

**Internship Report on**

**“Implementing Automation by Digitization of Information Systems**

**At Dhaka WASA”**

**Submitted To:**

#### **Dr. Dhiman Kumar Chowdhury**

#### **Professor and Chairman**

Department of Accounting & Information Systems, Faculty of Business Studies

University of Dhaka.

**Submitted by:**

Shyed Shahriar Housaini

ID: 10916046

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**Letter of Transmittal**

Date: 25/04/2022

Dr. Dhiman Kumar Chowdhury

Professor and Chairman

Department of Accounting & Information Systems

Faculty of Business Studies

University of Dhaka.

**Subject: Submission of Internship Report.**

I am here by submitting my Internship Report, which is a part of the MBA Program curriculum. It is great achievement to work under your active supervision. This report is titled- “Implementing Automation by Digitization of Information Systems at Dhaka WASA”.

I have got the opportunity to work as an Engineer at Dhaka WASA both in projects and in operation and maintenance divisions. While preparing this report, I have tried my level best to include all the relevant information, explanations, things I learned from the organization, my contribution to the organization to make the report informative and comprehensive. It would not have been possible to complete this report without your assistance, of which I am very thankful. This job gave me both academic and practical exposures. I learned about the organizational culture, working procedure of a prominent public water supply utility of the country, this also gave me the opportunity to develop a network in the public sector. It would be my immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Therefore, I pray and hope that you would be kind enough to accept my Internship Report and oblige thereby.

Sincerely Yours

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Shyed Shahriar Housaini

ID: 10916046

University of Dhaka.

**Acknowledgment**

I would start by thanking my honorable internship supervisor Dr. Dhiman Kumar Chowdhury who has provided me with the necessary guidance needed to complete this internship report. Without his help it would not be possible for me to compile necessary information, make necessary adjustments to finish the report in time. I am also deeply grateful to him for allowed me to choose an organization for internship according to my job.

I would like to thank Dhaka WASA colleagues for all their support, necessary tips and guidelines during the internship period and the entire divisional team for being helpful and supportive in every little help I needed and for creating the opportunity for me to bring out my best performance.

I would like to express my sincerest gratitude to my family members and friends who always encouraged me for my higher studies and successful result.

**Executive Summary**

This report is an overview of my internship job experience at Dhaka WASA. During my job I have learned a lot about working with various stakeholders at public sector, public relations, Digitization of information systems, Digitalization of work process and its different applications. I have known about the work flow of public projects and public organizations, along with the functions the management and accounting department performs.

I have learned to work in a public utility corporate space which not only enriched me professionally but also helped me grow personally as well. My contribution was appreciated by my supervisor and other members of the department. I have had a great opportunity to practically see how automation and digitization sector is working and evolving in Bangladesh.

This report has been presented based on my observation and experience gathered from the company. The organization has many projects, divisions and departments but the focus is given more on the Technical, Engineering, Automation and Digitization works of various Department. This report mentions about the overall procurement process for automation, financial information of those divisions and vendor management in Dhaka WASA.

However, this report has been written in a short time. I have tried my level best to make it meaningful by reflecting my works at Dhaka WASA. After knowing the scenario of automation process and information management and financing related to automation at Dhaka WASA, I came up with some important deductions. The report also consists recommendations and conclusion according to my point of view, which I think would improve the organization in the automation aspects.

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***CHAPTER 01 – INTRODUCTION***



**1.1 Background / Origin of the report:**

This report is a partial requirement of the Internship program of MBA program of – Department of Accounting & Information Systems, Faculty of Business Studies, and University of Dhaka. The main purpose of internship is to get the student exposed to the job world of the business managers. Being an employee & intern, the main challenge was to translate the real life experience into theoretical concept and write a report. The internship program and the report have following purposes:

* To get and organize detail knowledge on business processes of the organization.
* To experience the real-world business activities.
* To fulfill the requirement of MBA program.

This report is the result of three months long internship program conducted in Dhaka WASA and is prepared as a requirement for the completion of the MBA program of university. As a result, I need to submit this report based on the **“Implementing Automation by Digitization of Information Systems at Dhaka WASA”**. This report also includes writing on the overview of the organization, the products and services of Dhaka WASA, and also what factors they consider while selecting automation for different purposes.

**1.2 Objective of the report:**

The objective of the report can be viewed in two forms:

* General objective
* Specific objective

General Objective: The internship report is prepared primarily to fulfill the Masters of Business Administration (M.B.A) degree requirement under the Faculty of Business Studies, University of Dhaka.

Specific Objective: More specifically, this study entails the following aspects:

* To give an overview of Dhaka WASA.
* Look at various works related to automation of various divisions and financial information.
* To identify the policies and cost for implementing automation into management process.
* To find out bottleneck of automation process with effective solutions to overcome the limitations.
* To make some recommendations regarding implementation of automation effectively and efficiently.

**1.3 Significance of the report:**

Other than pointing out the key factors for Automation of to the management, it will also be useful to employees, management practitioners, automation industry and the society as a whole. Employees can find out in which direction the management is going and based on the organizational environment what should be their future preparations. Management practitioners can gain important insights regarding the areas for improvement in similar sectors. Automation industry and Technology-vendors/bidders can also benefit from the outcomes of this study by getting an indication of where to focus resources and efforts for business opportunities. Finally, the society at large will benefit from improved customer services, if the findings help improve overall atmosphere of the organization.

**1.4 Methodology of the report:**

**Framework of the report:**

The whole report has been arranged in nine specific parts. Part one named as Introduction, which includes the origin, objectives, significance and methodology of the report. Part two named as Organization Overview, which includes the description of the overall organization of Dhaka WASA. Part three named as Job experience which includes my job responsibility and activities in the organization as employee for past ten years. Part four points out key areas of automation. Part five discusses about. Part six mentions the digitized processes and services. Part seven includes case study of automated AIS and billing. Part eight includes recommendation and conclusion and Part nine is Appendix.

**Target population:** The target populations for the study are –1. Internal employees. 2. Vendors of the organization. 3. Consumers 4. Key executives of Dhaka WASA. 5. Government Regulators 6. International Agencies

**Study Area:** The study will be conducted within the organization to study the automation process of Dhaka WASA.

**Data Sources:** For the information of the report mainly both type of internal and external - primary, secondary and tertiary sources of data have been collected. For accurate study we have to follow some rules & regulations. The study materials were collected from these sources:

**Primary sources**: Data which is considered as first-hand information collected by a surveyor, investigator, etc. is defined as Primary Data. The sources from which such data is collected is termed as the primary source of data collection for the concerned information. Primary sources of data consist various data collected by-

1. Analysis of Practical work, Job responsibilities. Face to face conversation with the co-workers and informal interview with the employees of Dhaka WASA.
2. Direct observations of DWASA activities- Zonal office & Project works, Services.
3. Interview with Customers, Vendors & Consultants.

**Secondary sources:** Data that has already been collected, analyzed, published and has undergone statistical treatment can be defined as Secondary data. Such type of data is tailored from primary data sources.Secondary sources including

1. Files & folders in work computers have been used for this purpose. Digital copies of file notes, survey reports, estimates, drawings, contracts etc.
2. Old project files, letters, papers and old work documents, design and drawing papers.
3. Official letters, notices, circulars, organization reports and publications collected & maintained by office or record section.
4. Dhaka WASA information from the official websites.
5. Internal Study report, Masterplan on DWASA automation- Central SCADA committee.
6. Presentation materials and training manuals from DWASA training center and trainers.

**External sources:** Some external sources (Some are also known tertiary source) were also used various report and documents published by government units or development partners. – a) Newspapers & news websites, various Water Utility related Websites. b) Automation guidelines and user manuals of international companies. c) Textbooks and External Research or Study reports on WASA and SCADA and Automation.

**1.5 Limitation of the study:**

While doing this project I had to face some limitations. These are as follows-

* To perform employee survey involved in Accounting and Revenue/Billing Departments became very hard because I was not directly involved with the Accounting and Revenue/Billing Departments team; rather I worked with engineering team.
* Some employees were not willing to co-operate with external study.
* All the Information is not easily accessible or not permitted to disclose according to the organization policy, rules and regulations had been followed on the disclosure of confidential information.
* It was also difficult to collect information from different vendors of automation works.
* I also faced problem in communicating with my University Internship supervisor, Employees, Management members and Vendors of Dhaka WASA- face to face, due to COVID-19 situation.



*CHAPTER 02 - ORGANIZATION OVERVIEW*



Dhaka Water Supply and Sewerage Authority (WASA) is a service oriented autonomous commercial organization in the Public Sector, entrusted with the responsibility of providing water supply, sewerage disposal (wastewater), and storm water drainage service to the urban dwellers of Dhaka City. It covers more than 360 sq. km service area with more than 20 million people with a production capacity of 2650 million liters water per day (MLD). Dhaka WASA was established in the year 1963 as an independent organization and currently which is running under the WASA ACT 1996. The First Water Treatment Plant in Dhaka City Established in 1874 - Chadnighat –WTP.

**Legal Framework:** Under the order No. 19 of the East Pakistan Ordinance No. XIX of 1963 Dhaka WASA was established. Later in 1996, Dhaka WASA Act (Act No. 6 of 1996, 17 August 1996) was promulgated to formulate and implement the rule of corporate management.

**Dhaka WASA Organization Mandate:** To ensure Water Supply, Treatment and Disposal of Wastewater (sewage) and Storm Water Drainage. As an autonomous body Dhaka WASA started its journey with the mandate to effect (EP Ordinance NO. XIX, 1963) a) Supply of water b) Disposal of sewage c) Storm water drainage and d) Solid waste management

**Water Sources:** Major River System and Water Sources in Dhaka City: Padma, Meghna, Buriganga, Shitolokkha. Ground Water – Water present beneath earth’s surface aquifer is pulled up to surface.

**2.1 Organizational Profile:**

**Organizational Structure:** Dhaka WASA is under the supervision of - Ministry of Local Government, Rural Development and Co-operatives, Local Government Division of that ministry of the People's Republic of Bangladesh. The organizational structure of Dhaka WASA was changed according to the WASA Act 1996. As mentioned in the Act, Dhaka WASA Board consists of 13 members, headed by the Chairman. The Board is formed by representatives from different professional organizations and Government officials. According to the organizational structure of 2007, total number of approved posts and present employees are as follows:

**Manpower at a glance**

|  |  |  |  |
| --- | --- | --- | --- |
| Class | Approved Posts | Existing Posts | Vacant Posts |
| First | 309 | 221 | 88 |
| Second | 331 | 260 | 71 |
| Third | 1917 | 1079 | 838 |
| Fourth | 2111 | 1340 | 771 |
| Total | 4668 | 2900 | 1768 |

**Area of Jurisdiction:** All the extended areas of Dhaka South City-Corporation and Dhaka North City-Corporation.

**Dhaka WASA New Demand Areas Forecast**

|  |  |  |
| --- | --- | --- |
| Year | Population (Million) | Area (Sqkm) |
| 2025 | 21.6 | 1000 |

**2.2 Mission & Vision:**

**Vision:** To be the 'Best Water Utility' in the Public Sector of South Asia-Ensuring an environment-friendly, sustainable and pro-people water supply management system.

**Mission:** A) To reduce the dependency on ground water. B) To implement the projects effectively and speedily. C) To practice a corporate culture in its management and operation. D) To ensure a high level of transparency and accountability in all its service and activities. E) To improve the efficiency and reduce operating cost. F) To constantly seek way to serve our customers.

**Activities at DWASA:** Mostly, water supply system of Dhaka WASA is dependent on ground water. Around 78 per cent water comes from underground sources and the rest 22 per cent from surface water. Ground water is abstracted by using a total of 923 deep tube wells. Surface water is supplied by treating water of the river Shitalakshya and Buriganga through 4 Water Treatment Plants. Dhaka WASA supplies water to the mega city of Dhaka city and Narayanganj area. At present over 20 million people live in Dhaka and Narayanganj and this will increase many times by the year 2050.

It is notable that ground water level is declining by 2-3 meters per year due to continuous abstraction of water. Several water treatments plants projects have already been taken with a view to increasing dependency on surface water up to 70 percent. Saidabad Water Treatment Plant, Phase-Ill is under implementation, which will supply a total of 450 million liters water per day in the city. Furthermore, two additional large Water Treatment Plants at Gandharbpur and Padma (Josholdia WTP) Water Treatment Plant, (Phase-I) have been taken. In Gandharbapur, it is planned to treat water from the river Meghna, which will produce 500 million liter of water per day. The Padma Water Treatment Plant is being built at Josholdia near the bank of the great river Padma from where 450-million-liter treated water will be supplied for Dhaka city dwellers. Dhaka WASA has 410 (including 42 mobile generators) diesel-driven generators. Dhaka WASA has taken initiatives for purchasing two hundred new generators which is under process. Moreover, if there is any water crisis anywhere in the city, Dhaka WASA instantly supplies water by using 43 water carrier trucks and 44 tractor trolleys.

