MANAGEMENT INFORMATION SYSTEM
FOR A WATER UTILITY IN ALBANIA

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Abstract: A MIS for the Water Supply and Sewerage Utility of Pogradec (WSSP) was designed after carefully studying the current reporting routines and obligations within WSSP and to external institutions. Whereas financial reporting was found to be quite satisfactory the reporting of the technical departments was considered insufficient.
Therefore, detailed data acquisition routines were defined for the necessary availability of technical and service data on a monthly basis.
For the design of the MIS a top down approach was used. A set of 25 report forms were developed. The structure of the MIS is hierarchical so that reports on lower levels can be aggregated into higher level reports. The overall business performance is documented on a monthly basis by general performance indicators, financial performance indicators and service level performance indicators.
The performance of the first quarter of 2004 was 24%, 40%, 48%, 78% and 29% respectively. These numbers show considerable room for improvement.
A stepwise implementation of the MIS was recommended to familiarise the management with the system and to allow necessary changes and appropriate adaptations due to practical reasons and in time: Establish an operational data base, implement the MIS (pilot version), create management reports from basic data and gain experience, extend MIS according to growing demand and experience and integrate software components and systems within WSSP.

Keywords: Water Utility, Performance Measurement, MIS

ARNAVUTLUK'DA SU REZERVİ VE KANALİZASYON HİZMETİ İÇİN YÖNETİM ENFORMASYON SİSTEMİ

Özet: Pogradec'in Su Rezervi ve Kanalizasyon Hizmeti (Water Supply and Sewerage Utility of Pogradec-WSSP) için bir yönetim enformasyon sistemi (YES), WSSP'inin içindeki ve dış kurumlardaki yürürlükte bulunan raporlama rutinleri ve zorunlulukları dikkatli bir şekilde incelendikten sonra tasarlanmıştır. Finansal raporlar bir hayli tatmin edici bulunurken teknik departmanların raporları yetersiz görülmüştür. Bundan dolayı ayrıntılı veri elde etme rutinleri, aylık bir temelde teknik ve hizmet verilerinin gerekli kullanılırlığı için tanımlanmıştır. YES'nin tasarımı için yukarıdan aşağıya bir yaklaşım kullanılmıştır. 25 rapor formundan oluşan bir set geliştirilmiştir. YES'nin yapısı hiyerarşiktir, böylelikle daha alt düzeydeki raporlar daha yukarı düzeydeki raporlarla toplanabilir.
Detaylı iş performansı aylık bir düzende şu göstergelerle belgelenmektedir; genel performans göstergeleri, finansal performans göstergeleri ve hizmet düzeyi performans göstergeleri.
2004'ün ilk çeyreğinin performansı sırasıyla %24, %40, %48, %78, ve %29dur. Bu değerler bir iyileştirmenin mümkün olabileceğini göstermektedir. YES'nin adım adım gerçekleştirilmesi; yönetimi sisteme alıştırmak, gerekli değişikliklere ve pratik sebeplerden doğan uyarlamalara izin vermek için kullanılmıştır. Bununla birlikte aşağıdaki uygulamaların gerçekleştirilmesi tavsiye edilmiştir: operasyonel bir veri tabanının kurulması, YES'nin gerçekleştirilmesi (pilot versiyonunu), temel verilerden yönetim raporları yaratmak ve deneyim kazanmak, artan talep ve deneyime göre YES'ni geliştirerek, yazılım bileşenleri ve sistemlerini WSSP'nin içinde entegre edebilmek

Anahtar Kelimeler: Su Hizmeti, Performans Ölçümü, YES

I. INTRODUCTION

Because of its high biodiversity and its unique cultural heritage, Lake Ohrid is of tremendous local and international significance. Population growth and development have impacted the lake in many ways. These include intense fishing pressures, destruction of the reed beds and other natural habitats around the shoreline of the lake, and the introduction of pollutants, especially phosphorus, into the lake water [1].

