

**Internship Report on**

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

**At Dhaka WASA”**

**Submitted To:**

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**Submitted by:**

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**Date of Submission:**

**Letter of Transmittal**

Date:

Dr. Dhiman Kumar Chowdhury

Professor and Chairman

Department of Accounting & Information Systems

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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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**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 consist recommendations and conclusion according to my point of view, which I think would improve the organization in the automation aspects.

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|  | ERP Software |  |
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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, 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 strategies, policies and cost for implementing automation into all type of 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 –

* Internal employees.
* Vendors of the organization.
* Consumers
* Key executives of Dhaka WASA.
* Government Regulators
* 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.
2. Face to face conversation with the co-workers and informal interview with the employees of Dhaka WASA.
3. Direct observations of DWASA activities- Zonal office works, Project works, Services to Customers.
4. 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 drawings printed on paper.
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 Dhaka WASA automation DWASA 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 for information also

1. Various report and documents published by government units or development partners.
2. Newspapers & news websites.
3. Various Water Utility related Websites.
4. Automation guidelines and user manuals of international companies.
5. External Research or Study reports on WASA.
6. Textbooks.

**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*



**2.1 Introduction to DWASA**

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 to ensure water supply and sewerage in Dhaka city. 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)

1. Supply of water
2. Disposal of sewage
3. Storm water drainage and
4. Solid waste management

The organization however, continued to provide services spanning water supply, treatment and disposal of sewage since inception.

**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 and then distributed to customers.

**2.2 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 |

**2.3 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 |

**2.5 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:**

1. To reduce the dependency on ground water.
2. To implement the projects effectively and speedily.
3. To practice a corporate culture in its management and operation.
4. To ensure a high level of transparency and accountability in all its service and activities.
5. To improve the efficiency and reduce operating cost.
6. To constantly seek way to serve our customers.

**2.6 Activities at DWASA:**

**Water Supply System:** 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 887 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. For this reason, Dhaka WASA with the support & cordial cooperation of the present government, has pointed out the importance of reducing dependency on ground water by supplying water from surface water body as an alternative and sustainable source of water. For that purpose Dhaka WASA is moving towards environment-friendly, sustainable and pro-people water supply management system. Several water treatment plants projects have already been taken with a view to increasing dependency on surface water up to 70 percent.

To fulfill this target, 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 which help maintaining the extraction of ground water during the Interruption of power supplies. Particularly during the summer season water demand as well as the electricity rise to its peak. At that period water supply system in Dhaka city is kept under normal condition by extracting water with the help of these 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:** An effective sewerage system is a must for a healthy city. The sewerage system of Dhaka city was initiated in 1923.

Summary of the existing Sewerage System is as follows:

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

**2.8 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 |
| 1996 | 7.55 | 1300 | 810 | 490 | 216 |
| 1997 | 8.0 | 1350 | 870 | 480 | 225 |
| 1998 | 8.5 | 1400 | 930 | 470 | 237 |
| 1999 | 9.0 | 1440 | 1070 | 370 | 277 |
| 2000 | 8.5 | 1500 | 1130 | 370 | 308 |
| 2001 | 10.0 | 1600 | 1220 | 380 | 336 |
| 2002 | 10.50 | 1680 | 1300 | 380 | 379 |
| 2003 | 11.02 | 1760 | 1360 | 400 | 391 |
| 2004 | 11.56 | 1850 | 1400 | 450 | 402 |
| 2005 | 12.15 | 1940 | 1460 | 480 | 418 |
| 2006 | 12.65 | 1900 | 1540 | 460 | 441 |
| 2007 | 13.15 | 1980 | 1660 | 320 | 465 |
| 2008 | 13.65 | 2050 | 1760 | 290 | 490 |
| 2009 | 14.15 | 2120 | 1880 | 240 | 518 |
| 2010 | 14.50 | 2180 | 1990 | 190 | 560 |
| 2011 | 15.00 | 2240 | 2150 | 90 | 599 |
| 2012 | 15.00 | 2240 | 2180 | 60 | 615 |
| 2013 | 15.00 | 2250 | 2420 | - | 644 |
| 2014 | 15.00 | 2250 | 2420 |  | 672 |
| 2015 | 15.80 | 2250-2300 | 2420 | - | 702 |
| 2016 | 16.00 | 2400 | 2450 |  | 795 |
| 2017 | 17.00 | 2450 | 2500 | - | 827 |
| 2018 | 20.00 | 2500 | 2550 |  | 887 |
| 2019 | 20.10 | 2500 | 2600 | - | 886 |
| 2021 | 20.10 | 2520 | 2740 |  | 923 |