**Sewerage System:** The sewerage system of Dhaka city was initiated in 1923. Number of Operating Sewage Treatment Plant – 2 (Pagla , Dasherkandhi). Number of Proposed Additional Sewage Treatment Plant – 3 (in Uttara, Mirpur, Rayerbazar). Number of Sewage Lift Station – 26. Sewer Line - 934 km. Number of Sewer Connection - 88,980

**2.3 Dhaka WASA at a glance:**

Demand and Supply of Water by Dhaka WASA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Population (In million -  approximately) | Water Demand (Million Liter) | Water Supply Capacity  (Million Liter) | Shortage (Million Liter) | No. of Deep Tube  wells |
| 1963 | 0.85 | 150 | 130 | 20 | 30 |
| 1970 | 1.46 | 260 | 180 | 80 | 47 |
| 1980 | 3.03 | 550 | 300 | 250 | 87 |
| 1990 | 5.56 | 1000 | 510 | 490 | 216 |
| 1997 | 8.0 | 1350 | 870 | 480 | 225 |
| 2000 | 8.5 | 1500 | 1130 | 370 | 308 |
| 2001 | 10.0 | 1600 | 1220 | 380 | 336 |
| 2005 | 12.15 | 1940 | 1460 | 480 | 418 |
| 2009 | 14.15 | 2120 | 1880 | 240 | 518 |
| 2011 | 15.00 | 2240 | 2150 | 90 | 599 |
| 2013 | 15.00 | 2250 | 2420 | - | 644 |
| 2015 | 15.80 | 2250-2300 | 2420 | - | 702 |
| 2017 | 17.00 | 2450 | 2500 | - | 827 |
| 2019 | 20.10 | 2500 | 2600 | - | 886 |
| 2021 | 20.10 | 2520 | 2740 |  | 923 |

**Water Supply Infrastructure**

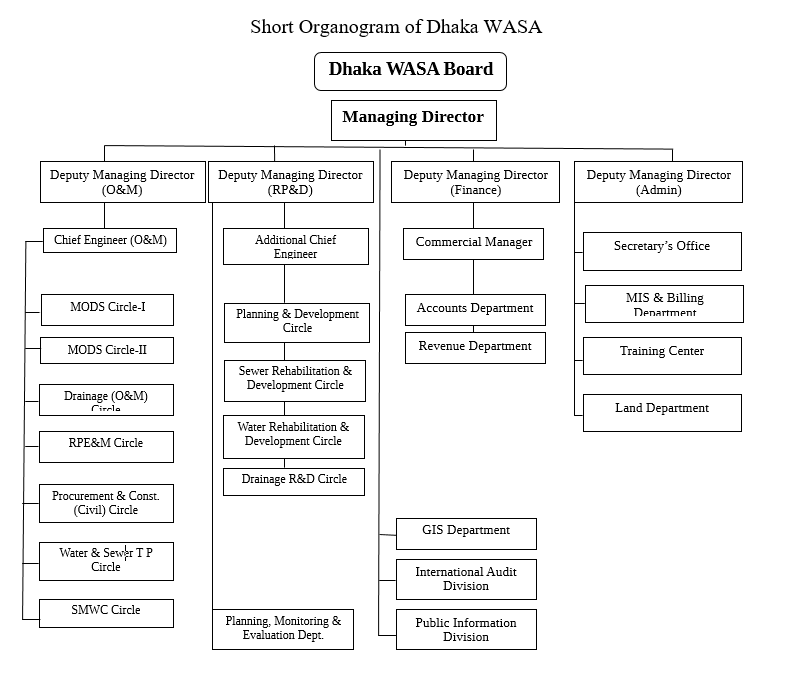
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Item | Unit | 2017-2018 | 2018-2019 | 2019-2022 | 2020-2021 |
| Deep Tube Well | Nr | 795 | 827 | 887 | 896 |
| Water Treatment Plant | Nr | 4 | 4 | 4 | 5 |
| Water Production/Day | MLD | 2450 | 2500 | 2550 | 2560 |
| Water Line | Km | 3600 | 3720 | 2550 | 2560 |
| Water Connection | Nr | 371766 | 379686 | 390642 | 392400 |
| Overhead Tank | Nr | 38 | 38 | 38 | 38 |
| Street Hydrant | Nr | 1643 | 1643 | 1643 | 1643 |

**Water and Sewerage Billing and Collection (In Million Taka)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 2017-2018  (In Lack Taka) | 2018-2019  (In Lack Taka) | 2019-2020  (In Lack Taka) | 2020-2021  (In Lack Taka) |
| Billing | 105285.95 | 1191110.47 | 13062 | 13679.20 |
| Collection | 100055.82 | 117942.50 | 13067 | 12813.06 |
| Bill Receivable (Dues) | 44711.09 | 45881.06 | 4584 | 7661.46 |

**Water Tariff**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Category | 01/11/2017  To  31/07/2018 | 01/8/2018  To  30/06/2019 | 01/7/2019  To  30/06/2020 | 01/7/2020  To  30/06/2021 | 01/07/2021 |
| Domestic | 10.00 | 10.50 | 11.02 | 14.46 | 15.18 |
| Commercial | 32.00 | 33.60 | 35.28 | 40.00 | 42 |
| Industrial | 32.00 | 33.60 | 35.28 | 40.00 |  |
| Community | 10.00 | 10.50 | 11.02 | 14.46 |  |
| Government | 32.00 | 33.60 | 35.28 | 40.00 |  |





***CHAPTER 03 – SERVICES &***

***JOB RESPONSIBILITIES***



Dhaka WASA is a service oriented public, autonomous authority, which as a part of Local government division provides services of Water supply and Sewer waste water disposal. Dhaka WASA did not collect any service charge for providing Storm Drainage services. Dhaka WASA received drainage development fund and only a part of operation cost from LGRD & Co ministry.

**3.1 Drainage Operation and Maintenance works:**

* At the start of my work at DWASA, on 2010 November - I was posted as Assistant Engineer at Drainage (Electrical & Mechanical) Division. That Drainage (E & M) division was created on 2008 and was responsible to mainly operating and maintenance of 4 permanent and various seasonal or temporary storm water pumping facility at various places of Dhaka City.

**Job Responsibilities:**

1. Worked at Various Pumping /Lifting Stations of Canals and Many more Temporary/Mobile Pumping Facilities of Dhaka city under Electrical and Mechanical division at Dhaka Drainage Network Operation and Maintenance division.
2. There were permanent pumping stations at Old Dhaka -Mill Barakh Dholaikhal-Burigangah point; Janapath-Titipara- Maniknagar area Pumping station on the Segunbagicha Canal, Rampura Pumping station on east side of Rampura bridge on Begunbari canal, another pumping station at Kallianpur regulating pond area pumping out to Turag River. I mainly looked after Titipara -Maniknagar and Rampura -Begunbari Pumping stations. There were 20 to 25 temporary pumping stations established during rainy seasons, at various points and at the edge of Dhaka City to drain out storm water.
3. Planning, Tendering, Evaluating, Procurement or Purchase for Drainage Electrical-Mechanical Operations and Maintenance Works. Supervise over DWASA staff and contractors at work and quality control.
4. There were Electric motor driven pumps and Diesel Engine driven pumps. But mostly electric ones were used where there was electricity available. Diesel pumps were problematic and operational cost was high .Also operation and maintenance of a truck mounted crane which helped in various lifting works at DWASA.

* Sub-Divisional Engineer (Operation & Maintenance) Division-1, Drainage System of Dhaka city (March 2013). There were 10 kilometers of Open Canals and Box-culvert and 190 km pipe storm sewer drain line and more than 2000 manholes to maintain under this division, Drainage Operation and Maintenance – 1 (Operation and Maintenance of Pipe Drainage, Box-Culverts and Canals network of Dhaka to keep the water flowing specially during rainy season).

**Job Responsibilities:**

1. Planning, Budgeting, Tendering, Evaluating, Procurement or Purchase for Drainage Operations and Maintenance Works.
2. Supervise over DWASA staff and contractors at work and quality control. Plan and schedule cleaning activities for DWASA cleaners to clean all drainage units- pipe lines, box culvert, canals, manholes, pits etc. Excavation and Re-excavation of canals. Eviction of illegal structures canal land or other property of Dhaka WASA drainage facilities.
3. Manual tendering, evaluation, Notification award, contracting- system was being phased out and paperless, web portal based time and work saving- tendering system were being introduced. I was the first person in my division to implement e-GP and also, I trained other colleagues to work with that system.

* Sub-Divisional Engineer, UDDP - Urban Dredging Demonstration Project. (Operation and Maintenance of Pipe Drainage and Canals network of Dhaka) With co-operation of Vitens Evides International – Dutch water Operators (Netherlands) and Water operator partnership /WOP, based upon MOU with Dhaka WASA.

**Job Responsibilities:**

1. Urban Drainage / cleaning of Pipes, Box Culverts and Canals dredging and Sediment deposition and removal monitoring management with online/web-server base WIT software and mechanized equipment (floating bulldozer, Excavator etc) and drainage inventory/asset management software system. Attempts were taken to modernize, mechanize drainage works.
2. Introduction of digital GIS system and software. Working to gather information previously unknown or not used. Example – Waste water sample collection, water testing to determine content, mobile gas analyzer, sedimentation data collection and digitization for storing etc.
3. This project also tried to popularize mechanization and Automation at various levels of our work by arranging various meetings and seminars which I also attended.

* Executive Engineer (Dec 2018 - Jun 2019). Five Canal Development Project by Land Acquisition of Manda, Baishteki/Journalist colony, Kurmitola, Hazaribagh, Begunbari Canals with Excavation and Re-excavation.

**Job Responsibilities:**

1. Preparing various documents maps, drawing, list of land owner related to land acquisition work, contacting with related stakeholders, government authorities, local people.
2. Planning, Tendering, Evaluating, Procurement or Purchase for Drainage Electrical-Mechanical Operations and Maintenance Works. Excavation and Re-excavation of canals. Eviction of illegal structures canal land or other property of Dhaka WASA drainage facilities.
3. Budgeting, Financial management of project funds. Easy and time saving Automated web portal-based file, note, reporting, letter drafting & distribution system was introduced. I also updated my work and also improved my skills.

**3.2 Sewer Projects Works**

* Executive Engineer, Sewer (R & D) Project Executive Engineer, Sewer (R & D) Project, (Nov 2017 - Jul 2019) Sewerage System Rehabilitation and Development Project works for Dhaka.

**Job Responsibilities:**

* 1. Planning, Tendering, Evaluating, Procurement or Purchase for Drainage Electrical-Mechanical Operations and Maintenance Works, Managing Construction works of pipe sewer lines and manholes at old Dhaka area.
  2. Ensuring safety and security of the workers and the people or property nearby the work site, as the sewer lines were being constructed at more than 10- 15 feet deep trenches.
* I was also responsible as an Executive Engineer (Additional charge) Jan 2021 - Apr 2021 · 4 months, at Dhaka Sanitation Improvement Project. Working on improvement of Sanitation system- Sewer network and Lifting stations and Pagla sewerage treatment plant at Narayanganj. Upgrading the Pagla STP from 120 mld to 600 mld capacity (mld = million liters per day) was the main focus. Almost 15 KM trunk main sewer line construction was also planned. Construction of pipe sewer collection network was also part of the project.

**Job Responsibilities:**

1. I was mainly involved in the preparation phase of this project. My main duty was to help the project director with preparation of Tender documents, technical documents of large packages. I also prepared documents for required land acquisition for a sewer lifting station at Golaphbagh, Dholaipar area.
2. I also helped the project team to prepare documents, specifications and BOQ for small office restoration and reconstruction civil works, vehicle procurement, office equipment and procurement of Computers and related equipment.

**3.3 Planning and Design Division Works**

* Executive Engineer at P & D (E & M) Division. Planning and Design works related to Electrical and Mechanical equipment.

**Job Responsibilities:**

1. Planning Electrical & Mechanical works as needed by various divisions of Dhaka WASA.
2. Drawing, Designing, preparing specification, tender evaluation for Electrical & Mechanical works or supplies. Inspection & Testing for Quality assurance of various works and supply.
3. Supervision, Inspection and Management of Work-site and Office works, Inspection of various works related to implementation of automation for water production and distribution system. Example – SCADA, VFD, PLC, HMI, Sensors etc were specified and inspected for quality control.