The common problems of Lake Ohrid encouraged the governments of Albania and Macedonia to start the Environmental Protection of Lake Ohrid Project in 1998 in order to conserve and protect the natural resources and biodiversity of Lake Ohrid by developing and supporting effective cooperation between Albania and Macedonia for the joint environmental management of the Watershed.

Within this overall context the German Kreditanstalt für Wiederaufbau (KfW) supports the Water Supply and Sewerage Utility of Pogradec (WSSP) in the improvement and establishment of appropriate infrastructure (e.g. sewerage treatment plant) and in strengthening the institutional capacity (e.g. management consultancy).

The MIS expert mission was undertaken as part of the "Management Consultancy Services" to WSSP. Within the frame of these services the author visited WSSP three times:

- September 8 to 19, 2003.

- November13 to 26, 2003.

- April 14 to 27, 2004.

II. TERMS OF REFERENCE

The WSSP is receiving management consultancy services in the overall framework of the "Environmental Protection of Lake Ohrid" Project. According to the terms of reference (TOR) of the project [2] it was required to develop and implement an adequate MIS to monitor actual performance against targeted performance and budgets/plans.

Upon the first arrival of the MIS expert in Pogradec the TOR were discussed and the details specified:

- Major elements of MIS

  - Billing and Collecting,

  - Financial information,

  - Materials management,

  - Technical information.

- Objectives and achievements

  - Develop overall structure for the information flows and a general MIS for internal and external purposes,

  - Elaborate a detailed implementation procedure for a selected billing and collecting system,

  - Sensitise the staff as to information requirements,

  - Reduce information flow hindrances within WSSP,

  - Implement the MIS.

- Suggested steps and activities

  - assess the current reporting system,

- review the external reporting obligations,

- identify the information flow needs,

- develop an operational reporting system (internal and external),

- develop all-level information flow charts,

- harmonise internal and external reporting,

- implement the MIS,

- train department heads on the information flow and reporting concept.

III. DEVELOPMENT APPROACH

A phased approach was chosen for the development of the MIS:

- Phase 1: Organisational Analysis.

- Phase 2: Reporting Analysis.

- Phase 3: MIS Design.

- Phase 4: MIS Implementation.

Phase 1: Organisational Analysis

In phase 1 the organisational structure of WSSP was analysed in detail. The main business processes were analysed and documented.

The functionality and appropriateness of the existing IT systems for accounting and store management were investigated.

Phase 2: Reporting Analysis

In phase 2 all reports presently prepared by the staff of WSSP were collected, analysed and documented. For the analysis such criteria were used as

- Type of report,

- Frequency,

- Source,

- Destination,

- Main contents,

- Processing,

-   Quality and accuracy.

Phase 3: MIS Design

In the design phase a top down approach was used. Starting with the mission statement of WSSP [3] a hierarchical set of performance indicators [4] were derived to measure and monitor the performance of all relevant processes of the business.

Report forms were designed for a monthly reporting system. These forms were transferred into EXCEL-worksheets. The data acquisition procedures were documented (monthly reports for department heads) and the availability of data tested.

Phase 4: MIS Implementation

Two training seminars for staff members were held in November 2003 and April 2004. A training manual was prepared in Albanian. The report forms were filled with figures for the first quarter of 2004 and the system was finally handed over to the new assistant to the director of WSSP.

IV. ORGANISATIONAL ANALYSIS

The organisational structure of WSSP changed whenever the expert came to Pogradec. Finally WSSP consisted of four departments: Water, Wastewater, Finance&Administration and Customer Service.

The business processes analysed and partly documented are (Figure.1and 2):

-   Key processes: Water production, distribution network maintenance and repair, sewer maintenance and repair, sales and services.

-   Technical support processes: Procurement and store, workshop.

