A RESEARCH STUDY ON HUMAN RESOURCE EFFICIENCY OF AN ORGANIZATION ENGAGED WITH WATER SUPPLY, SANITATION AND WASTEWATER MANAGEMENT ACTIVITIES.

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"In the name of Allah the most beneficial and merciful".

DEDICATION

I dedicate this document to my family and my teachers. The endless support and affection of all of these people has resulted into the fruitfulness of my research work.

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All praise to Allah Almighty, Most Gracious, Most Merciful, Who, Alone, brings forgiveness' light and new life to those who call upon Him. Peace and blessings of Allah be upon Prophet Mohammad, His Slave and His Messenger.

"Truly strong is the Grip (and Power) of thy Lord it is He who creates from the very beginning, and He can restore (life).And He is the Oft-Forgiving, Full of loving kindness, Lord of the Throne of Glory, Doer (without let) of all that He intends" (Qur'an 85:12-15).

I offer my humblest thanks from the deepest core of my heart to Allah Almighty and the Holy Prophet Mohammad (PBUH), the most perfect and excelled amongst all human beings, ever born on the surface of earth. This research work has come up as the fruit of a long and hard journey in obtaining the degree of Masters of Studies in Environmental Science. Today at the completion of my work would like to pay my gratitude to a few people who made my journey easier with the words of encouragement and by offering different opportunities to look at and to expand my vision and ideas. Firstly, my humblest thanks to Dr. Rashid Saeed, my supervisor in this research work, for his dexterous ideas, guidance, support and patience towards me. I would like to say a very special thanks to Mr. M. Iqbal for his valuable suggestions and support which has motivated and helped me to compile up my work. I am deeply indebted to Mr Eithsham-ul-Haq for his support and expert advice which improved my research skills. Bundle of thanks to Mr. Ijlal Ashraf for his cooperation and learned guidance. My deepest gratitude goes to my family for their unflagging love and support throughout my life and carrier. I feel blessed for the affectionate encouragement by my family, which kept me firm at the times when I felt that I would give-up.

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ABSTRACT

The aim of this study was to study the structure of an organization involved in water supply and management involving the idea of water as a common good. Moreover to review goals, targets and the services provided by the organization, and determining the level of commitment of the organization's management to provide services to its customers. One of the main purposes of this study was to determine the over all efficiency (level of HR's performance) of the organization, keeping in view the extent and nature of work of water supply, sanitation and management organization/ department. Also analyzing whether its existing human force (workers) is capable to fulfill the responsibilities and duties assigned to the organization and/or the organization needs to hire more people. In this way it was aimed to find out the level of efficiency of the said organization. Moreover, it was planed to determine the role that the workforce of an organization could play in efficient service delivery. The main need for this study was felt as in the past no consolidated effort was made to monitor the relationship between the organizational efficiency and the role of its work force in a good service delivery system. Moreover, a dyer need was felt to trace out the importance and affects of good human resource management practices, required to increase the efficiency level of RWASA. To carry out the research on the Human Resource efficiency of RWASA 12 Union Councils of the study area i.e. Rawalpindi were selected randomly. About three houses were visited in each of the selected UC to collect the primary data i.e. the pattern of consumption of water for drinking purpose. The main methodology adopted was by means of interviewing the Tube-well operators, the area supervisors and also the customers of Rawalpindi WASA. Different co-relations were found after analyzing the data collected through various surveys. It was found that in Rawalpindi, there was a severe shortage of clean drinking water at various points. Most of the water being supplied for daily household use was either contaminated or was insufficient to fulfill the daily household requirements of the community. The major reasons behind these problems were either poor organizational structure or inefficient management of water supply channels. Moreover in the water supplying and sanitation Authority (RWASA) there was a deficiency of skilled and trained manpower at all levels of the organization. It was learned that the top management and the employees were incompetent and did not show any interest to improve the existing conditions of the organization. Due to all these problems the development and management of the existing water reservoirs has also became a challenge. It was further learned that out of the various other factors either directly or indirectly responsible for accelerating the water stress condition in some of the areas of the city, one of the factor was the inefficiency and insufficiency of a proper, trained and well managed work force.