**3.5 Training received from DWASA:**

During past 10 years of my work at Dhaka WASA, I have received many trainings related to work. Some of the trainings I received are listed below: -

1. At the start of my job at Dhaka WASA, I was placed in an orientation training course and was informed about overall structure and scope of work and business process, DWASA Act 1996 and DWASA regulations 2010 by DWASA.
2. Public Procurement Act 2006 & Public Procurement Rules 2008 by DWASA training center.
3. Office management, Leadership, Staff management trainings by DWASA and training center.
4. Project planning, management and implementation by training center, Web and Computer based E-GP and digital web-based file/Nothi management by DWASA, Microsoft office suite software package by DWASA and training center.
5. Budget planning, budget management and implementation by training center, Planning, Modeling and Designing of Draining system by Vitens Evides International and training center, Asset and Inventory management by software-based systems by Vitens Evides International, Vei-Dutch Water Operators and DWASA, Water distribution network - design, operation and maintenance by Water Operators Partnership.
6. Gender role in Water policy making by Water Aid Bangladesh, Water & Gender Alliance.
7. Procurement management, PPR PPA, local and international bidding, vendor management, contract management – 21day training hosted by Engineering Staff College.
8. Office manner, staff development, personal skill development by training center.
9. Time management and Emotional Intelligence by training center, Personal and Official financial management by training center, Divisional procedures by training center.
10. Non-revenue water management and implementation of SCADA by training center.
11. Organization management and Leadership Training by WOP and MDF consultant & Training center.



***CHAPTER 04 - Digitized & Automated Systems and Services at Dhaka WASA***



**Advantages of Automation:**

1. Reduced costs 2) Save time. 3) Better Customer. 4) Enhanced workflow. 5) Satisfied employees. 6) Better situational. 7) Better quality service. 8) Automation also promotes consistency. 9) Improved Insight of organization. 10) Embrace new & better technology. 11) Reduce system loss and unethical practices. 12) Improve Span of control.

**4.1 DWASA Web sites & Web pages:**

**DWASA Web Site & pages show following information:** Main Menu – About DWASA, Rules and Regulations, Project Reports, Master Plan, Reports about DWASA, Gallery, Webmail, Contacts pages, Notice Board – Various notices about DWASA or matters related to DWASA internal or external issues, National Integrity Strategy of Bangladesh and DWASA activities pages, Dhaka WASA Citizen Charter pages, Annual Performance Agreement (APA) pages, Grievance Redress System pages, Right to information pages, DWASA Innovation Corner pages, Water tariffs and connection fees, Office orders, Pages about tenders, Official travels, passport, government orders pages, Reports, Career pages, Public information pages, Miscellaneous pages, Bank List, Central e-services, DWASA Hotline, Important links, site map etc. This web site is maintained by MIS division of DWASA.

**Web Portal, Web application & Internal and External Web services:**

DWASA Web Portal services for Clients and Employees- Water and Sewer Connection Application, Personal Deep Tube-Well Application, WASA billing website, WASA bill online Payment, Supply Chain Management, [Info of IT Return Submission under 108A](http://27.147.238.114:9999/pridebook/#/login), PIMS, Official Residence / Quarter Allocation, Maintenance Management Software, [SCADA](http://www.dwasa.org.bd/site/view/internal_eservices), Digital Map, Web Mail, Land Estate Management Software, Vehicle Management Software, [Software for Public Information Division Usage](http://192.168.111.175/), [Bottle Plant Management Software](http://27.147.238.114/login), Dhaka WASA Central Store, Employee Leave, Pension, Loan, Salary and Income Tax Statement & Certificates etc.

**4.3 Dhaka WASA Mobile APP:**

DWASA mobile application is now available for Android and iPhone mobile service. We can view all DWASA water and sewer bills through one app and pay all due bills from the application by only a few taps. DWASA mobile application is the first water and sewer bill payment application in Bangladesh. Customers can easily download DWASA mobile App to experience the easiest DWASA bill payment in Bangladesh.

**Features:** View DWASA water and sewer bill, pay due DWASA water and sewer bill, Pay DWASA new connection and private deep tube well connection fees and demand note payment, pay yearly deep tube well permission renewal fee, DWASA complain feedback etc.

**4.8 District Metered Area (DMA) Approach and Non-Revenue Water (NRW) Reduction in DWASA:**

Almost 144 years ago these pipe lines was constructed and became leaky causing 40-45% of non-revenue water. Due to this leakage the water demand of city dwellers cannot be fulfilled and on the other hand Dhaka water supply & sewerage authority (DWASA) are not getting the revenue also. For example, if the water production is 3.0 crore liter which can fulfill the water demand of 200,000 people) per day but due to leakage 1.35 crore liter (which fulfill the water of 90,000 people) water is unaccounted for and only 1.65 crore liter (which fulfill the demand of 1, 10,000 people) can be supplied to the households. So, producing 3.0 crore liter water for 2, 00,000 people per day only 1 10,000 peoples are served. Due to this unaccounted-for water it become difficult to supply water to the people causing water crisis and this become serious especially in hot season. Only 59% of homes had water meters, and those were often inaccurate or inaccessible to meter readers. Surveys showed that 90% of slum dwellers were using DWASA-supplied water through illegal channels. Physical losses topped 50%; with improper metering, in a low-pressure, intermittent supply system, those losses were difficult to quantify accurately. The water that did reach consumers, DWASA was collecting only 62% of revenues. Only one-third of the water entering the system was ever paid for.

The situation has become challenging to meet the rapidly increasing water demand in parallel to the rapid urbanization & development of Mega City, Dhaka. With course of time Dhaka WASA water supply system was moving towards unsustainable and unmanageable state due to inadequate system water pressure, use of suction pump, plenty of unidentified leakages and illegal connections, poor water quality, high system loss 40% -45%. So, it is clear that water supply system cannot be improved unless and until the Non-Revenue Water (NRW) can be reduced.

For this purpose, a pilot project was initiated in 2007 under a Technology Assistance project by Asian Development Bank (ADB) in Manikdi area of the city where NRW was 45%. Under the project 7 km water line was rehabilitated and 500 nos. of house connection was shifted from old water line to new one. After commissioning it was observed that the NRW became 12%. The consultant found similar circumstances across the system and concluded the network needs rehabilitation to prevent significance loss of water.

To cope up the challenge to ensure safe water for the city dwellers with customer's satisfaction in terms of water quantity, quality, system pressure; technically sustainable, economically viable approach introduced through DWSSDP in 2011. Dhaka WASA implemented the DWSSDP with financial assistance full for from ADB & GoB.

The project aims to ensure sustainable, more reliable and improved water supply services through strengthening distribution networks and capacity building for better operation & management of the network by introducing of District Metering Areas DMAs) to ensure 24/7 pressurized water supply in the network at 1-bar or more, to reduce the water loss to 15% or less, and Improve Water Quality. District Metered Area (DMA) is a technical term to define a hydraulically isolated small area from big network system with its own water supply system and distribution network for a community which can be isolated from remaining network without affecting supply system of other areas but with facilitating surplus water to adjacent water deficit areas. Dhaka WASA started establishing DMAs in 7- Zones, with a target of about 145 DMAs. So far established 54 DMAs and remaining 91 DMAs are in progressing. The amazing achievement of established DMAs is becoming a great focus to the customer and Dhaka WASA management. Most of the parameters, data or information needed to monitor DMA will be collected, monitored and controlled by SCADA system by sensors, valves, gates, meters, pressure regulators and pumps etc.

In a 2016 Citizen Report Card Survey after completion of project, in all 11 DWASA zones, nearly 82% of the respondents reported no service failure in the previous 12 months and 12% noted only one service failure. Forty-four percent said that the compatibility between their bills and services received was “good”; 36% found the value for services “acceptable.” As a service provider, DWASA was rated “good” by 47% of those who replied to the survey. Volume, pressure, continuity of supply, and quality of water, the majority said, was “excellent” (2%), “very good” (18%), or “good” (37%).

**DWSSDP, DMA & SCADA Financing:**

The DWSSDP was funded with at a total project cost of USD 212.7 million including taxes and duties of USD 16.1 million. About 70.5% (USD 150 million) of the total project cost was funded with loan facility from the Special Funds Resources (SFR) of the Asian Development Bank (ADB). The Government of Bangladesh however, counterpart funded the rest 29.5% of the total cost (USD 62.7 million) of the project. The counter fund includes cost elements covering land acquisition, remuneration of counterpart staff, office accommodation, taxes and duties, resettlement cost, part of the civil works and other miscellaneous costs.

The repayment period for the loan facility by the government of Bangladesh was fixed within 32 years, a grace period of 8 years, and an interest charge of 1.0% per annum during the grace period and 1.5% per annum thereafter 5 Further, agreement was reached to relend loan proceeds to DWASA under repayment term period of 20 years which includes a 5-year grace period and an annual interest rate of 5%. Also, the Government of Bangladesh would bear all foreign exchange risks which was costed at USD 35.4 million.

|  |  |  |
| --- | --- | --- |
| Item |  | Amount  (USD Million) |
| A | Base Cost  Part a: Distribution system and quality improvement  Part b: Capacity building and institutional strengthening  Part c: Project management and Implementation support | 160.4  8.3  17.1 |
|  | **Subtotal (A)** | **185.8** |
| B | Contingencies | 23.2 |
| C | Financing Charges during Implementation | 3.7 |
|  | **Total** | **212.7** |

**E-Government Procurement (e-GP) and Online Nothi or File portal:**

**About e-Government Procurement (e-GP) System:** National e-Government Procurement (e-GP) portal (i.e. [https://www.eprocure.gov.bd](http://www.eprocure.gov.bd/) ) of the Government of the People’s Republic of Bangladesh is developed, owned and being operated by the Central Procurement Technical Unit (CPTU), Implementation Monitoring and Evaluation (IME) Division of Ministry of Planning. The e-GP system provides an on-line platform to carry out the procurement activities by the Public Agencies - Procuring Agencies (PAs) and Procuring Entities (PEs).

The e-GP system is a single web portal from where and through which PAs and PEs will be able to perform their procurement related activities - (i.e. For Public Offices - Annual Procurement Plan, Tender Notice, Tender Document, Document selling and tender document/Security money collection via third party / Banks, Estimate/Bill of Quantities, Conditions, Specifications, Tender Opening, Tender Evaluation, Bidder selection and approval, Notification of Award, Performance Guarantee money collection via third party/Banks, Contract management etc.- creation and approval process without any paper or physical process delay. This portal saves a lot of time, effort and money in the process.) using a dedicated secured web based dashboard. The e-GP system is hosted in e-GP Data Center at CPTU, and the e-GP web portal is accessible by the PAs and PEs through internet for their use. This complete e-GP solution introduced under the Public Procurement Reform (PPR) Program is being supported by the World Bank and gradually used by all government organizations. This online platform also helps them ensuring equal access to the Bidders/Tenderers and also ensuring efficiency, transparency and accountability in the public procurement process in Bangladesh.

**For bidders / Tenderers it provides online platform for** – Give information about planned works all over Bangladesh– this increases their work opportunity, Tender Notice buying, Tender document submission, Document management, Financial / Bank management, Bidding, contract management.

**Online Nothi or File portal for office work:** This portal (<https://dwasa.nothi.gov.bd/>) provides Single Online Portal for – Almost every official work that were being done with manual paper based letters, applications, documents, files – now can be done online on this portal paperless manner saving huge amount of time also.

**Water ATM:**

In the past water from various deep tube wells were being sold to the local people illegally. It is forbidden to sell DWASA water without the supervision or management of DWASA and only DWASA can collect revenue of water. But some people were taking advantage of temporary water shortages at various places by selling DWASA water and taking away the revenue from sold water. To stop this, DWASA has taken a very modern measure. Dhaka WASA has signed and MoU with an international NGO working in water sector to take steps to sell water from deep tube wells in a legal way. Customer has to buy a smart card. When customers want to buy water, they will have to insert the smart card into the water ATM machine and water will start pouring out for them. Taking out the card will stop the water flow. Per liter water is sold - taka 0.40. Revenue from RFID card and water sell will go to DWASA.

**Water ATM Financial Mapping:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | Number Of System Installed | Number Of System Online | Total No. Of Card sold | Total No Of card sold amount | Customer Recharge | Total Revenue | O&M Bill | Dhaka WASA Payout |
| 2017 | 6 | 6 | 3,615 | 1,084,500 | 1,033,190 | 2,117,690 | 760,000 | 1,357,690 |
| 2018 | 62 | 62 | 14,658 | 4,397,400 | 12,623,734 | 17,021,134 | 9,834,239 | 7,186,895 |
| 2019 | 127 | 124 | 31,629 | 4,611,650 | 34,656,067 | 39,267,717 | 33,310,247 | 5,957,470 |
| 2020 | 198 | 181 | 41,382 | 3,817,400 | 44,506,452 | 48,323,852 | 58,589,578 | -10,265,726 |
| 2021- Feb | 198 | 173 | 8,828 | 459,250 | 7,394,465 | 7,853,715 | 9,703,107 | -1,849,392 |
| 2021-June | 240 | 211 | 32,957 | 2,679,650 | 26,067,772 | 28,747,422 | 20,846,084 | 7,901,338 |

**Obligations of DWASA:** To pay all the necessary expenses according to contract documents.

**Obligations of Drinkwell vendor:** Design, build & operate water ATM at various deep tube well pump houses to provide purified drinking water to customers and stop illegal water selling.