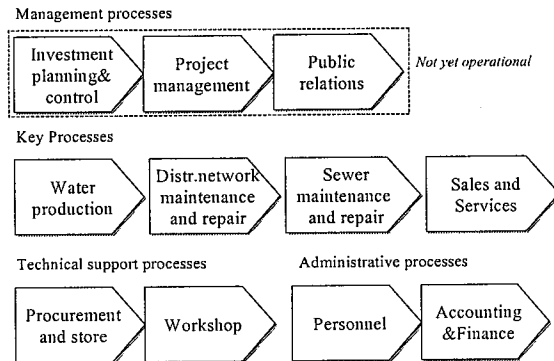-   Administrative processes: Personnel, accounting and finance.
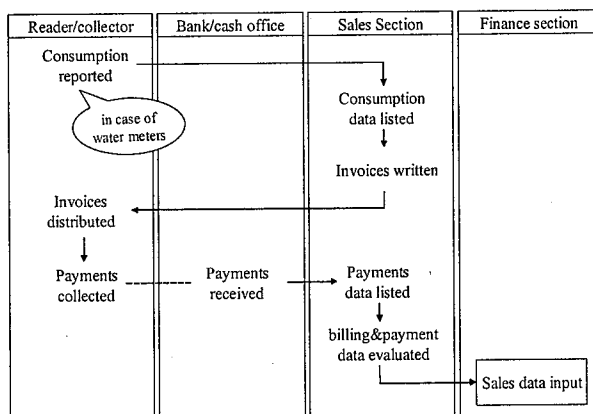

Figure.1. Essential Business Processes

Figure.2. Work Flow Billing and Collection

The functionality and appropriateness of the existing ITsystems for accounting and store management were investigated (s. chapter V).

V. REPORTING ANALYSIS

The present reporting system of WSSP is very simple and focuses on basic needs only (Figure.3). Reporting obligations to external offices are just met. Altogether 18 such reports were identified and analysed.

No	Reporting unit	weekly	monthly	annual	others
0	General management				
1	Technical branch		xx		daily
1.1	- Water quality	x			
1.2	- Pumping stations				
1.3	- Village				
1.4	- Network maint. and reservoirs				
2	Financial branch		xxx	xxx	quarterly
2.1	- Sales		x		
2.2	- Store				x
2.3	- Finance		s. Fin. branch (2)		

xxx = various reports

Figure.3. Reporting Overview

External report obligations exist to the:

- Supervisory Board,

- Pogradec Municipality,

- Korca Prefecture,

- Ministry of Finance,

- Ministry of Economy,

- Ministry of Territory, Adjustment and Tourism.

There is no routine for regular internal reporting. Reports are only submitted on request of external offices. Technical defects are registered in a diary (name, address of informant and defect). Because of lack of funds investments are rare, the main emphasis lies on water production, water distribution and defect handling and repair of the water distribution and sewerage networks.

Tree times a day the "water quality" is controlled in five different places of the supply area. Only the chlorine content is measured in mg/l. If the chlorine content measured is too high or to low the chlorine input is adjusted accordingly. Other quality controls are performed by the external sanitary office.

Reporting Water and Waste Water Departments

Key figures that reflect the activities of the department should be reported on a regular basis:

- water production,

- water distribution

- water supply and consumption,

- water quality,

- installation of water meters,

- connections/disconnection of clients,

- technical defects.

Therefore, it will be necessary to establish a database favourably computer-based for

- basic reporting,

- defect handling and cost of repair,

- project planning and controlling.

A form for monthly reporting was proposed. The same form can also be used for a more frequent reporting (e.g. per week). It was also agreed, to set up a defect register (or data base).

Reporting Finance & Administration Department

Accounting is computerised. The software system in use, QuickBooks, offers customers, vendors, employees and banking components or add-on software that could be utilised for the purpose of WSSP.

Calculations of costs based on the provided services or based on the utilities in use are presently not available. QuickBooks, however, can also be used for cost allocation in three dimensions: projects, activities/departments and cost type. The system is reliable and simple to use. QuickBooks expertise is locally available and it is supposed to be widely used in Albania.