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INTRODUCTION

It had been known since long that fresh water reservoirs were of vital and finite nature and therefore there had been a great concern regarding the socio-economic, political and environmental security of human life and regulation of ecosystem activities.

The multi-sectoral nature of fresh water resources (fresh) development and its economic utilization had been discussed and recognized in the plan of action adopted at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, under Agenda 21. The agenda included recognition of the importance of the trans-boundary water resources and adoption of an integrated approach to the development, management and use of these resources. It also demanded for a strong cooperation among all the states of the world community to conserve these dwindling resources.

1.1 Current World Water Situation

It had been estimated that almost 80% of the Earth's surface is covered with water, but out of that only 1% is fit for drinking purpose, i.e. fresh water. According to the CIA Global Trends report, by 2015, it had been estimated that almost 3 billion people i.e. nearly half the world's population would be living in the countries that were "water stressed," this means that the amount of water they can have for their daily use was less than 126 gallons per day per capita (USAID, 2003).

The United Nations had estimated that if the rate of water consumption continued to go on as they were today then 2.7 billion people would face severe water shortages by 2025. Equally concerning, the World Health Organization had estimated that the demand for fresh water till 2025, was expected to rise by 56 % more compared to that what was currently available (USAID, 2003).

It was recently reported that one in every four people in the developing world had no access to safe water supply (i.e. more than 1.2 billion people), the picture was worsened by learning that every two in five people lack access to improved sanitation (connection to a public sewer or septic system, or access to a pour-flush latrine, simple pit latrine, or ventilated improved pit latrine)(USAID,2003).

1.2 Water Availability and Distribution in Pakistan

The current water use percentage in Pakistan is given in the table 1.2.1 below;

According to the IUCN-Pakistan, the total amount of water available to Pakistan, through Indus and its tributaries was 154 MAF and an additional 41.6 MAF amount of groundwater has been extracted, annually. Out of the total available surface water (154 MAF), almost 40 MAF flowed to the sea and was wasted, less than 2 MAF was being used for industrial and drinking water supplies, 105.5 MAF was being diverted for irrigation and 8-9 MAF of water was lost in the system and evaporation. In case of the groundwater, more than 90% of the 41.6 MAF was being used for irrigation; the remaining component served the industrial and drinking

water consumptions. The figure 1.2.1 (below) shows the water use patterns in all the three sectors i.e. household, industrial and agriculture.

Table: 1.2.1

Water use patterns

Drinking [illegible] urban areas)	[illegible]	[illegible]	[illegible]
Drinking water (in [illegible]	[illegible]	[illegible]	[illegible]
Industrial water	[illegible]	[illegible]	[illegible]
Irrigation	[illegible]	[illegible]	[illegible]

Source:IUCN(Pakistan).