**Opportunity of Automation at ‘Shanti’ Bottle Water Plant:**

**Project Description:**

|  |  |
| --- | --- |
| Project Name : DWBWS Project | Project Cost : BDT 16.93 Crore |
| Construction Start : 25.11.2004 | Construction Complete : 30.06.2006 |
| Capacity : 10000 ltr./hr. (4000 ltr/hr washing) | Product Brand : “Shanti” |

**Fixed Asset:** Injection Machine: 6 Set, Blow Machine: 4 Set, Filling machine (Semi-auto): 4 Set, Wrapping Machine: 3 Set, Ozone Generator: 2 Set, Water Treatment Plant: 1 Set, UV disinfection unit: 4 Set, Cooling Tower: 2 Set, Date Coding Machine: 3Set, 20 Liter Jar Washing Machine: 2 Set.

|  |  |
| --- | --- |
| **Profit – Loss FY: 2020-2021** | |
| Item Description | Taka (Lakh) |
| EXPENSE | |
| Raw material | 111.846 |
| Operational Cost (outsource & Master role Salary) | 65.191 |
| VAT & SD | 35.49 |
| Electricity, Telephone, Fuel, Water etc | 41.849 |
| Office Expense, Conveyance, Honorarium, OT etc | 14.393 |
| In FY 2020-21, 5% depreciation of the Fixed Asset (131.995) | 6.599 |
| Total Expense | 275.013 |
| INCOME | |
| Sales | |
| Total Income | 217.851 |
| Loss | = 57.162 |

|  |  |
| --- | --- |
| **Profit – Loss FY: 2021-2022 (27th Oct-21)** | |
| Item Description | Taka (Lakh) |
| EXPENSE | |
| Raw material | 19.317 |
| Operational Cost (outsource & Master role Salary) | 16.470 |
| VAT & SD | 9.09 |
| Electricity, Telephone, Fuel, Water etc | 10.301 |
| Office Expense, Conveyance, Honorarium, OT etc | 5.639 |
| In FY 2020-21, 5% of the Fixed Asset (12.434) | 0.621 |
| Total Expense | 61.438 |
| INCOME | |
| Sales | |
| Total Income | 73.88 (Oct-21) |
| Profit | = 12.442 |

**Cost Analysis in Taka:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Cost Items | 0.250 L | 0.5 L | 1.0 L | 1.5 L | 2.0 L | 5.0 L | 20.0 L |
| 1 | Bottle (PET) | 2.37 | 3.03 | 4.48 | 5.656 | 7.53 | 18.01 | 0.00 |
| 2 | Cap | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.02 | 1.36 |
| 3 | Hanger | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.35 | 0.00 |
| 4 | Body Label | 0.52 | 1.02 | 1.04 | 1.32 | 2.77 | 3.26 | 0.93 |
| 5 | Wrapping | 0.50 | 1.00 | 1.50 | 1.86 | 2.70 | 5.75 | 0.00 |
| 6 | Security Seal | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.60 |
| 7 | Chemical | 0.001 | 0.002 | 0.004 | 0.005 | 0.006 | 0.007 | 0.1 |
| 8 | Power | 0.067 | 0.133 | 0.26 | 0.26 | 0.533 | 0.533 | 0.533 |
| 9 | Gas & Oil | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.00 |
| 10 | Salary | 0.08 | 0.107 | 0.107 | 0.107 | 0.107 | 0.107 | 0.107 |
| 11 | Consumable Item Cost | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0 |
| 12 | Maintenance | 0.01 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| 13 | (10%) Capital Investment | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 14 | Raw Water | 0.01 | 0.02 | 0.04 | 0.06 | 0.08 | 0.2 | 0.80 |
| 15 | Overhead- 1% | 0.04649 | 0.0643 | 0.0855 | 0.10389 | 0.1485 | 0.30308 | 0.0547 |
| 16 | Depreciation (5%) | 0.23477 | 0.3249 | 0.4319 | 0.52464 | 0.7498 | 1.53055 | 0.276235 |
| 17 | Total Cost | 4.93026 | 6.8222 | 9.0694 | 11.0175 | 15.745 | 32.1416 | 5.80 |
| 18 | SD | 0.24651 | 0.3411 | 0.4535 | 0.55088 | 0.7873 | 1.60708 | 0.290047 |
| 19 | VAT | 0.77652 | 1.0745 | 1.4284 | 1.73526 | 2.4799 | 5.06231 | 0.913647 |
|  | Grand Total Cost | 5.9533 | 8.238 | 10.95 | 13.304 | 19.01 | 38.811 | 7.00463 |

**Prices:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Size** | **Plant Rate (TK)** | **Trade Price (TK)** | **Max Retailed Price (TK)** |
| 1 | 250 ml | 6.00 | 7.00 | 10.00 |
| 2 | 500 ml | 9.00 | 10.00 | 15.00 |
| 3 | 1000 ml | 13.00 | 15.00 | 20.00 |
| 4 | 1500 ml | 16.00 | 18.00 | 25.00 |
| 5 | 2000 ml | 20.00 | 22.00 | 25.00 |
| 6 | 5000 ml | 40.00 | 45.00 | 65.00 |
| 7 | 20,000 | 40 | 50 | 70 |

15% VAT & 5% SD Applicable for 250ml -2000ml bottle water, Only 15% VAT Applicable for 5000ml -20000ml bottle or water.

**Automated Services:** 100% Online Sale (POS), Payment. 100% Online Store Inventory. BWPP Plant under CCTV Coverage. 100% Procurement by e-GP. 100% e-nothi introduced. Biometric Attendance of all staffs and workers. A LIMS or laboratory information management system software is on and production software is in progress.

**Modernization Recommendation:** a) Introducing cost effective bottle (Less weight & short neck) and Short Cap to reduce cost. b) Advertisement & awareness campaign in Electronic & Print Media led by -Professional marketing wing or resources. c) Change old Chinese Machineries (Injection, Blowing, Filling etc semi-automatic, more than 15 years old), which requires too much troubleshooting & high maintenance & operating cost, labor cost & partial operation hour. d) Build up professional & skilled manpower / technicians. e) Invest into automated production machines will increase production 300 % and reduce labor, material, operation & maintenance cost by 50%. In 2020 it was estimated that 5 production lines will cost 10,00,00,000 taka to be fully automated with modern European machines.



***CHAPTER 05 – AUTOMATION at MIS, AIS & GIS DEPARTMENTS***



**Management Information System (MIS):**

The MIS, plays a vital role in the management, administration and operation of an organization. The system ensures that an appropriate data is collected from the various sources, processed and send further to all the needy destinations. The system is expected to fulfill the information needs of an individual, a group of individuals, the management functionaries: the managers and top management. A MIS needs to have the necessary components in order to collect, process, store, and retrieve the needed information to deliver to leaders.

MIS department at Dhaka WASA pays as the main actor in the field of Automation, Digitation and Computerization. MIS and Billing department performs almost all the works, procurement of goods and services for Networking, Hardware and Software purchase, Operation and Maintenance is done by MIS department art DWASA.

Most of the DWASA communication and IT structure and computers, servers, internet, database, software, data center, digitized records are created and maintained by MIS. DWASA Geographical Information System (GIS), Accounting Information System (AIS), Internal Audit, Planning, Revenue Divisions, Billing Division, Administration department also uses services of MIS.

MIS and billing department is allocated average yearly budget or around 6 to 7 Crore taka.

**Work & Budget Allocation for MIS & Billing Department**

|  |  |
| --- | --- |
| Ministry | LGRD & Co-operative |
| Division | Local Government Division |
| Agency | Dhaka WASA |
| Procuring Entity | Senior Systems Analyst (MIS & Billing Dept.), Dhaka WASA. |
| Method of procurement | Most of the works will be done by Direct Procurement Method (DPM) and |
| Approver | Work will be approved by Head of Procuring Entity or Managing Director. |
| Budget Source | Own Fund / Revenue |
| Budget Heads | Allocation (Lakh Taka) |
| 1. Computer Repair & Maintenance | 3.06 |
| 1. Repair & Maintenance | 151.00 |
| 1. Computer Purchas | 491.96 |
| Total Allocation (amount in Lakh Taka) | 646.02 |

**ANNUAL PROCUREMENT AND WORK PLAN, FINANCIAL YEAR 2020-21**

|  |  |  |
| --- | --- | --- |
| **S/N** | **Description of Procurement package** | **Cost in TK.** |
|  |  | Contract Amount (TK.) |
|  | Software |  |
| 1 | Online PIMS Software Development | 3,35,000 |
| 2 | Pension Software Development and Online Bank Payment Service update of Billing System | 1,65,000 |
| 3 | Land and e-Lab Software Development | 5,00,000 |
| 4 | Accounting Software purchase and Development for Accounts Division of Dhaka WASA. | 37,50,000 |
| 5 | Online Electricity, Gas and Others Billing Information Preservation and Management software of Dhaka WASA. | 1,76,400 |
| 6 | Mobile application Development of Dhaka WASA. | 5,46,525 |
| 7 | Real-time Online Billing Software Upgradation. | 19,50,000 |
| 8 | Private DTW and Water New Connection Security System. | 4,39,500 |
|  | **1 – 8 Carried over from previous year** |  |
| 9 | Audit Software Upgradation | 4,50,000 |
| 10 | Digital Archiving of Employee Information of Dhaka WASA | 8,00,000 |
| 11 | Residence Management software | 8,00,000 |
| 12 | Private DTW, Store Inventory and Water New Connection Annual Maintenance Contract | 1,50,000 |
| 13 | PIMS, Pension, Payroll System Upgradation. | 5,00,000 |
| 14 | Loan Approval Process, Loan and Payroll Data Migration Tools | 9,00,000 |
| 15 | Enhancement work of Private Deep Tube well | 3,00,000 |
| 16 | Complaint Management Software for FM Division | 10,00,000 |
|  | Software Sub total | **12,762,425** |
|  | Hardware |  |
| 17 | Computer, Printer, Scanner, UPS & Laptop for Revenue Department | 91,00,000 |
| 18 | Line Printer for Billing Print | 1,96,00,000 |
| 19 | Purchase of a Multifunction color printer for the office of the Chief Revenue Officer of Dhaka WASA. | 3,98,640 |
| 20 | Purchase of Desktop computer offline UPS, Power Strip for Accounts Department and a mini Projector (Portable) for the Chairman of Dhaka DWASA | 5,17,525 |
| 21 | Online UPS Servicing of Computer Center Server Room | 1,57,550 |
| 22 | Photo copier Printer Servicing for Revenue Zone-5 of Dhaka WASA. | 19,200 |
| 23 | Computer, Printer, Scanner, UPS & Laptop for All other Department of Dhaka WASA. | 60,00,000 |
| 24 | Hardware Accessories for Regular Maintenance. | 2,95,000 |
|  | Hardware sub-total | **3,60,87,915** |
|  | Networking |  |
| 28 | Online Billing (Internet VPN-Central Internet 530mbps) Connection among Revenue, MODS and other Dept. of Dhaka WASA. | 26,71,200 |
| 29 | 200MBPS Backup Internet Connection for WASA Bhaban | 10,08,000 |
| 30 | 5 mbps Internet Connection | 60,000 |
| 31 | Grameenphone Data Connectivity bill for backup billing connection of Dhaka WASA. | 1,44,000 |
| 32 | 2 no Network and Hardware Technician | 8,20,115 |
| 33 | 5mbps Data Connectivity for Revenue Zone-11, Narayanjonj. | 61,800 |
| 34 | Security Devices Collection for Revenue Zones of Dhaka WASA | 7,95,000 |
|  | 28 – 34 Carried over from previous year on Network |  |
| 35 | Update and New Billing Network Establishment for Revenue Zone-2 and 4 | 5,74,625 |
| 36 | Update/New Billing/Internet Network Establishment for Accounts, Central Laboratory Dasherkandi and Land Dept. of Dhaka WASA. | 3,95,650 |
| 37 | Update and New Billing Network Establishment for Revenue Zone 6 and Devices for regular maintenance of Dhaka WASA. | 4,95,350 |
| 38 | Update and New Billing Network establishment for MODS Zone8, Eater (R&M) Div-1, Sydabad Phase-3. | 4,93,050 |
| 39 | 50mbps internet connection establishment in Savar-Keranigonj Wellfield plant. | 5,33,500 |
| 40 | Network Accessories for Regular Maintenance | 14,00,000 |
| 41 | Billing and Internet Network Upgradation for Revenue, MODS, DMA Manager and other Departments. | 20,00,000 |
|  | Networking Sub total | **1,14,52,290** |
| 42 | Emergency Allocation | 42,99,500 |
|  | **Grand Total=** | **6,46,02,130** |