**Water Supply Infrastructure**

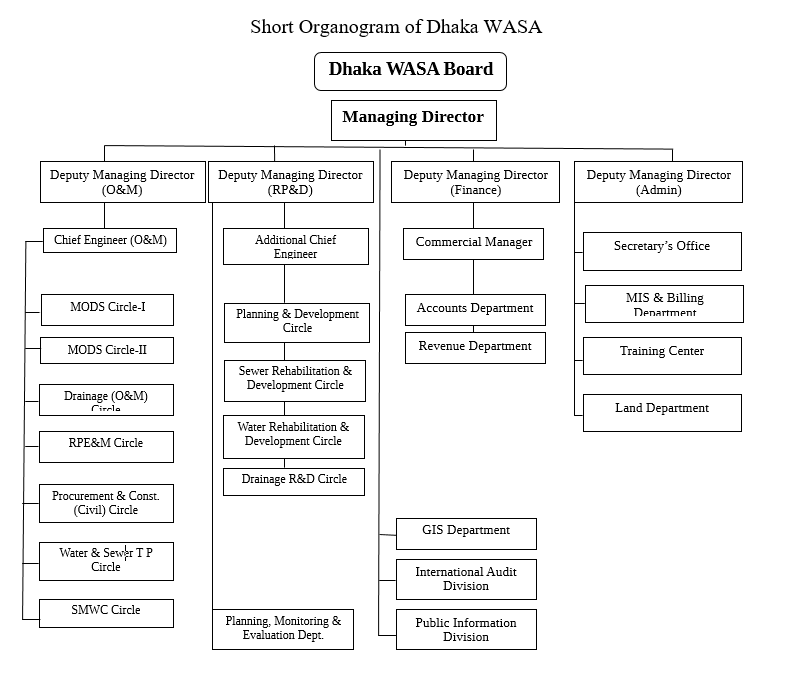
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Item | Unit | 2017-2018 | 2018-2019 | 2019-2022 | 2020-2021 |
| Deep Tube Well | Nr | 795 | 827 | 887 | 896 |
| Water Treatment Plant | Nr | 4 | 4 | 4 | 5 |
| Water Production/Day | MLD | 2450 | 2500 | 2550 | 2560 |
| Water Line | Km | 3600 | 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 |  |



**2.9 Why DWASA Should Implement Automation:**

* Reduce Costs - To reduce labor cost, DWASA should turn to automation. Since machines and computers can do complex tasks quickly, DWASA can skip hiring additional staff for simple needs.
* Save Time - Time equals money. This is why all companies should treat time like gold. Sometimes staff spends countless hours doing simple tasks. This not only decreases their morale, but it also makes them feel overworked. Having a machine perform tasks for employees will allow them to spend their time doing more important jobs.
* Better Customer Service - In today’s digital age, customers do not tolerate bad customer service. Revenue will start to slip if customers cannot reach service providers easily. To achieve this, DWASA can turn to automated e-mail services, message chat-bots.
* Enhanced Workflow - By automating business processes, DWASA can execute operational activities efficiently. Since machines will take care of monotonous tasks, your employees can focus on main business processes and ways to generate more revenue. Connecting all automated processes will also shorten workflow by eliminating unnecessary steps.
* Satisfied Employees - Nobody likes to do repetitive tasks all through their career. Having an automated workflow will liberate staff from doing so. In turn, it would make them happier and more satisfied since the machine will be doing all the boring tasks. If employees are happy, they will become more productive.
* Situational Awareness - Automating business process will enable DWASA to access information in just one click. It will also be easier for you to track and monitor processes.
* Better Quality - Customers expect you to deliver consistent quality products and customer service. Automating your business will ensure that every action is the same.
* Automation also promotes consistency. This way, all customers will experience the same level of service from your company. With no increase in production cost and time, you can focus more on improving products or services.
* Improved Insight - Integrating analytics is one of the most effective strategies to get to know your customers. Knowing more about your customers’ behavior will allow you to identify which campaigns yield the best results.
* Embrace New Technology - Many people are hesitant about integrating new technology into public sector. However, making way for a work culture that welcomes technological change will be better for public service in the long run.
* Reduce System loss and Unethical Practices - With automation we can achieve real time data gathering. Instant data can be turned into useful information by automated processing, which is easy to be analyzed by DWASA management. Management then can take decision to change processes that causes ineffective and inefficient works to reduce system loss (Any loss of water, electricity, machinery, materials or manpower at Water production facilities and distribution network system).
* Improve Span of control - The span of control is the number of subordinates a supervisor manages within a structural organization. Introducing automated business process concepts has a considerable impact on the span of control. Improved Span of control can reduce cost.