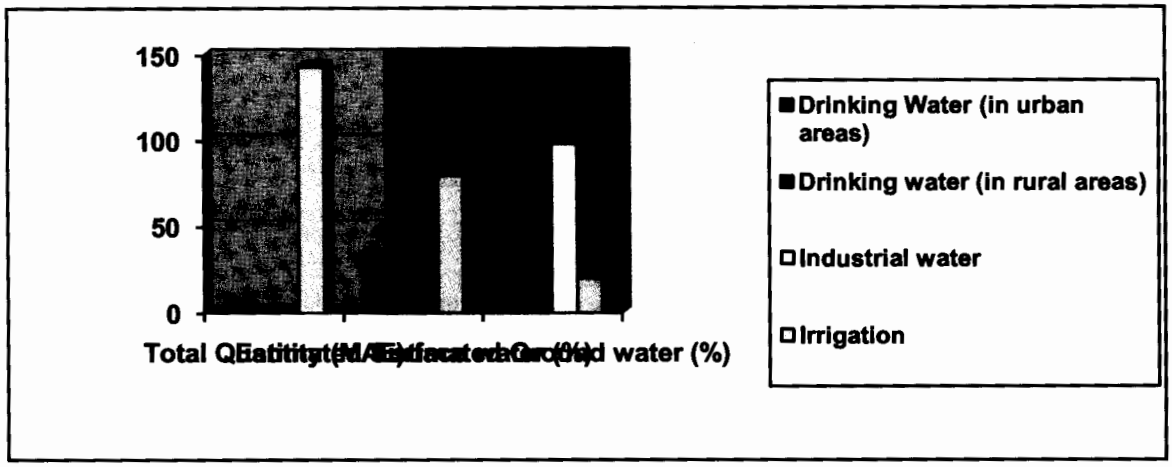


Figure 1.2.1: Water use patterns; industrial, household and agriculture.

According to Abdul et al., 2004 Pakistan had limited water, therefore, in order to meet the food and fiber requirements of its growing population there was a serious need to adopt effective technologies and structures. This was felt important

as to ensure that these resources were being utilized efficiently. It was suggested that this would be made possible by introducing in the large

Surface Storages through construction of Small and Medium Dams on small rivulets. Moreover, the same goals would be achieved through the development of groundwater reservoirs and through On-farm water management methods. It was further proposed that for planning and conducting all such development activities there was a serious need for well trained and qualified professionals and skilled laborers.

1.3 Importance of Clean Water

Although water was considered to be an inexhaustible commodity, but to ensure its unrestricted supply for all times it was necessary to conserve the quantity and quality of water, and to conserve and use these resources very carefully.

Besides availability and supply the cleanliness of water was also one of the determining factors in community's health as water was one of the major components which was involved in all the activities of our day to day life i.e. from washing, bathing and household uses to industrial and agricultural uses, every where we needed water (World Health Organization,2009).

The water when it was exposed to the atmosphere gets contaminated with many impurities. Also the human activities, improper sanitation and management of freshwater resources were sometimes responsible for the contamination of these freshwater reservoirs (Khan, 2010).

Besides this it was investigated that one of the major factors responsible for poor management of water reservoirs included the lack of responsible behavior of the organizations and departments (government or private sector) related to the water management and supply. Therefore the arising problems were not understood technically and were not solved at the right time. For this reason it was suggested that not only the water resources, but the human force of an organization was also needed to be managed and trained efficiently (Khan, 2010).

It was found that due to inefficient management approximately 80% of the municipal and industrial untreated water returned to the rivers, nullahs and streams without being treated and this resulted in deterioration of the reservoir water quality. Hence was responsible for many water borne diseases (most of the diseases also result due to the use of contaminated water) (Abdul et al., 2004).

1.4 Condition and Problems Related to Water Supply in Pakistan

Pakistan stands amongst those developing countries, which have a severe water contamination problem. Most of our cities, towns and villages lack well-organized pollution controlling department or organization.

Besides those that already exist have a very poor organizational structure, most of them do not have adequate manpower, equipments, machinery, labs and funds, so as to maintain and manage the quality water supply channels.

A part from this there is very little or no public participation in the decision making processes, and the political influence also on its peak. Further, it has been witnessed that the managing authorities and the Government departments put a

deaf ear to the public complaints and vows. Moreover, lack of access to uninterrupted supply of water increases the costs of household income and also results in wastage of the productive (working) time of a family (which a family then has to assign to obtain water for their daily usage). As it could be witnessed in most of our small cities, villages and in many of the main cities; women, men and children standing in lines for hours, with buckets, bottles or drums in their hands for collection of water from the community taps for their daily household use.

This not only indicates the plight of a common man to get the basic amenity of life but also speaks of the incapability and incompetence of our water supplying, managing and regulating authorities. This is the result of the short term planning and mismanagement which has resulted in the incapability of the responsible men-in-authority to supply equitable water to all the sectors of society.

1.5 Water Supply and Management

Water supply is defined to be a process or an activity by which water is provided for some use, e.g. to a house, farm, factory, business or agricultural land. The activities related to water supply were considered to be designed in such a way as to provide access to and improve the process of supplying clean drinking water equitably to all levels of the community. These activities included improvement and monitoring of water delivery systems, identification and alleviation of the sources of contamination through both large-scale water treatment and small scale or household water use treatment, and source p rotection through improvement or rehabilitation of the tube-wells (WAPDA, 2001).