All basic documents are produced. Report obligations to external offices are met.

Not only external report obligations should be met in the future. To manage a company professionally a detailed costing and controlling system should be established that allows cost allocation in the a.m. three dimensions: projects, activities/departments and cost type. In addition, budgets and estimates (planned figures) can be introduced to allow effective controlling.

The functionality of the QuickBooks software system is such that it also allows catering for client management (data base, billing and payments), payroll (salaries etc.) and other administrative procedures.

The latest version of the self tailored ACCESS application for store management was analysed and checked. The system is a simple and straight foreword application of MS-ACCESS. All together three files were used: one for the basic data of stock items, one each for change of stock events (ingoing and outgoing). The data base is thus not normalised, which would ease handling by inexperienced users and reduce data redundancy and inconsistencies.

The existing MS-ACCESS application for store management was improved and extended:

- improved data structure,

- additional reports,

- more comfort and user friendliness,

- data security.

The new system was presented to the Financial Director and tested accordingly. Necessary changes and requested adaptations were made. The person in charge of the system was informed and training organized.

Reporting Customer Service Department

No computerised sales/client data base exists. All data is handled manually, even bills are handwritten. Reminders (households) go with the current bill. Monthly sales report shows overview of billing and payments per client category and location.

Open accounts per client are available for Pogradec town since 1997 on an annual basis (EXCEL files):

- The debts per client are in general considerably high.

- Any payments are booked FIFO (first in = first out) wise, starting with the earliest unpaid bill.

- No interests are taken.

- It is not known whether any of these debts are critical or not.

All in all most of the required data seems to be available for effective reporting. Possibilities for extension (village data) were also discussed. The available sales data were analysed and reports were produced. The reports were used as examples during MIS training. A revised form for monthly reporting was recommended.

WSSP is - more or less - a single product enterprise. Main focus, therefore, should concentrate on a well designed and well maintained client data base containing client, water meter, client account and administrative data as well as bill processing. It has been recommended previously to either implement an own software system for the billing or to outsource these services. A final decision has been made recently in favour of outsourcing.

In addition, standard consumption/billing and a detailed settlement of accounts once per quarter or year is recommended.

A register book for customer requests or complaints was proposed and appropriate data structures were designed.

VI. MIS DESIGN

For the design of the MIS a top down approach was used (Figure.4 and 5). A set of 25 report forms were developed. The structure of the MIS is hierarchical so that reports on lower levels can be aggregated into higher level reports. The business performance is documented on a monthly basis by

- general performance indicators,

- financial performance indicators and
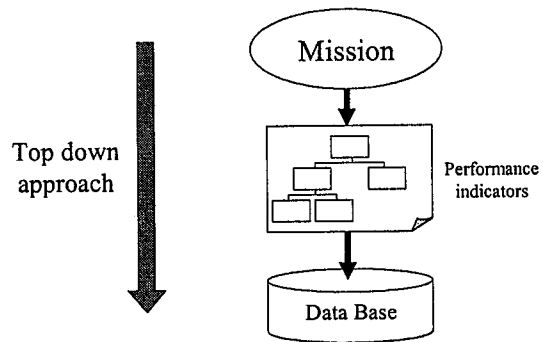
- service performance indicators.
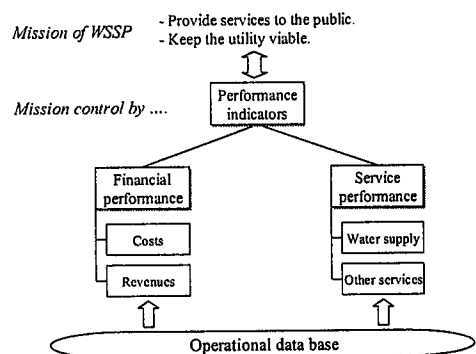

Figure.4. Development Approach

Figure.5. General Structure of the MIS

The general performance indicators are:

- Percentage of technical losses and wastages = 1 - total consumed/total produced.