***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. Dhaka WASA is not a business oriented profit focused organization. Service at various divisions and job responsibilities: -

**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. We had to visit those sites regularly during rainy season.
3. Planning, Tendering, Evaluating, Procurement or Purchase for Drainage Electrical-Mechanical Operations and Maintenance Works.
4. Supervise over DWASA staff and contractors at work and quality control.
5. 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.
3. Excavation and Re-excavation of canals.
4. Eviction of illegal structures canal land or other property of Dhaka WASA drainage facilities.
5. 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 operators 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.
2. Attempts were taken to modernize, mechanize and automate drainage works.
3. Introduction of digital GIS system and software.
4. 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.
5. 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,
2. Contacting with related stakeholders, government authorities, local people related to project site.
3. Planning, Tendering, Evaluating, Procurement or Purchase for Drainage Electrical-Mechanical Operations and Maintenance Works.
4. Excavation and Re-excavation of canals.
5. Eviction of illegal structures canal land or other property of Dhaka WASA drainage facilities.
6. Budgeting, Financial management of project funds.
7. 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 city.

**Job Responsibilities:**

* 1. Planning, Tendering, Evaluating, Procurement or Purchase for Drainage Electrical-Mechanical Operations and Maintenance Works.
  2. Managing Construction works of pipe sewer lines and manholes at old Dhaka area.
  3. 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.
2. I also prepared documents for required land acquisition for a sewer lifting station at Golaphbagh, Dholaipar area.
3. 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.
3. Inspection & Testing for Quality assurance of various works and supply.
4. Supervision, Inspection and Management of Work-site and Office works.
5. 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 and 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.
5. Web and Computer based E-GP and digital web-based file/Nothi management by DWASA.
6. Microsoft office suite software package by DWASA and training center.
7. Budget planning, budget management and implementation by training center.
8. Planning, Modeling and Designing of Draining system by Vitens Evides International and training center.
9. Asset and Inventory management by software-based systems by Vitens Evides International, Vei-Dutch Water Operators and DWASA.
10. Water distribution network - design, operation and maintenance by Water Operators Partnership.
11. Gender role in Water policy making by Water Aid Bangladesh, Water & Gender Alliance.
12. Procurement management, PPR PPA, local and international bidding, vendor management, contract management – 21day training hosted by Engineering Staff College.
13. Office manner, staff development, personal skill development by training center.
14. Time management and Emotional Intelligence by training center.
15. Personal and Official financial management by training center.
16. Divisional procedures by training center.
17. Non-revenue water management and implementation of SCADA by training center.
18. Organization management and Leadership Training by WOP and MDF consultant & Training center.



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



**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.

**4.2 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, Salary and Income Tax Statement /Certificate 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.

**4.7 Employee Leave, Pension, Salary Statement:**

**4.8 District Metered Area (DMA) / Water distribution network system monitoring, management and control with SCADA**

District Metered Area (DMA) Approach and Non-Revenue Water (NRW)

Reduction in DWASA:

Dhaka WASA has already started establishing DMA concept which is new and

Innovative in the South Asia Region. Dhaka WASA has been providing dedicated

service for safe water to the city dwellers.

