressure range on system.

11.3 Number of system leaks repaired.

11.4 Number of meters repaired.
    Number of meters repaired/man day.
    Number of meters replaced.
    Number of meters installed (on new or on unmetered services).

12. Water source data.

12.1 Percentage of sources metered.

12.2 Data routinely collected, stored and usable, on river flows
    lakes and impoundments
    groundwater (drawdown, salinity, etc.).

13. Laboratory data produced and used.

For National or Specific Area Programs

14. Percentage or number of cities with public water service.

15. Percentage of people in urban population served by water from public system (house connections or house and hydrants).
16. Percentage or number of villages without access to safe water.

17. Percentage of village populations having reasonable access to safe water (specify distance to define reasonable).

18. (a) Number of systems completed during period (urban or rural).
    (b) Number of people benefitted.

B. SEWERAGE

Remark: Many indicators shown for water are applicable with slight modifications. In some cases change produced to collected or treated. Other specific sewerage oriented indicators are given below.

Sewerage Project Indicators

19.1 Water sold/sewage produced.

19.2 Water sold/sewage treated.

20.1 Sewer connections/water connections.

20.2 New sewer connections/year/1,000 population.

21. Percentage population served by direct sewer connections to public system.

22.1 \[ \frac{\text{BOD Influent} - \text{BOD Effluent}}{\text{BOD of Influent}} \times 100 = \% \text{ BOD removed by treatment.} \]

22.2 \[ \frac{\text{SS Influent} - \text{SS Effluent}}{\text{SS Influent}} \times 100 = \% \text{ SS removed by treatment.} \]

23.1 Cost/kilo (or other unit) of BOD removed.

23.2 Cost/kilo (or other unit) of SS removed.

24. Sewer investment/1,000 population.

25. Actual/potential house connections.


Financial Indicators (Water and Sewerage)

27. Rate of return.

28. Operating ratio.

29. Debt:Equity ratio.
30. Debt service coverage.

31. Net plant investment
   for water per average mgd produced
   for sewerage, per connection or per capita

   (plant revalued as necessary, exclude work in progress).

32. Average depreciation rate (annual depreciation charge average
gross plant excluding work in progress).

33. Weighted average repayment period of debt outstanding at year
   end.

34. Weighted average interest rate of debt outstanding at year end.

35. Operating revenue per unit of value of gross plant (total
    operating revenue ÷ gross plant excluding work in progress).

36. Operating revenue per connection.

37. Average revenue per m³ or 1,000 gal. sold-collected (total and by
    consumer class).

38. Cash operating expense per unit of value of gross plant
    (exclude depreciation).

39. Total operating expense per 1,000 gals. or m³ sold.

40. Total employment cost per employee (salaries, wages, benefits).

41. Number of average days bills outstanding (bills outstanding
    x 365 ÷ total billing for year). (By customer category if possible).

42. Revenue effectiveness index

   \[ \frac{\text{Revenue Collected}}{\text{gloss m}^3 \text{ (or 1,000 gal) produced}} \]
   \[ \frac{\text{Average Revenue Billed per m}^3 \text{ (or 1,000 gal)}}{\text{ }} \]

43. Internal cash ratio
   (Net operating income plus depreciation plus any non-operating
   net revenues, less debt service, less changes in non-cash
   working capital, less dividends, taxes, etc. ÷ gross plant
   investment, including work in progress).

44. Inventory turnover.