**ANNUAL PROCUREMENT AND WORK PLAN, FINANCIAL YEAR 2021-22**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Budget Source | | | Own Fund / Revenue | | |
| Allocation for MIS & Billing Department | | | | | |
|  | | |  | | |
| Budget Heads | | | Allocation (Lakh Taka) | | |
| 1. Computer Purchase | | | 526.44 | | |
| 1. Computer Maintenance | | | 100 | | |
| 1. Call Center Cost | | | 73.15 | | |
| 1. Rest of the amount of Budget of 2021-2022 of MIS & Billing Dept. (Serial No 3 to 10) | | | 10.58 | | |
| Total Allocation (amount in Lakh Taka) | | | 710.17 | | |
| **Summary** | | | | | |
| Budget Head | | Budget Allotment | Budget estimated for purchasing goods | | Emergency fund |
| Computer Purchase | | 526.44 | 512.11 | | 14.33 |
| Computer Maintenance | | 100.00 | 100.00 | | 0 |
| Call Center Cost | | 73.15 | 0.00 | | 73.15 |
| Sub Total | | - | 612.11 | | 87.48 |
| **Total** | | **699.59** |  | |  |

|  |  |  |
| --- | --- | --- |
| **S/N** | **Description of Procurement package**  **(Works/Goods)** | **Estimated Cost in Lakh TK.** |
|  |  |  |
|  | **Networking** |  |
| 1 | Online Billing (Internet VPN-Central Internet 530mbps) Connection Among Own Fundenue, MODS and Other Dept. of Dhaka WASA. | 11.00 |
| 2 | 200 Mbps Backup Internet Connection for WASA Bhaban (Mango) | 5.40 |
| 3 | 5 mbps Internet Connection for AMR | 0.60 |
| 4 | 50 mbps Internet connection establishment in Savar-Keranigonj Wellfield plant. | 1.80 |
| 5 | Internet and Security device for Integrated Water Operative Center (IWOC) at WASA Bhaban | 1.38 |
| 6 | Purchase of required network accessories for managing director sir division of Dhaka WASA. | 5.76 |
| 7 | Purchase of Internet bandwidth centrally for online billing and internet related service among Own Funded Zones, MODS Zones and All other departments of Dhaka WASA. | 30 |
| 8 | Purchase of required network accessories for MODS Zone-3, Magistrate Court-2 and DESWSP of DWASA. | 5 |
| 9 | Network equipment purchase for regular maintenance ant various dept. of DWSAS. | 80 |
| 10 | Network Switch and Router purchase for DWASA Bhaban | 37 |
|  | For Network Total Goods | 208 |
|  | Software |  |
| 11 | Central WiFi at DWASA Bhabon | 30 |
| 12 | Online PIMS Software Development | 3.35 |
| 13 | Pension Software Development and Online Bank Payment service update of Billing Section | 1.65 |
| 14 | Land and E Lab Software Development | 5.00 |
| 15 | Accounting Software for Accounts Division, Dhaka WASA. | 13.00 |
| 16 | Online Electricity, Gas and Other bills information preservation and management software of Dhaka WASA. | 1.76 |
| 17 | Mobile Application Development for Dhaka WASA. | 2.90 |
| 18 | Real time online billing software upgradation | 19.50 |
| 19 | Private DTW and Water New Connection security systems | 4.40 |
| 20 | Residence management software | 7.80 |
| 21 | Private DTW Work enhancement | 3.00 |
| 22 | Complain management software | 5.00 |
| 23 | Loan Approval Process, Loan and Payroll Data Migration Tools | 9.00 |
| 24 | PIMS, Pension, Payroll System Upgradation. | 5.00 |
| 25 | Digital Archiving of Employee information of DWASA | 8.00 |
| 26 | Software for Public Information Division | 5.00 |
| 27 | Contractor Enlistment Software. | 6.00 |
|  | 12 – 27 Sub Total of Carried Over Goods Total: 100.36 | 100.36 |
| 28 | Audit Software Up gradation | 10.00 |
| 29 | Payroll Software Development | 5.00 |
| 30 | New Connection, DTW and Inventory Software | 1.50 |
| 31 | Software for Supply Chain Management. | 35.00 |
| 32 | Web based inventory, POS & Production Management Software. | 5.50 |
| 33 | Software for Land Record & Tax Payment for Land Division | 2.00 |
| 34 | API for BIDA | 5.50 |
| 35 | Software for Welfare Department | 5.00 |
| 36 | Software for DA Section | 8.00 |
| 37 | Software for Employee personal information update process | 10.00 |
| 38 | Software for MIS online report | 5.00 |
|  | Subtotal of goods to be done | 92.50 |
|  | For Software Total Goods | **192.86** |
|  | Hardware |  |
| 39 | Procurement of Server, WM ware and related services for keep running of software’s used in digitization of Dhaka WASA | 54.50 |
| 40 | Urgent purchase of Display for Dhaka WASA Board Room. | 6.81 |
| 41 | PC, UPS, Printer and Scanner for Dhaka WASA | 130.00 |
| 42 | Hardware Accessories for PC and Printer | 10.00 |
| 43 | Hardware Accessories for PC and Printer | 5.00 |
| 44 | Hardware Accessories for PC and Printer | 5.00 |
|  | For Hardware total Goods 211.31 | 211.31 |
| 45 | Urgent and Unforeseen works/goods/services to be done under sudden emergency requirement. | 87.48 |
|  | **Total** | **699.59** |
|  | **Goods to be done subject to the Availability of Budget** |  |
|  | **Budget Head: Computer Purchase/Computer Maintenance/Call Center Cost.** |  |
| 46 | PC, UPS, Printer and Scanner for Dhaka WASA. | 130.00 |
| 47 | Line Printer for Own Funded Zones of Dhaka WASA | 185.00 |
| 48 | Storage for Server of Dhaka WASA. | 180.00 |

**Accounting / AIS:**

Accounting division is one of the most important division of Dhaka WASA. Accounts provide all the necessary information related to transaction. From Bills paid to Vendors, Money paid back to development partners, Tax or VAT etc. payment or water and sewer tariff collected, fees paid for water or sewer connection lines or meters, earning from water ATM or private tube-wells, fees collected from bidders, money from development partners or GoB money – every transaction is being traced, recorded and monitored by Accounts division. Accounting division uses a custom made software by the vendor Flora Limited do most of the recording and reporting. Annual expenditure for this software is 15, 00,000 taka.

**Software Automated Processes of Accounting System for Dhaka WASA:**

**Login Page:** Log in page is the starting page for any user. Any authorized user can log in to the accounting system by giving his/her ID and password. If both ID and password match, then that user can use then system according to user permission.

**Logout Page:** If user wants to close or logout from the system, user can find a logout link.

**Account Setup Pages:**

**Financial Year Setup Page:** In this page the financial year for accounting is set up so that a user can show easily any types of information according to financial year. Now the process of use this page is following:

**Insert Financial Year:**

**2. Group Head Page:** In this page Account Group Head information is stored according to Account Type. The process of using this page is following:

**Insert Group Head:** To save a Group Header at first user has to click on ‘Add New Group’ button which is on **Screen Shot** 11 then user has to fill up required fields and click to save button that is on **Screen Shot** 12. After saving data a message will display (**Screen Shot** 13). Then the new data will be added in grid view (**Screen Shot** 14)

**Update Group Head:** To update a data user go to ‘Edit Record’ column and select a row which user want to Edit and then click that column (**Screen Shot** 15)

Then user has to fill up required fields that he wants to update and then click to ‘Update’ button (**Screen Shot** 16)

After update data a message will display and then click OK to return to previous.

Message will show That data has been updated successfully.

**3. Sub Group Head Page:** In this page Account Subgroup Head information is stored according to Account Type and Account Group.

**Insert Subgroup Head**

After clicking ‘Add Sub Group’ button the fields are open and user must have to select ‘Account Type’ at first and ‘Account Group’ will display according to ‘Account Type’ and then select Group also. After fill up all fields click to ‘Save’ button

After inserting data successfully, a message will display and then click OK to return

**Screen Shot: 23**

Then data has been insert successfully and show in grid view

**Update Subgroup Head**

**Screen Shot: 24**

To update a row user has to click on ‘Edit Record’ column (**Screen Shot** 24)

**Screen Shot: 25**

After filling up required fields user has to click on ‘Update’ button (**Screen Shot** 25)

**4. Ledger Head Page:** In this page Ledger Head information is stored according to Account Type and Account Group and Subgroup. The process of using this page is following:

**Screen Shot: 28**

To visit this page user has to Click ‘Account Setup’ and then again click to ‘Ledger Head’ (**Screen Shot** 27) and the page will display and then click to ‘Add Ledger’ button to add (**Screen Shot** 28)

**Insert Ledger Head**

**Screen Shot: 29**

After clicking ‘Add Ledger’ button the fields are open and user must have to select ‘Account Type’, ‘Account Group’, ‘Sub Group’ at first and ‘Account Group’ will display according to ‘Account Type’ and ‘Sub Group’ will display according to ‘Account Group’. After fill up all fields click to ‘Save’ button (**Screen Shot** 29)

**Screen Shot: 30**

Then data has been inserted successfully and show in Grid Table (**Screen Shot** 30)

**Update Ledger Head**

**Screen Shot:32**

To update a data user go to ‘Edit Record’ column and select a row which user want to Edit and then click that column (**Screen Shot** 32)

**Screen Shot: 33**

After fill up required fields user has to click on ‘Save’ button (**Screen Shot** 33)

**Screen Shot: 35**

Then data has been updated successfully and show in grid view (**Screen Shot** 35)

**5. Cost Centre Name Page:** In this page Cost Centre information is stored. The process of using this page is following:

**Go to page**

**Screen Shot: 37**

To visit this page user has to Click ‘Account Setup’ and then again click to ‘Cost Centre Name’ (**Screen Shot** 36) and the page will display and then click to ‘Add New Cost Centre’ button to add (**Screen Shot** 37)

**Insert Cost Centre**

**Screen Shot: 38**

After clicking ‘Cost Centre Name’ button the fields are open. After fill up all fields click to ‘Save’ button (**Screen Shot** 38)

**Screen Shot: 39**

After inserting data successfully, a message will display and then click OK to return (**Screen Shot** 39)

**Screen Shot: 40**

Then data has been inserted successfully and show in grid view (**Screen Shot** 40)

**Update Cost Centre**

**Screen Shot: 41**

To update a data user go to ‘Edit Record’ column and select a row which user want to Edit and then click that column (**Screen Shot** 41)

**Screen Shot: 42**

After fill up required fields user has to click on ‘Update’ button in Add Cost Center Info page.

**Screen Shot: 44**

**6. Budget Head page:** In this page Budget information is stored. The process of using this page is following:

**Go to page**

**Screen Shot: 45**

**Screen Shot: 46**

**Insert Budget**

To visit this page user has to Click ‘Account Setup’ and then again click to ‘Budget Head’ (**Screen Shot** 45) and the page will display and then click to ‘Add Budget’ button to add (**Screen Shot** 46)

**Screen Shot: 47**

After clicking ‘Add Budget’ button the fields are open. After fill up all fields click to ‘Save’ button (**Screen Shot** 47)

**Screen Shot: 48**

After inserting data successfully, a message will display and then click OK to return (**Screen Shot** 48)

**Screen Shot: 49**

Then data has been Inserted successfully and show in grid view (**Screen Shot** 49)

**Update Budget**

**Screen Shot: 50**

To update a data user go to ‘Edit Record’ column and select a row which user want to Edit and then click that column (**Screen Shot** 50)

**Screen Shot: 51**

After filling up required fields, user has to click on ‘Update’ button (**Screen Shot** 51)

**7. Yearly Budget Entry:** In this page Yearly Budget information is stored. The process of using this page is following: To add new Budget Info click Add Budget Ceiling.

**Go to page**

**8. APP Setup:**  In this page annual procurement plan for different Budget for corresponding Cost Center is shown for a fiscal year. For add an item in procurement plan click Add New Package.

**9. Supplier List:**  By Clicking Supplier List in Menu one can view a supplier list. To add a Supplier click Add New Supplier Button.

**10. Work Orders:**  By clicking Supplier Work Order one can view the Work orders made for Suppliers and one can add a new Work order by clicking Add New Work Order. Put information and save the work order.

**11. Income Tax Slab Setup:**  By Clicking IT slab setup from menu user can view the Income Tax Slab Setup Page. To add click Add tax slab.

**8. User Setup:** In this page user information is stored. The process of using this page is following:

**Add a new User**

To create a new user, click on “Add New User” button.Then below page will appear. Fill the require information and click on save button.

**Edit Existing User:**

To edit existing user, Click on edit button from the “Edit Record” column. It will show below page. After filling information, click on update button. After finishing updating, it will show a message.

**Accounts Payable:**

**1. General Bill Register:** In this page all approved and unapproved bill register will displayed between to date periods.

**Add new bill:** To add new bill, click on “Add Bill for payment” button. Then below window will open. After that need to fill require information and click on to “Save Bill” button.

Last added bill will be not approved until higher authority approve it. To approve bill, click on approve button from approve column, and then click on approve button. Then the bill will be listed on the approved bill list.

**Edit Bill:** To edit bill click on edit button from payment column. After that below window will appear. Then fill the require information and click on save button.

**2. Unapproved Payment Vouchers:** In this page unapproved payment vouchers will displayed.

**3. Checks to be issued list:** In this page, checks which need to be issued will be displayed.

**4. Payment Archived:** In this page, payment which are archived will displayed.

Here we can print the voucher by clicking Print button on the Print voucher column. For viewing “Payment archive” data, need to click on view button of “View column”.