The first water treatment plant was established by Nawab Khaza Abdul Ghani in

Chandni ghat named "Dhaka Water Works" in the year 1874. Which is also the 1 st water

treatment plant in South Asia. From then the piped water supply was started in Dhaka

city.

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.

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 TA 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.

What is DMA:

> DMA is a hydraulically isolated area.

Interconnectivity with adjacent DMAs with provision of export or import

facilities through DMA chamber.

Conjunctive use of ground water & Surface Water.

>

Controlling and monitoring water balance.

A

Maintain pressurized system for 24/7 water supply

Minimum NRW.

Criteria for selection of the DMA boundaries are:

Selection of area for establishment a DMA

At least one or more DTW with in the DMA

Surveyed and Model designed for selected DMA

Rehabilitate the existing whole network by HDPE pipe.

Upgrade the pumping station.

X All illegal house connection must legalized.

Under Dhaka Water Supply sector Development Project (DWSSDP) a total of 47 nos.

of DMA was established in 6 MODS Zone of D'WASA. In the project total 2456 km

of water line was rehabilitated and 1,06,662 numbers of house connection was shifted.

The average NRW became 5% and 5.4 million people are getting benefit from the

project.

Achievements of DMA establishment are:

Pressurized water supply for 24/7.

All illegal house connections are legalized.

Average Water loss (NRW) became 5%.

Assured portable water.

. No further use of suction pump.

. .

Reduced electricity cost of consumers & D'WASA.

.. Decreased health cost.

Increased of DWASA Revenue.

Water Supply provided in LIC/Slum Area.

-> Easy operation & maintenance.

The achievement not only benefited to Dhaka WASA only, it is now becoming an icon

in the South Asia Region. Thus, the high-level delegation from India and Srilanka team

visited the DMAs to share knowledge and experience to introduce the innovative

concept to their water supply system. Both the teams highly appreciated the lessons they

earned from the experience of DWASA and they planned to replicate the DWASA's

successful experience in their countries.

The ADB mission in September 2015 noted that Dhaka is the first City in South Asia

to have achieved such high level of performance in NRW reduction and 24/7 water

supply and has become a role Model for other cities in the South Asia.

Dhaka WASA expressed that next challenge would be to sustain DMA Management in

order to keep low NRW.

Pressure balancing in the water supply distribution network - A properly designed

water supply network demands a hydraulically balanced system to have reasonably

uniform pressure over the entire command area of the network. This will ensure even

distribution of flow to all the consumers. Present water supply distribution network

lacks in this aspect. With several areas having very low pressure in the pipeline, while

certain areas experience high water pressure. Consequently, flow available to the

consumers is not uniform. Installation of electronically controlled pressure control

devices (pressure reducing valves/pressure sustaining valves etc.) at strategic

locations will improve upon the pressure distribution in the network and in turn will

improve functional efficiency of the system.

> Providing continuous (24/7) water supply-Wherever water supply is not

continuous, consumers tend to hoard water an apprehension of delay in next supply

During next time of supply, they discard the old water hoard fresh water once again.

Consequently, in case of intermittent supply, water loss is much higher.

DWASA has planned to undertake the project of converting present practice of

ntermittent water supply system to continuous pressurized 24/7 water supply system

for the entire city.

. Use of energy efficiency pumping machineries- this will ensure reduced power

consumption at different locations; in turn will reduce the recurring operational cost.

. Water quality monitoring-DWASA's long term goal is to monitor and network water

quality in real-time, so as to detect contamination early and control its spread to mini-

mize impact to customers. There is a need to move away from depending on custom-

ers to act as sensors for water quality issues like discolored water, bad smell, pres-

ence of sediments, taste etc. Furthermore, in today's volatile social-political climate,

we need to be even more vigilant to deter and prevent acts of sabotage that may

threaten the quality of the water supply. As a part of water quality management,

DWASA plans to enhance chlorination system, regular water quality monitoring,

implementation water safely plans, water quality safeguard etc.