1.6 Sanitation and Sewage System

Sanitation is the process of eliminating or disposing the wastewater containing human waste of an area (community) in a regulated manner so that there is no risk to health and hygiene of the community.

Sewage system involves the process by which the contaminants are removed from household sewage and wastewater, including both of the runoff i.e. effluents and the domestic wastewater. In this way an efficient and effective sewage system provides for an environment-safe fluid waste stream and solid waste by means of physical, chemical, and biological processes.

1.7 Wastewater and Its Management

The water which has been utilized in such a way that its original nature is altered and becomes capable of causing negative impacts on its quality is termed as wastewater. It includes water discharged from the offices, schools, industries and that from the households etc. Moreover the water utilized in agriculture which is no longer considered fit for human consumption also falls in the category of wastewater.

The proper management of the wastewater includes a proper system for the safe disposal and treatment of the wastewater. For this purpose wastewater treatment plants are utilized that would help to purify the sewage and recycle the wastewater for useful proposes e.g. watering lawns. These wastewater filtration

plants may involve different mechanisms to recycle the wastewater, including the use of water filters and chemical treatments.

1.8 Industries and Water Pollution

The increasing industrial pollution has been tending to control the activities that were aimed to manage and reduce the exposure of the human and environment to the hazardous wastes. Moreover, it was demanded that the discharge of such toxins in the water channels should be cut off so as to reduce the pollution and its devastative effects on the aquatic environment. It was further suggested that a there was a dire need for a proper management and controlling system to address this issue. The most important elements required for this purpose were handling, regulating, transporting, disposing storing and cleaning up of the sewage (WAPDA, 2001).

1.9 Concept of an Organization

It is one of the most complex terms and has a variety of meanings. In a generic sense the word organization is used for the design of any kind of social arrangements between individuals, for achieving a set of goals, regardless of their nature of work/job i.e. no matter if they are farmers or government officials. The main purpose of any organization is the arrangement of its personnel for facilitating its accomplishment about some agreed purpose through the allocation of functions and responsibilities (Robbins, 2005).

"An organization is the formal structure of authority through which the work sub-divisions are arranged, defined and coordinated for the defined objectives." (Luther Gullick).

Organization is also defined as a system incorporating a set of sub-systems (Katz and Kahn, 1978). These sub-systems are related group of activities, which are performed to meet the objectives of the organization. (Robbins, 2005).

The theorists have viewed the concept of organization in different ways. However, all definitions usually contain five common features:

- Composed of individuals and groups of individuals;
- Oriented towards achieving common goals;
- Differential functions;
- Intended rational coordination; and
- Continuity through time.

There are some other definitions of the term "organization" e.g. Leavitt (1962) defines;

"An organization is a specific configuration of structure, people, task and techniques."

Hence the main components of any organization are Man (people), Material (structure), and method (tasks and techniques).The term" structure" refers to the form of departments, hierarchy and committees. An organizational structure directly influences the efficiency and effectiveness of the organization. The term "people" is used to describe the skills, attitudes and social interaction of the members of the organization. By "task" are referred the goals of the individual and the organization.

"Techniques" refer to the methodological approach used to perform tasks. And these require periodic renovation and improvement in order to enhance the performance of an organization and to increase and improve the output/benefits to the people (Robbins, 2005).

Therefore the organizational structure refers to the institutional arrangements and mechanisms for mobilizing human, physical, financial and information resources at all levels of the system (Sachdeva, 1990).

Structure constitutes an integral part of the organization. Nystrom and Starbuck (1981) have defined structure as the arrangement and interrelationship of component parts and positions in an organization. It provides guidelines on:

- Division of work into different activities.
- The link between different functions of the organization.
- Hierarchy in the organization.
- Authority distribution levels and structure.
- Relationship between different authorities (within the organization) and
- Coordination with the environment.