**5. Supplier ledger:** In this page, supplier payment history will be displayed.

**6. Employee advance register:** In this page, employee bill register history will be displayed.

**Add Employee Bill:** To add employee bill, need to click on “Add employee bill” Button.

**Edit Employee Bill Register:** To edit employee bill register, need to click on edit button of “Edit” column from the employee bill register page. Then edit window will show. After changing information, need to click on save button.

Payment Bill: For advance bill payment, need to click on the payment button of “Payment Column” from the employee bill register page. Then payment Window will show.

**View Voucher:** By clicking view voucher detail button, View voucher window will open.

**Adjustment:**By clicking adjustment button from adjustment column, below window will open.

**7. Adjustment of advance:**In this page advance adjustment list will be displayed.

**Add Adjustment:** To add adjustment need to click on “Add Adjustment” button.

**8. Vat Deduction List:**In this page, List of VAT are displayed.

**Printing:**  By clicking print button, we will get vat deduction list.

**9. AIT Deduction List:**In this page, List of AIT are displayed.

**Printing:** By clicking print button, we will get vat deduction list.

**10. Update VAT Challan:** In this page, vat challan list will displayed, and user can update the Vat challan.

Updating VAT Challan: After inserting required fields, need to click on “update vat challan” button to update the information.

**11. Update AIT Challan:** In this page, AIT challan list will displayed, and user can update the AIT challan.

**Updating Challan:** After inserting required fields, need to click on “Update Tax Challan” button to update the information.

**12. Vat Certificates:** In this page, Supplier vat list/ certificate will be displayed.

**Daily Transaction:**

**1. Payment Voucher Listing:** In this page, the list of payment voucher list will be shown.

**Print Voucher:**  By clicking print button from Print column, user can view the bank payment voucher

**View voucher:** By clicking view button from view column, user can view the payment voucher.

**2. Receipt Vouchers Listing:** In this page, receipt voucher listing will show based on between two date period.

**Add receipt voucher:** By Clicking add receipt voucher button, below ad screen will appear.

**3. Contra Vouchers Listing:** In this page, contra voucher listing will show based on between two date period.

**Add contra voucher:** By Clicking add contra voucher button, below ad screen will appear.

**3. Journal Vouchers Listing:** In this page, journal voucher listing will show based on between two date period.

**Add journal voucher:** By Clicking add journal voucher button, below ad screen will appear.

**4. Purchase Vouchers Listing:** In this page, purchase voucher listing will show based on between two date period.

**Add purchase voucher:** By Clicking add purchase voucher button, below ad screen will appear.

**5. Sales Vouchers Listing:** In this page, sales voucher listing will show based on between two date periods.

**Add purchase voucher:** By Clicking add purchase voucher button, below ad screen will appear.

**6. Debit note Listing:** In this page, debit note listing will show based on between two date period.

**Add purchase voucher:** By Clicking add debit note button, below ad screen will appear.

**7. Credit note Listing:** In this page, credit note listing will show based on between two date period.

**Add purchase voucher:** By Clicking add credit note button, below ad screen will appear.

**Monthly Transaction:**

**1. Bank Reconciliation:** In this page, bank reconciliation can be added

**2. Charge Dedication for this month:** In this page, Charge Dedication for a specific date

**Fixed Asset Management**

## 1. Fixed Asset Listings: The list of all fixed asset is shown in this list which you can manage through fixed asset acquisition.

## 2. Fixed Asset Acquisition: Whenever a fixed asset is purchased, user should entry the asset details, cost, Use status, Depreciation percentage etc to book in to the fixed asset register and automatically depreciation is calculated and charged monthly with other asset.

**3. Asset Depreciation Schedule:** Select the fixed asset and you will find the full depreciation list from the beginning with accumulated depreciation amount and written down value.

**4. Fixed Asset Transfer Relocation:** This Page will let user to add the fixed asset transfer relocation information.

**5. Fixed Asset revaluation:** This Page will let user to add the asset transfer revaluation information.

**6. Fixed Asset disposal:** This Page will let user to add the fixed asset disposal information.

**Reports**

1. Account Head wise budget, 2. Cost centre wise budget, 3. Day Book, 4. Bank Book, 5. General Ledger, 6. Trial Balance Report, 7. Income Statement, 8. Balance Sheet, 9. Cash Flow, 10. Chart of accounts listing.

Automation development works planned for the future:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Package Name | Sl no | Item Required | Implemented by | Estimated cost in million US dollars |
| Package-1 | 1 | Central IT Infrastructure (Active & Passive) | DWSNIP | 5 |
|  | 2 | Central Control Room with Bazel Less Video Wall | DWSNIP | 2 |
|  | 3 | 10 Zonal IT Infrastructure (Active & Passive) | DWSNIP | 2 |
|  | 4 | 10 Zonal Control Room with Bazel Less Video Wall | DWSNIP | 3 |
| Package-2 | 1 | Central Server and Virtualization, Storage and Backup, 10 Zonal Server (2) and Virtualization | DWSNIP | 3 |
| Package-3 | 1 | Network and Firewall (HQ & Zonal) | DWSNIP | 1 |
|  | 2 | Core Structured Cabling (HQ) | DWSNIP | 0.5 |
| Package-4 |  | Data and Internet Bandwidth (5 Yrs) | DWSNIP | 0.5 |
| Package-5 | 1 | Central Unified Distributed SCADA System and Implementation | DWSNIP | 4 |
|  | 2 | Web GIS Software, Customization & Reporting with data modeling. | DWSNIP | 1.5 |
| Package-6 | 1 | Billing software and interfacing with Financial management system (5Yrs) | DSIP | 5.1 |
|  | 2 | Financial Management software (5Yrs) (Modules: Accounts, General Ledger, Intercompany Transaction, Fixed Asset, Warehouse, Procurement, Payroll with facility management & HR) | DSIP | 5.1 |
| Package-7 | 1 | SCADS RTU/PLC, Field Devices (Smart flow Meter, Smart Pressure Sensors Sensor, Leveling switch and Sensor, Water Quality Sensor & Energy Meter) & Electrical Components. | EWSP, DWSNIP | 4.6 |
| Package-8 | 1 | Smart Digital Water Meter (4G) for Household | DWSNIP | 1 |
|  | 2 | MDM & Central Firmware Update Platform | DWSNIP | 1.2 |

DSIP – Dhaka Sanitation Improvement Project

DWSNIP – Dhaka Water Supply Network Improvement Project

EWSP – Emergency Water Supply Project

Source of fund is – Asian Development Bank, Government of Bangladesh and Dhaka WASA.

**Digital/Online Billing and Bill Payment:**

The WASA Authority has created a website where we can get all the information and payment system.

**Dhaka WASA bill statement:** The bill statement is a part and parcel for the people of Dhaka. Because it is the most important things. The bill statement will show your current water bill, bill payment last date. As a result, it is your duty to collect the Dhaka WASA Bill statement. The citizen of Dhaka can easily check their water bill from online. Because DWASA authority has customized the system of paying bills through online. You should to know the right method.

**How to calculate WASA bill:** Firstly visit - http://app.dwasa.org.bd/website. Then, put your Account Number (The number is mentioned on your Bill Card), Put Your Password (Your Account Number is your Password), finally- you can get your Bill Card. Put your Date Format which you want to check your Bill. Search it and you can check your Bill now.

**Dhaka WASA bill payment system:** After checking the bill, you need to complete your payment. In this modern era, it is really easy to make the payment. You can pay your bill through bKash, Nagad and Rocket.

The full procedure -

* Open the Mobile App bKash, Nagad or Rocket. Go to Payment section. Go to Bill Payment. Go to Dhaka WASA Bill. Enter your Meter Number. Put your amount of Bill. Enter your Pin Number. Complete your payment.

Digital billing and online bill payment has made it easy for consumers to pay bill and bill collection of DWASA has increased.

**Financial Report from Various Development Projects (For The FY 2020-21):**

In 2020-21 Financial Year, on the basis of the Master Water and Sewer Plans and Turn around DWASA Program, it has implemented 10 development projects. Those projects were included in the Annual Development Program (ADP) in the said year. Among the said projects: 5 were investment projects for water supply and 3 projects for sewerage & Other 2 were Drainage Projects. Planning, Monitoring and Evaluation Division has been engaged exclusively to monitor and to evaluate those projects’ performance which are as follows:

1. Development Projects of Dhaka WASA
2. Investment Projects in Water Supply Modernization

|  |  |  |
| --- | --- | --- |
| Name | Duration | Estimated cost & Financing Source |
| Dhaka Environmentally Sustainable Water Supply Project | October’ 2013 to June’ 2022 | Estimated Cost 815107.00 Lakh Taka.  Financing Source -$250 million from ADB, $64 million from Agence Française de Développement and $136 million from the European Investment Bank, GoB & DWASA. |
| Saidabad Water Treatment Plan Project Phase-III | July’2015 to June’ 2021. Revised - June 2025(Proposed) | Estimate Cost - 459736.05 Lakh Taka.  Financing Source - ADB, Agence Française de Développement and European Investment Banks or agencies etc , Gob & DWASA. |
| Dhaka Water Supply Network Improvement Project | April 2016 to December 2021 Revised - June 2025(Proposed) | Estimate Cost- 318230.00 Lakh Taka  Financing- $275 million from ADB, $200 million from ATF - Danida Loan, $128 million from Agence Française de Développement, and • $44 million from the European Investment Bank etc, Gob & DWASA. |
| Emergency Water Supply Project | January 2020 to December 2023 | Estimate Cost- 73232.00 Lakh Taka  Financing- Gob & DWASA. |

1. Investment Projects on expansion & modernization Sewerage System

|  |  |  |
| --- | --- | --- |
| Name | Duration | Estimated cost & Financing Source |
| Dasherkandi Sewage Treatment Plant Project. | July 2015 to June 2022 | Estimated Cost 371254.00 Lakh  Financing Source – China Exim Bank, GoB & DWASA. |
| Land Acquisition for Construction of Sewage  Treatment Plant at Uttara. | July/2019-June /2021, Revised - June 2022 | Estimate Cost - 139800.00 Lakh Taka  Financing Source - Gob & DWASA. |
| Dhaka Sanitation  Improvement Project | January 2020 to December 2024 | Estimate Cost- 385560.00 Lakh Taka  Financing- $275 million from ADB, $200 million from ATF - Danida Loan, $128 million from Agence Française de Développement, and • $44 million from the European Investment Bank etc, Gob & DWASA. |

1. Financial Progress of those Projects: In FY 2020 -21, total taka 2171.94 crore was allocated against those projects in the Revised Annual Development Program (RADP). Taka 1033.32 crore was allocated from the own fund of Government of Bangladesh and tk. 1138.62 crore was sanctioned from the Development Partners (DP) fund as the Project Aid. In this said year, tk. 2060.15 crore has been released and tk. 1810.03 crore was incurred as expenditure as a whole, the financial progress was 90% in that time. In this time, the physical progression was 97% as a whole.
2. Major Physical Progression of the Said Projects:

|  |  |  |
| --- | --- | --- |
| **SI No** | **Name of the Component** | **Progress** |
| 1 | Construction & rehabilitation of deep tube wells | 97 No |
| 2 | Construction & Rehabilitation of water lines | 388.1 km |

**Automated Biometric Time Attendance System (Face Detection/Fingerprint):**

July 2018, Dhaka WASA started its journey with biometric digital time attendance. Started with only 5 devices at Dhaka WASA head office (WASA Bhaban).

**During lockdown:** Government of Bangladesh declared lockdown from 26/03/2020. That’s why WASA all office stopped taking biometric attendance (Total Seven months) due to lockdown and so that the virus can’t speared by finger scanning devices.

**New Face detection Time attendance system:**

|  |  |
| --- | --- |
|  | WASA authority took decision to replace biometric fingerprint attendance system with new technology 3D face detection attendance devices to avoid contagious contamination from finger touch, system started on 2nd June 2020.  ZKTeco's newly released UFace800+ Semi-Outdoor Multi-Biometric Time Attendance & Access Control Terminal which supports 3,000 face templates, 4,000 fingerprint templates and 10,000 cards. Price: 28000-30000 Taka per unit. |

**Features of present systems:** Dashboard for Management, Scheduled Reporting to Management by E-Mail, Online access of Staff & user, Android & iOS Application, SMS alert.

**Customized Web based Real-time Attendance Software for DHAKA WASA:**

**Software Features:** Staff Attendance Entry, Customized Reporting of Section Wise & Individual Staff Attendance, Daily Absent & Absconding SMS Notification to Staff and customized Reporting on job card. Complete Admission Process, Staffs Details Profile, Customized Reporting on a Staff, and Staff Migration between Branch, Shift, & Section, User administration, Multi user Role access with different privileges, Role Based Access Control, Role Based Input Control etc.