Another technical innovative approach introduced is the Trench Less Technology,

which brings the tremendous quick pipe installation progress with minimum distur-

bance to the city dwellers & traffic and reduced cost for road cutting, damage & resto-

ration. It added a dimension & technical viability of pipe installation in busy city like

Dhaka. When all Zones of Dhaka WASA will come under DMA system it will be a great

achievement in terms of technical sustainability, customer's satisfaction, economical-

ly viable water supply system. In the course of time sustainable DMA Management

capacity of Dhaka WASA will be enhanced to run the system smoothly.

The DMA approach not only facilitates Unaccounted for Water (UFW), but also helps

in maintaining assets for longer duration and enables better pressure management,

better water quality and continuous water supply. DMA Managers, Deputy Managers

and Licensed plumbers has already deployed for individual DMAs for installations of

fresh connections, carrying out necessary repairs also will be responsible for any

illegal connections in the area to keep the DMA sustainable

**5.9 e-Government Procurement (e-GP) System**

This is National e-Government Procurement (e-GP) Portal of the Government of the People's Republic of Bangladesh.

**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), 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 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.

**Important Messages and Support Details**

* The eGP guidelines were approved by the Government of the People's Republic of Bangladesh in pursuant to Section 65 of the Public Procurement Act, 2006. As per approved guidelines, e-GP system has been introduced and implemented. The eGP system has been developed and introduced in two phases.

* In the first phase, e-Tendering has been introduced on pilot basis in the CPTU and 16 other Procuring Entities (PEs) under 4 (four) sectoral agencies, namely: Bangladesh Water Development Board (BWDB), Local Government Engineering Department (LGED), Roads and Highways Department (RHD) and Rural Electrification Board (REB). The system rolled out to 291 PEs of those 4 sectoral agencies is now expanding to all the PEs of the government up to Districts and sub-Districts level.

* In the second phase, e-Contract Management System (e-CMS) has been developed and introduced and implemented. eCMS is a complete electronic contract management system which provides platform for preparation of work plan and its submission; defining milestone, tracking and monitoring progress, generating reports, performing quality checks, generation of running bills, vendor rating, generation and issuance of completion certificate.

**5.10 Digital/Online Portal for office work management. nothi.gov.bd or For Dhaka WASA - https://dwasa.nothi.gov.bd/ Working with digital/online/paperless documents, letters, files etc.**

**5.11 Water ATM**

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

Dhaka WASA is a service oriented public authority, main goal of Dhaka WASA is to provide safe potable water and safe sewerage system to Dhaka city dwellers. But providing any service to the dwellers of a megacity is a challenge. Sometimes even with best efforts citizens may face difficulties to get water to their desired places or there may be problem with sewerage system or any other problem related to services of Dhaka WASA. That is the reason Dhaka WASA had maintained several complain centers at various offices to serve various areas of the city.

**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.

**7.3 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:** Dhaka WASA signed a contract with a vendor to carry out these services according to DWASA requirements and yearly cost is between 7500000 to 10000000 takas. As the agreement the vendor will provide manpower, equipment, software, communication costs etc. Software cost is 500000 takas.

**7.4 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 note down the problem into a computer system with brief description and then issue a ticket number assigning to it.

The computer system then send 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.

**6.1 *AUTOMATED &* Biometric Time Attendance MANAGEMENT System (Face Detection/Fingerprint):**

Time attendance systems are used to track and monitor when employees start and stop work. A time and attendance system enables an employer to monitor their employee working hours and late arrivals, early departures, time taken on breaks and absenteeism. It also helps to control labor costs by reducing over-payments, which are often caused by paying employees for time that are not working, and eliminates transcription error, interpretation error and intentional error.

**6.2 Beginning of Biometric Attendance:**

July 2018, Dhaka WASA started its journey with biometric digital time attendance. Started with only 5 devices at Dhaka WASA head office (WASA Bhaban) 2 Number Devices at Saidabad Water Treatment Plant (SWTP)-1 & 2. Before COVID-19 Pandemic lockdown - Total Location covered: 32, Total Bio-Metric (Fingerprint) Device Installed: 48 (Including WASA head office).

**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.

Semi-Outdoor Multi-Biometric Time Attendance & Access Control Terminal which supports 3,000 face templates, 4,000 fingerprint templates and 10,000 cards – were to be installed.