- Percentage of under billing = (total consumed - total billed)/total produced.

- Billing efficiency = Total billed/total consumed.

- Collection efficiency = Total collected/total billed (including all payments for overdue bills).

- Percentage of production paid = Total collected/total produced.

The performance of the first quarter of 2004 was 24%, 40%, 48%, 78% and 29% respectively. It was

agreed that for the time being the collection efficiency should be calculated twofold:

- total collection efficiency (total payments collected during that month)

- relevant collection efficiency (only payments collected for bills issued previous month)

The relevant collection efficiency for the first quarter was 64%. These numbers show substantial room for improvement.

For planning purposes it must kept in mind that these indicators are interrelated. E.g. losses and under billing depend on the other three indicators:

- Perc. of technical losses = 1 − prod. paid / (bill.eff. * coll.eff.)

- Perc. of under billing = (1 − losses)*(1 − bill.eff.)

Computers are not essential for implementation but can help. They help to design forms or to write reports, but a fully computerized MIS would be a far too challenging task. It was rather recommended to use computerized subsystems (e.g. for store management, financial accounting and billing) whenever applicable. Step by step single components could be integrated into a comprehensive system.

The report forms were designed as EXCEL-Worksheets and translated into Albanian to ease usage and to support routine calculations and data aggregation.

VII. MIS IMPLEMENTATION

A stepwise implementation is recommended to familiarise the management with the system and to allow necessary changes and appropriate adaptations due to practical reasons and in time:

- Establish an operational data base.

- Implement the MIS (pilot version).

- Create management reports from basic data and gain experience.

- Extend MIS according to growing demand and experience.

- Integrate software components and systems within WSSP.

All data that is readily available has to be incorporated into the system at the very beginning. For an effective application of the MIS missing data should be added as soon as possible. As soon as the scope of business expands the data base has to be extended accordingly.

Before implementation, however, the operational data bases have to be properly developed and maintained to provide the data input for the MIS. It was, therefore, recommended to immediately start with the setup of the operational data bases, especially for the technical departments:

- weekly/monthly activity reporting of departments,

- introduction of suitable defect registration and monitoring procedures,

- vehicle and equipment reporting.

A first MIS seminar and workshop was held within the premises of WSSP on November 22nd, 2003:

- Presentation: Purpose and characteristics of a MIS.

- Workshop: Performance measurement.

- Presentation: Structure of a MIS for WSSP.

- Workshop: MIS and day-to-day recording of operational data.

- Presentation: Implementation of a MIS for WSSP.

- The training material was made available in English and Albanian.

The training was successfully repeated on April 23/24, 2004 in Ohrid under the supervision of the new director of WSSP and during a visit of a KfW delegation. It was agreed to use the MIS also as a basis for regular reporting of performance to the KfW. The director and the staff members accepted the proposed report forms and confirmed the usability of the MIS.

VIII. GENERAL RECOMMENDATIONS

Changes in procedures are difficult to implement, especially if additional effort is needed for the daily routine of the staff. Motivation and training of staff is a prerequisite. In addition, management support is needed for ongoing and sustainable improvements of practices.

Because of growing responsibilities (new office building and site, water meter installations, investments in distribution network and sewerage plant) the present administrative routines have to be adapted, improved and extended.

In addition, the new organisational structures, new functions and training of key personnel have to be implemented.

All stand-alone computers in the head office should be LAN-connected and linked to a common data server. Appropriate provisions should be made for the new office building. All relevant data should be stored on a central server to reduce the number of files owned and used separately and to allow multiple accesses. The key staff has to be trained in the proper use of MS-EXCEL. Training capacity is locally available.

A local IT-consultant should be contracted for developing ACCESS based systems for defect monitoring and for complaint registration as a basis for calculating service level indicators (e.g. response times).

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