**Advanced Software Reporting Management:** Shift information for different staffs and different offices for different days, Employee information report/details, leave information integration with other leave management tools/software/systems, daily in/out report – time logging, daily absent, present & leave report, daily late arrival or early leave report, daily over time (OT) report, Daily summary OT information.

**Drawbacks of automated time and attendance systems:** High Cost, Errors in software programs APP systems, this system is heavily reliant on electricity supply and communication network.

**Current link:** http://wasa.itechbd.net/login/

**Expenses for hardware:** There are 50 different offices, division, projects - at DWASA and almost 800 different deep tube well pump houses. DWASA has concluded that they will need around 30 devices for offices and 200 devices to cover all the different pump houses.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sl no | Place of Installation | Number of office / Installations | Number of Devices | Unit cost in BTD | Total cost | Remarks |
| 1. | Head Office, Zonal Office,  Project Offices, SCADA room, Server room, Lab room etc. | 50 | 40 | 30000 | 12,00,000 | Completed |
| 2. | Pump House | 800 | 200 | 30000 | 60,00,000 | Ongoing |
|  | Total estimated Hardware investment |  |  |  | 72,00,000 | Taka |

**Geographical Information System (GIS):**

Following functions were implemented by DWASA GIS division-

**Water, Sewer and Drainage Networking Mapping:** Many have characterized Geographic Information Systems (GIS) as one of the most powerful of all information technologies because it focuses on integrating knowledge from multiple sources and creates a crosscutting environment for collaboration. GIS is a system for the management, analysis, and display of geographic knowledge, which is represented using a series of information sets. In the present study, GIS will be used to organize the data for usage in water distribution networks design, and analysis.

**DMA and Water Network:** A district metered area (DMA) is defined as a discrete area of a water distribution network. DWASA GIS has already planned to build about all DMA maps using GIS tools.

**Deep tube well mapping:** Deep tube well is the only source of underground water which distributed to city dwellers. The Deep tube well position with information has been built in GIS. Using these data, can help to provide comments before installation of new Deep Tube wells both DWASA and private owned.

**Land Mapping:** To proper management of WASA land, old Land maps has been converted to digital maps using GIS tools.

**Surface Water Transmission Line Mapping:** Dhaka WASA has four water treatment plant. Under those surface water treatment plants, all transmission line has been converted in digital format.

**Base line Mapping:** Dhaka WASA has built land, road, water body, house position, bridge, culvert and also other utilities network mapping.

**House Connection mapping:** Dhaka WASA has been determined to be with Digital Bangladesh and progressing to step-by-step development to achieve the Goal. In this Stage, DWASA has taken initiative to make Smart Metering. GIS mapping for House Connection can be the first step to turn smart metering

**Valve mapping:** Valve point are using to proper maintenance for water service area. So it's very important to know the location and related information of Valve. Mapping of Valve position has been built in GIS including information to provide better operation and maintenance. Flow control, pressure sustaining and reducing valve are using in DMA management.

**Bulk Meter mapping:** Bulk meter are using to estimate inflow/ import and outflow/export into adjacent DMA areas for calculation of water loss. So it's very important to know the location and related information of Bulk meter. Mapping of bulk position has been built in GIS.

**Digital elevation modelling (DEM):** Ground elevation is the important component for water, sewer and drainage network design and operation.

**LIC Mapping:** As a part of the plan to bring all slum and Low-Income Community areas in Dhaka city under water distribution service, prepare GIS database for LICs – more than 25000 household connections done. In Korail slum people had to pay Tk 150 monthly per house for dirty water from illegal connections, that was available only once a day or once every 3 days, residents now they pay only Tk 50 to DWASA for clean water that is always available.” In 2015, Korail received a citywide award for prompt payment.

**Zonal Billing Mapping:** Billing information is being joined with these maps; as a result of which is possible to find out connection status, non-metered household and connection type etc. for better understanding of physical features of service areas.

**A few works have been done:** Scan and digitize of about 1200 system maps on Water, Sewer and Drainage line. Upload of all types of maps to DWASA website. GPS survey Based mobile apps for water, sewer and drainage network.

**Plans are underway to:** Develop GIS Based on Web Platform for Dhaka WASA, Integrate whole billing system with GIS, Integrate SCADA system with GIS.

**DWASA GIS Annual Budget:** DWASA Computer-GIS mainly operates, maintains and modify existing software, servers, web portals / Apps supplied by vendors or MIS division.

|  |  |  |  |
| --- | --- | --- | --- |
| Head | FY 2020-21 | FY 2021-22 | Remarks |
| Capital Expenditure | 141.80 | 154.59 | Lakh Taka |
| Operating Expenditure | 100.84 | 99.20 | Lakh Taka |
| Computer-GIS Total Budget | **242.64** | **253.79** | Lakh Taka |

***Automated Dhaka WASA Customer Complain Management System*:**

**Old complain resolving steps:**

Consumers initiate a call

DWASA staff answers the phone call

Staff note down problem with relevant information on complain register book

Not related to WASA

In case of other problems

Advise &/or terminate the call

Field staff or SAW/AE or EE checks complain register for unsolved problems

Action may be taken by appropriate person assigned to that task.

**Dhaka WASA Automated Complain Management Center (Call center):**

**DWASA Complain Center Contacts:**

Hot line number: 16162 (short code)/ 09611016162 (long code). Website: dwasa.complaincenter.com:16162. Along with old complain management system, Dhaka WASA taken an initiative to setup a automated complain center to hear the problem regarding the services it offers to the population of Dhaka City. Now the consumers of Dhaka WASA can lodge complains just by dialing 16162 (from Bangla link) or 09611016162 from any operator serving in Bangladesh. People don't have to come to complaint center physically in their serving area anymore enabling them to save their valuable time and money spent in transportation.

**Costs for Call Center and Automated Complain Management System & Software:** Dhaka WASA signed a contract with a vendor to carry out these services according to DWASA requirements and yearly cost is between 7500000 to 11000000 takas. As the agreement the vendor will provide manpower, equipment, software, communication costs etc. Software cost is 500000 takas .

**A Complain Lifecycle of Automated Problem Solving (Flow Chart)**

Consumer Initiate a Call

Call Center agent answer the phone call

How can we help?

Other Problem. Advice the customer for proper action &/or terminate the call

Advise

Problem with Water & Sewerage

The agent notes down the problem into a computer system with brief description and then issue a ticket number assigning to it.

The computer system then sends two alert SMS to the concern SAE and AE/SDE assigned to the location of the problem.

The SAE will have 2 hours to acknowledge by dialing the magic number in the SMS. The AE/SDE will receive the notify SMS containing the assigned SAE name.

A Complain Lifecycle of WATER & SEWRAGE Problem (Flow Chart continued from previous page):

Problem acknowledged in two hours

Yes No

The computer system will generate an alert SMS and Send to AE/SDE to acknowledge the problem. AE/SDE will get 30 minutes to acknowledge.

Problem acknowledged in one hour.

The Computer System will generate two resolution SMS, One to SAE Requesting to update AE/SDE after solving the problem. The other SMS will be sent to AE/SDE with a magic number which he requires to dial once SAE finish the work.

The computer system will generate another alert SMS and send to SAE to acknowledge the problem. This time SAE will get one hour to acknowledge the problem. A notify SMS will go to AE/SDE.

Yes

NO

Yes

Problem acknowledged in 30 minutes.

NO

The time computer system will generate a notify SMS and sent EE. EE will take necessary actions.



***CHAPTER 06 - Smart Water Management with “scada” System***



Dhaka Water Supply and Sewerage Authority (DWASA) pumping stations are equipped with deep tube wells, they are the main network nodes of the system. DWASA management wants to implement a SCADA (Supervisory Control and Acquisition) system in the network, complete with remote monitoring and control. For that reason, DWASA management had formed a committee to produce a conceptual overview to WASA for a unified, fully integrated Central SCADA Platform with Interactive loT and HMI Dashboard. The report meant to provide a brief overview of the architecture and framework that has been envisioned by the SCADA Committee for deploying the ideal solution at Dhaka WASA. This automation guideline was meant to guide water production and distribution monitoring and control processes mainly.

**What is SCADA:**

**SCADA stands for: Supervisory Control & Data Acquisition**

* It is a technology to collect data and monitor the performance of production and distribution processes.
* It is an application that can help to increase efficiency, lower costs and increase the profitability of operations by turning data into information.
* Reduce manpower needed for operation and monitoring activities thus reducing costs.

**Activities of a SCADA System:**

1. Data acquisition through sensors from various field devices.
2. Data transfer using communication network to various RTU, Local SCADA or Central SCADA.
3. Data processing and data or information presentation
4. User authentication and user access control into the SCADA monitoring and control system based upon various levels of user roles.
5. Instruments Control – Control various pumps motors, valves and chlorination systems remotely.

**SCADA system outputs:** Alarm analysis. Trend analysis. Periodic reports.

**Existing Status of SCADA:**

In 2017, Dhaka WASA started the piloting project work for DTW (Deep Tube Well) SCADA, and has covered 163 out of 913 DTW under SCADA systems. Around 8 (eight) company was done this work. Above them 77 DTW has done by one vendor and he had sold the License software to Dhaka WASA and also found that the software is not perfect to fulfil WASA requirements. All SCADA are running under the vendor-controlled demo software. Vendors used several different field devices as well as different demo software which is running at vendor end. On the other hand, total 23 used such communication device which are infeasible to integrate into central SCADA.

**5.8 Equipment needed in a SCADA system:**

SCADA systems historically have been broken down into two basic types:

* Proprietary SCADA System
* Mix & Match SCADA System

**SCADA SYSTEM COMPONENTS:**

These are the four basic parts of a SCADA system.

• Field Instruments Inputs. • PLC/Remote Terminal Unit (RTU). • Communications Link – open standard (like MODBUS) and proprietary Radio/Cellular, Ethernet, Telemetry systems. • Central Computer Station including HMI Software – Proprietary for specific RTUs or open including interfacing many products, maintenance, alarm system, Top monitoring.

**Various equipment and tasks of SCADA system:**

|  |  |
| --- | --- |
|  | Deep Tube-well with substation- Submersible pump house. Pump is places 400 feet deep underground to bring up water. Deep tube well pump house and surrounding facilities costs from 300,000 to 500,000 taka. Each submersible pump cost from 10, 00,000 to 16, 50,000 taka based upon capacity.  There is also electrical power distribution transformer of 150 kva to 250 kva, which costs 750000 to 1500000 takas.  There are also Electrical Cables, 4 inch water pipes and electrical panels and chlorination system in the pump house. |
|  | VFD - While not an essential instrument, a Variable Frequency Drive (VFD) is a field device that frequently interfaces with SCADA systems to control process outputs. VFD’s are used to power motors driving pumps and fans. VFD’s generate analog and discrete signals.  90 kw -110 kw VGD may cost 325,000 to 400,000 takas. |
|  | Bulk water flow meter - Price of turbine type 200 mm Bulk water meter is around 100,000 takas. |
|  | Turbidity meter - This is a turbidity meter used to measure solids in water. Price range 85,000-200,000 takas. |
|  | Valves - A gate valve, also known as a sluice valve, is a valve that opens by lifting a barrier (gate) out of the path of the fluid. Gate valves require very little space along the pipe axis and hardly restrict the flow of fluid when the gate is fully opened. Can be manually operated or automated. Valves of various types may cost 35000 to 150000 takas. |
|  | Pressure Sensor with - Price is 15000 to 45000 takas. |
|  | Water Level Sensor - Borehole Water Level Sensor for Deep Well, cost around 50000-150000 takas. |



* Chlorination Sensor and Monitoring - Chlorination Sensor used in DWASA SCADA System shows if the chlorination unit is active or inactive. The Chlorination chamber has separate monitoring of the chlorine system. These can monitor chlorine in the water at the time of injection and residual chlorine in the water network pipelines. Various types of these units may cost 25000 to 50000 takas.



* Limit switches - Limit switches are used to automatically detect or sense the presence of an object or to monitor and indicate movement limits of that object have been exceeded. It was at this point that the switch was engaged to control the limit of travel. Unit cost is 5000 to 15000 takas.

|  |  |
| --- | --- |
|  | Relays – Relay Contact switches are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. Unit cost 500 to 15000 takas. |
|  | Float switch - A float switch detects the level of a liquid in a tank or container. Unit cost is 5000 to 40000 takas. |

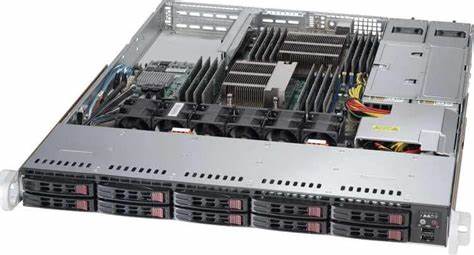


* RTU (Remote Terminal Unit) - Sensors and process controller devices are attached to remote terminal units (RTU). Multiple remote terminal units at different sites transmit the data collected to a single master station which displays the information in a browser. RTU package unit price range is 50000 – 500,000 takas.