New era of Face detection Time attendance system started on 2nd June 2020. DWASA installed 2 face detection devices at SWTP-1 & 2. Installed face detection attendance system at WASA Bhaban (Head Office) as well as different MODS zone, revenue zone, WTP etc. location.

**6.3 Customized Web based Realtime Attendance Software for DHAKA WASA:**

Connected Device in Different location WASA offices-

* WASA Bhaban/ Head office: 2 Devices
* MODS Zone-3 & Revenue Zone-3: 1 Device
* SWTP-1: 1 Device
* SWTP-2: 1 Device
* Total Device Connected: 5 Devices

**Features of present systems:**

* Dashboard for Management - A dashboard is a type of graphical user interface which often provides at-a-glance views of key performance indicators (KPIs) relevant to a particular objective or business process. In other usage it is considered as a form of data visualization tool. Digital dashboards allow managers to monitor various departments in their organization. The “dashboard” is often accessible by a web browser or an application and is usually linked to regularly updating data sources.
* Scheduled Reporting to Management by E-Mail – all the reports are automated to be sent to preset management members.
* Online access of Staff & user – all data can be accessed by internet if required.
* Android & iOS Application – Digital Apps for various devices can be developed.
* SMS alert – important data, information is automated to be sent to preset management members via SMS.

**6.4 Centralized customized Software feature:**

**User Management:**

* User administration – Creating new users, input various information, photograph entry, vital information about them, login authentication / authorization.
* Multi user Role access with different privileges - Users with single or multi user roles with different specified work can have only one or multiple user accounts.
* Role Based Access Control – various roles may allow or deny entry into the system from different devices or accounts.
* Role Based Input Control - various roles may allow or deny data input into the system from different devices or accounts.

**Staff Attendance:**

* Staff Attendance Entry – Only previously set employees can give easy automated attendance.
* Customized Reporting of Section Wise & Individual Staff Attendance – as required by managers.
* Daily Absent & Absconding SMS Notification to Staff - as required by managers.
* Customized Reporting on Staff & Assigned Subject Mapping - as required by managers.

**Software Features:**

* Complete Admission Process – Easy process for initial entry of a new staff or user.
* Staffs Details Profile – Detail staff profiles can be stored and used.
* Customized Reporting on Staff – Various types of reports for variety of staff or users.
* Attendance Automation – only fingerprint or face placement needed for attendance, no manual record keeping or sign in or authorization is needed for attendance.
* Staff Migration between Branch, Shift, & Section – when staffs get posted or promoted to a different office or to a different role.
* Staff Management – This system can also be connected to other digital management tools.

**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.

**6.5 Additional Software Features:**

* Easy to use & fully customized, Ability to add employees easily.
* Reduces HR daily work & increases productivity.
* Integration attendance with various fingerprint or face detection devices.
* Tracks up to date work status.
* Centralized monitoring & Enhanced Reporting Capabilities.
* Employee personal information connected with MIS software.
* Attendance Management, Holiday Management & Leave Management -
* Employee wise leave day, General shifting and Employee wise shifting.
* Daily summary attendance information.
* Monthly in/out report, Monthly absent, present & leave report, Monthly late report.
* Employee over time (OT) calculation.
* Monthly over time (OT) report & Monthly summary OT information.
* Monthly summary attendance information for management.

**6.7 Challenge to implement this software:**

* Old Fingerprint Attendance Device connectivity is a problem, as they have older hardware and old software not used for integration.
* All Pump House connectivity to this software - almost 1000 water pump have various challenges.
* Different Time Schedule in different office/zone – this increases the complexity if software.
* Others software like Leave management integration – old leave management web app portal was not made to be integrated with the new software.
* Roaster duty/ Roaster Shifting changes almost every month for a large portion of workers, changing duty or shifts and office time for them may cause error for other staff data.
* 24hours duty schedule (6AM-2PM, 2PM-10PM, 10PM-6AM) and 12 hours schedule (8AM-8PM & 8PM-8AM) and General Duty (9AM-5PM) - these creates additional data sets.
* Data Collection and maintenance covering whole of DWASA – employees at all offices of DWASA have to be covered, that is a big task.

**6.8 Reasons to track employee hours:**

* Regular pays or Wages paid to employees are determined by the number of days or hours worked. Employers will want to be sure that they're accurately paying employees whether they're in the office or in a remote location.
* Overtime paid to most workers, whether hourly or salaried, are eligible for overtime pay when they work more than 40 hours per workweek. So, time tracking is important.
* Employees receive certain breaks & rest periods during their shifts. Tracking hours can show that employers are compliant with rules in providing these breaks.
* Companies that award paid time off for personal, vacation, and sick days based on work days, must calculate the earned time correctly.
* Tracking hours can help determine whether workers are arriving to the office on time.

**6.9 Benefits of automated time and attendance systems:**

* The biggest benefit of digital time and attendance tracking systems is that they eliminate the need for manual records. All the time data is collected electronically, with the desired data processing and calculations on demand.
* Since time and attendance software systems are automated, they cut down on the chance of human errors in calculations of labor and job costing. They also free up the person who was responsible for time and attendance tracking before to work on other tasks. Additionally, with fewer error comes lower risk of noncompliance with labor laws and regulations.
* Another positive is that these systems manage all your time needs – employee attendance etc. – in one program. This can be both cost-effective and a boost to productivity, as employees won't waste time toggling between different programs to ask for time off or look at their schedules. In short more efficient time tracking.
* With time and attendance software, we don't have to round the hours employees worked to more convenient numbers that work better with [payroll calculations](https://www.businessnewsdaily.com/12008-how-to-process-payroll.html) and pay rules. Our software of choice will automate and ensure the accuracy of all wage payments. In short more accurate payroll processing.
* Most time and attendance tracking software platforms integrate with many other human resources tools, so they improve all workforce management tasks, not just attendance-related processes.

**6.10 These are the main drawbacks of automated time and attendance systems:**

* Cost- The biggest drawback of time-tracking systems is that they are more expensive than the manual method where employees write down their hours each day.
* Errors-Even the best software programs may occasionally malfunction. There's always a mild risk of tracking or calculation errors when you use any software for time and attendance systems.
* This system is heavily reliant on electricity supply and communication network.

**6.11 Future activity related to automated time and attendance systems:**

* Administrative, salary and other stakeholders should get through training on all hardware, software and how to use them for maximum benefit of DWASA.
* Software should be commercially available and licensed. Customization of software can be developed after gaining experience.
* All employees (Permanent, temporary, Master-roll, outsourced, contractual) should be included in this system.
* All biometric attendance machines should be covered by monitoring camera also.



***CHAPTER 06 – 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.

**Below are four important components of a MIS:**

**Information system:** A mix of hardware, software, personnel, and infrastructure that aids in the collection of data stored in the MIS. The information system component allows employees to interact with the system for information collection.

**Database management system (DBMS):** Software that handles the storage, retrieval, and updating of data in a computer system. It also includes the physical databases where information is stored after capture. The amount of data needing to be processed and stored will determine the type of DBMS used in the MIS. For example, a small DBMS may work well for a personal computer, but a larger DBMS will be needed for larger and more complex machines.

**Intelligence system:** Deals with the processing of collected data and presenting it in a way that is easily comprehended. This is sometimes referred to as business intelligence, which stores human knowledge and uses the logic to formulate quick solutions for future problems.

**Research system:** Identifies the main management problems within the organization and provides alternative solutions, helping ensure all possible options are analyzed and the appropriate decision is made.

**Some of the important roles of the MIS:** Companies invest in a MIS for the following reasons-

* Increases operational efficiency
* Adds value to existing products and services
* Brings about innovation and new products and services development
* Identifies strengths and weaknesses within a company due to reports and records
* Provides access to a singular database that holds the data necessary for day-to-day operations
* Supplies a higher level of accountability, as inputs and moderations are logged and authors noted

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 |
|  | Network 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:**

**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- you need to 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.

**Geographical Information System (GIS):**

Following functions were implemented-

**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. However, a DMA can also be created by permanently disconnecting pipes to neighboring areas. Dhaka WASA has already planning to build about 144 DMA 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 using GIS tools.