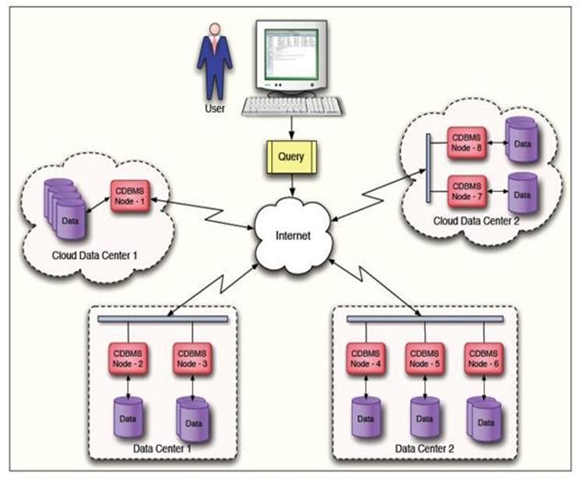
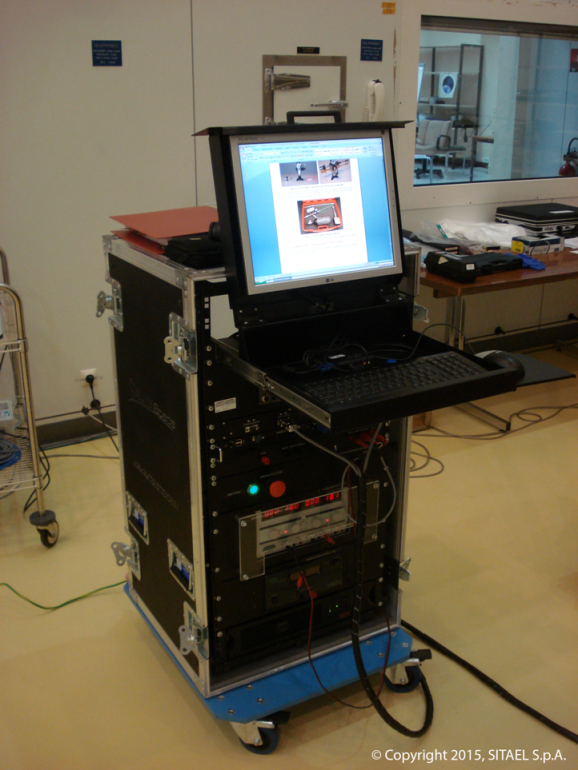


* HMI (Human-Machine Interface) - An HMI SCADA system, or SCADA Master, can provide several helpful extensions for network alarm management of monitoring equipment. HMI software is used at the Central Control location. HMI modules may cost from 25000 to 50000 takas.

|  |  |
| --- | --- |
|  | PLC (Programmable Logic Controller) - Data from sensors on individual assets is transmitted to the PLC. The PLC translates that data into a format that can be used by the software. If the data crosses certain thresholds, a maintenance work order is created. The Programmable Logic Controller (PLC) was invented in 1968 to support the automobile industry by Bedford Associates’ engineer Dick Morley. PLC and PLC modules unit cost is 10,000 to 50,000 and up-to 100,000 takas. |
|  | OIT – Operator interface terminal OIT’s provide a local interface, typically in a remote location or into an isolated system like skid mounted equipment. Screens to display information have a simple layout since displays are not large; anywhere from 4 inches to 14 inches. Unit price 25000 to 55000 takas, |
|  |  |



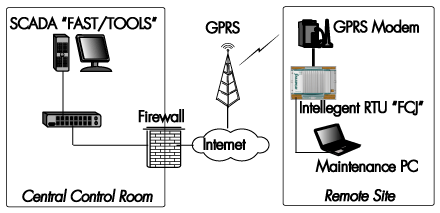
* Server and Memory Storage- Rack server and external memory chips and RAM. SD memory cards, RAM, Rack Servers costs 2000, 5000, 600000 takas.



* Database server, cloud storage, backup server - To store the data and operated the equipment. These may cost 700 to 35,000 takas per month per Terabyte of data - in cloud or external Dedicated backup server respectively.



* Physical and mobile monitoring facility - Reading and analyzing on Desktop Computer, Laptop Computer, mobile, tablet, staff panel - To see the SCADA data and use it accordingly. Mobiles, Laptops or Note pads/tabs costs 15000 to 235000 takas.

* Internet/radio frequency/GPRS - Wireless SCADA systems are the ones in which the communication between the Remote Terminal Unit (RTUs) and Human Machine Interface (HMI) is wireless in nature. General Packet Radio Service (GPRS) is the commonly used wireless technique used in wireless SCADA systems. Prices of unit range is 10,000 to 50,000 to 100,000 takas based upon model, power and capacity.

Radios are the most common communication method in large SCADA systems used in plants.

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The two basic workhorse antennas of SCADA systems are YAGI and Omni. The yagi is for directional transmission and the omni provides 360 degrees of transmission.

In addition to the traditional radio and serial cable communications, SCADA systems also use:

* Cellular. • Telephone Lines. • Wireless Internet / Wi-Fi or Microwave. • DSL Broadband / Ethernet • Fiber Optic. • Satellite.

**System Monitoring and Controlling Console:**



Control room equipment and furniture (system console) including but not limited to control console for dual redundant workstations, desk for engineering workstations. Servers, manager workstations and printer compartment along with chairs.

It may cost up-to 1,00,00,000 takas to establish a basic SCADA monitoring room for a water treatment plant.

**Training and Support services:** Training, 1 year Warranty and 3 years after sales services may cost up-to 20% of total contract value.

**Investment and Maintenance Cost of SCADA and water production related equipment:**

From DWASA budget it can be seen that, DWASA is heavily investing in SCADA automation and its maintenance.

**Financial Savings by SCADA System:**

SCADA system allows various equipment at different places to be monitored, controlled or operated remotely. Operator don’t need to be present on the equipment rooms. Dhaka WASA may have about 1000 pumps running at pump houses all the time, to supply nonstop running water to supply line to city dwellers. With SCADA single operator can monitor, supervise or control multiple pump houses, 2 or 3 within 1 KM.

**Operator salary expense without Automation, SCADA or Smart water management:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number of pump houses to be monitored | Number of shifts | Number of operators | Monthly average salary | Total monthly salary expense |
| 1000 | (24 hour / 8 hour =) 3 | (3 shifts x 1000=) 3000 | 25000 takas | (3000x25000 = )7,50,00,000 takas |

**Operator salary expense with Automation, SCADA or Smart water management:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number of pump houses to be monitored | Number of shifts | Number of operators needed | Monthly operator average salary | Total monthly salary expense by DWASA |
| 1000 / 3 ≈ 334 | (24 hour / 8 hour per shift =) 3 | (3 shifts x 334 =) 1002 | 25000 takas | (1002 x 25000 =) 25050000 taka |



***CHAPTER 07 – SWOT MATRIX of DWASA, CONCLUSION and RECOMMENDATIONS***



SWOT matrix is a vital strategic planning tool that can be used by managers to present a situational analysis of the organization. It is a simple technique to map out the present Strengths (S), Weaknesses (W), Opportunities (O) & Threats (T) Dhaka WASA is facing in its current business environment. **SWOT Matrix of Dhaka WASA:**

|  |  |
| --- | --- |
| **Strengths:**  •Stable, experienced & dynamic staff & Senior Management Team.  •Capable & experienced employees supported by a Training Centre established in 1980.  •50+ years successful record in providing water & wastewater disposal services for Dhaka.  •Progress of “Turnaround Program” is continuing & trust & support of GoB & Development Partners.  •Customer-oriented corporate culture and using technology for efficiency & cost saving.  •Long-term master plans for development of water & sewerage are in place & current major projects to substitute groundwater by surface water, rehabilitate water networks, reduce Non-Revenue Water & expand sewerage service- are ongoing or in advanced planning stage.  •A monopoly position in piped water supply & wastewater service for Dhaka City with assured revenue with very satisfactory Operating Ratio  •Water production capacity is more than water demand.  •Financial and Policy and Administrative help from Government of Bangladesh (GoB) on various issues and project works. | **Weaknesses:**  •Customer complaints about the quality of supplied water are too frequent.  •There are many weaknesses in current water quality monitoring, including:  1) Frequency of water quality monitoring in the networks vis-à-vis international norms; 2) Equipment, protocols & Water Quality Management equipment at water treatment plants; 3) Control of Drinking Water Treatment Chemicals;  •Monitoring of quality of surface water sources.  •Terms of employment for contract-based employees is leading to high employee turnover and loss of skills (e.g. DMA Management Staff).  •Sewerage coverage, 20% of Dhaka WASA Service Area, lags far behind water supply coverage.  •Although Dhaka WASA is striving to provide Quality service to the public, little is being done to publicize this.  •Water tariff is slightly lower than the actual production cost.  • Less Coordination between different wings about financial or technical information.  • Cost benefit financial lifecycle analysis is not being used. |
| **Opportunities:**  •Exploring potential for increasing efficiency and cost saving through outsourcing & PPP (Public Private Partnership).  •Expanding Dhaka WASA’s service area into surrounding urban, or urbanizing, areas to bring in new customers & revenue.  •Increasing sewerage coverage from the present 20% has potential for a very large increase in revenue.  •Delegation of responsibilities to local Zone Offices for closer ties to local communities.  •Taking advantage of Dhaka WASA’s internal expertise and facilities to supply services to other parties on a commercial basis.  •Automation, Digitization & Computerization.  •Investment into big & modern water/sewer projects with international best practices & modernizations & Increased training by DWASA & GoB. | **Threats:**  •Population migration to Dhaka, rapid economic development & increasing water demands outstrip ability to increase & distribute water supply.  •Project delays, due to external factors (road cutting, land acquisition, public & legal protests, etc.), lead to increased costs and protracted Government approval process for budget increases. Lack of inter-agency coordination between the organizations disrupts project success.  •Delay of surface water supply projects and network rehabilitation projects, extends reliance on a diminishing groundwater resource & may result in deteriorating groundwater quality & water shortages and declining ground water table.  •Increasing surface water pollution of Dhaka’s surrounding rivers & increase in the cost of water supply, climate change & increased possibility for droughts, dropping of water layer and flooding. |

**8.2 Recommendations:**

1. To build a staff awareness and Consensus about automation, digitization and its use to bring benefit and ease of work to the employees.

2. All staff, from senior management to the field crew, should understand the basics of Computerization, SCADA and MIS, GIS, AIS - Automation systems at various levels as required by their works.

3. Building the understanding at top-level management on Automation at every possible place to maximize profit cut down unnecessary expenses.

4. Middle management must understand their roles and responsibilities on implementing automation technology, since it requires hard effort by them to create awareness about new technology.

5. Field level SCADA, MIS, GIS, AIS and related work should follow the International standards guideline and supervised by Internal and/or External Automation Expert team.

6. Automation experts, MIS, GIS, AIS and SCADA working teams should supervise, advice and update the technology as required. Team should be checking technological change regularly and after 5 years should upgrade the DWASA Automation masterplan.

7. All project, working divisions, DWASAS Administration, Revenue division, Accounts divisions, Field offices and all stockholder should try to follow the guideline of Government and DWASA Automation Masterplan for smart water management and MIS, AIS, GIS best practices for administrative purposes.

8. Different and relevant training should be organized on Automation for various levels of staffs.

9. Cost benefit analysis of capital investment and maintenance cost should be formulated and used before taking any large investment decisions.

10. Investment adding values to products or services or saves expenditure- should be considered.

11. DWASA's sustainable & modern technology based managerial capacity, also technical & financial capacity management- should be strengthened and better coordinated to keep Smart-Water systems profitable.

**8.3 Conclusion:**

Dhaka Water Supply and Sewerage Authority (DWASA) as an autonomous government institution is working very hard for providing water supply, sewerage service to almost 20 million people of the Dhaka mega city. Dhaka WASA is investing heavily to increased number of modern water purification plants & surface water collection from city Side Rivers, investing to establish modern and safe sewerage treatment plants, operating regular mobile court against bill defaulters and cut illegal connections etc. Dhaka WASA also achieved success in water production and supply by using various digital or other modern technology. However, its activities are not faultless because of challenges like - regular increase of Dhaka WASA geographical area, increase of water supply network size, weak sewer network and other related activities. Various initiatives including strong monitoring by use of automation have been taken to ensure rapid improvement of its functions. Automation and SCADA is not only a brand-new concept using ICT but also is a tool for technology-based management concept in Bangladesh public sector. Integrated Water operation control and command platform is a future oriented water management strategy. So, it is managing the entire process of the water production source as well as water cycle scientifically and systematically. The outcome will be sustainable provision of a more reliable, improved and climate-resilient sustainable water supply in Dhaka city.

**APPENDIX:**

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* Chief Engineer, Dhaka WASA.
* Training Officers, Dhaka WASA.
* Commercial Manager, Dhaka WASA.
* Engineers and Chemists at Saidabad, Padma, Vakurta water treatment plants.
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