**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.

**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 – 25000 households done.

**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 |  |  |
| Computer-GIS Total Budget | 242.64 | 253.79 | Lakh Taka |  |  |
| Capital Expenditure | 141.80 | 154.59 | Lakh Taka |  |  |
| Operating Expenditure | 100.84 | 99.20 | Lakh Taka |  |  |



***CHAPTER 07 - CASE SUDY: Opportunity of Automation at bottle water plant***





***CHAPTER 08 – 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 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 NRW & 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. | **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 & WQM 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 lower than the production cost. |
| **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.  •Devolution of some HQ responsibilities to MODS Zone Offices (Mini-WASAs) 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. | **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.

2. All staff, from senior management to the crew, should understand the basics of Computerization, SCADA and MIS, GIS, AIS Automation systems at various levels.

3. Building the understanding of top-level management on Automation at every possible place.

4. Middle management and staff must understand their roles and responsibilities on automation, since it requires a long-term, combined effort from all departments in the utility.

5. To establish any automation specially Field level SCADA, MIS, GIS, AIS and related work should follow the guideline and verified 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. Every year the team should be checking technological change and after 5 years should upgrade the Automation masterplan.

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

8. Intensive training should be organized on Automation at various stages of organizational use for various levels of staffs and managers.

9. Cost benefit analysis of capital investment and maintenance cost should be formulated and only investment which adds values to products or services or saves expenditure- should be completed.

**8.3 Conclusion:**

However, Automation and SCADA is not only a brand-new concept using ICT but also is a tool for technology-based management concept. Therefore, primary and systematic operation and maintenance of water supply system is very critical issues above all. Integrated Water operation control and command platform is a future oriented water management strategy by integrating ICT based water management technology. So, it is managing the entire process of the water production source as well as water cycle scientifically and systematically above all. Aligning with master plan for automation will best impact on Smart water management systems. The outcome will be sustainable provision of a more reliable, improved and climate-resilient sustainable water supply in Dhaka city. Sustainable managerial capacity of district metered areas enhanced DWASA's managerial and technical capacity will be strengthened to keep Smart Water management Systems.

***Conclusion:***

From the overall discussion it can be said that, Dhaka Water Supply and Sewerage Authority (DWASA) as an autonomous government institution is working very hard for providing water supply, sewerage and drainage service to almost 2 million people of the Dhaka mega city. Its activities are not faultless because of financial, technical and technological challenges like - regular increase of Dhaka WASA geographical are, water supply network, drainage network and other activities. Various initiatives including strong monitoring by use of automation have been taken to ensure rapid improvement of its functions. Dhaka WASA is increasing number of water refinery station, surface water collection from city side Rivers, operating regular mobile court against bill defaulters and illegal connections etc. Dhaka WASA also achieved success in water production and supply through good administrative structure and efficient management system by using modern technology. Less political intervention and active participation of skilled employees may provide Dhaka WASA with the capability to fulfill total water demand as well as creating safe environment in Dhaka by near future.

APPENDIX:

***References:***

***Books & Articles***

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Urban Research in Bangladesh: Review of Recent Trend and an Agenda for the 1990s Nurul Islam, Centre for Urban Studies

 Urban Centers in Bangladesh: Trends, Patterns & Characters Md. Abdur Rouf & Sarwas Jahan

***Field Work & Collected Documents***

      Visit to Dhaka WASA Head Office, Dhaka

      Dhaka WASA website: www.dwasa.org.bd

      Interview from

* Deputy Managing Director (Technical & Development), Dhaka WASA
* Chief Accounts Officer, Dhaka WASA
* Deputy Secretary – Public Information Department, Dhaka WASA
* Chief Engineer, Dhaka WASA
* Chief Training Officer, Dhaka WASA
* Commercial Manager, Dhaka WASA

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      Annual Report of Dhaka WASA (under preparation) 2008 – 2009

      MIS Report of Dhaka WASA, October 2009, December 2009, January 2010

      Managing Director’s Speech & Presentation on DWASA in Singapore

      Dhaka WASA Institutional Assessment Report,

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      Dhaka WASA “Revised Budget for 2020-21 and Budget Estimated for 2021 – 22”

      Urbanization: Definition

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