Organizational structure may differ within the same organization i.e. in different departments of the same organization according to the particular requirements. Structure in an organization has three components (Robbins, 1989):

1.9.1 Complexity

Referring to the degree to which activities within the organization are differentiated. This differentiation has three dimensions:

- Horizontal differentiation refers to the degree of differentiation between units based on the orientation of members, the nature of tasks they perform and their education and training,
- Vertical differentiation is characterized by the number of hierarchical levels in the organization, and
- Spatial differentiation is the degree to which the location of the organization's offices, facilities and personnel are geographically distributed.

1.9.2 Formalization

Refers to the extent to which jobs within the organization are specialized. The degree of formalization can vary widely between and within organizations.

1.9.3 Centralization

Refers to the degree to which decision-making is concentrated at one point in the organization.

Apart from the importance of development and improvement in the structural and methodological designs of an organization there is a strong need to develop and improve the human force (resource) of the organization. This is essential in order to achieve the highest level of efficiency and for attaining the targeted goals of an organization. Also such activities would provide a chance to improve and

analyze their productivity and provide them a chance to overcome their weaknesses (Robbins, 2005).

1.10 Concept of Human Resource

There are different definitions of human resource that are given by different writers. William R. Tracey, in The Human Resources Glossary defines Human Resources as; "The people that staff and operate an organization" (as contrasted with the financial and material resources of an organization). Human Resources is also the organizational function that deals with the issues such as compensation, hiring, performance management, training, monitoring and controlling of the activities of employees and also deals with the employees themselves. A single person or employee within an organization can also be termed as "Human Resource" (Wisner & B. Millet, 2003).

1.11 Human Resource Management and Its Importance for an Organization

The process that involves the recruitment, management and provision of direction for the workforce (people/employees) of an organization and is an integral function of an organization is called Human Resource Management.

Human Resource Management, is an organizational function that deals with issues related to people such as compensation, hiring, performance management, organization development, safety, wellness, benefits, employee motivation, communication, administration, training of the people and monitoring and controlling their activities to achieve highest levels of efficiency.

1.12 Human Resource Development Concept and Its Importance in an Organization

Human Resource Development is a development paradigm that is directly related to the rise or fall of organization's working efficiency. It is about creating a healthy and motivating environment in which people can show their mental productivity, creativity by developing their potential to produce results (of their work) according to the demands and interests of the organization.

The real wealth of an organization is its people or its work force. Development is thus about expanding the choice of working methodology that the people (work force of an organization) can adopt according to their ease and ability.

The process of Human Resource Development gives the framework of helping employees by developing their personal and organizational skills, knowledge, and abilities. The process of development of human resource provides such opportunities as employee training, employee career development, performance management and development, coaching, succession planning, key employee identification, tuition assistance, and on the whole the development of the organization.

The main focus and aim of all aspects of Human Resource Development is to develop the most superior workforce so that the organization and individual employees become capable of accomplishing their work goals in service to customers. The key point in enlarging the working choices is to build human

capabilities —the range of methods that people can follow/adopt in order to contribute in the achievement of the goals and targets of the organization.

The process of Human Resource Development can be formally arranged e.g. in classroom training, a college course, or may be an organizational effort planned to bring a positive change. Human Resource Development process can also be informal as employee coaching by a manager within an organization. Human Resource Development and all of these aspects are essential and preliminary for ensuring the health of an organization.

Human development shares a common vision with human rights. The goal is freedom of thought, way of living and working methodology for establishing a healthy and positively progressing organization, and for pursuing capabilities and realizing rights, this freedom is vital. People must be given a free hand to exercise their choices of work according to their capabilities and to participate in decision-making that affects their work efficiency and thus their lives. (FAO)

1.13 Key Activities of HRM

Armstrong M., (2001) stated that the main Human Resource Management activities include;

- Laying strong design for the organization with clear aims, objectives and proper job description/specification (duty description). Moreover, a clear hierarchical structure should be formulated keeping in mind that it must

provide effective communication and decision making at all levels of the organization.

- The HRM of an organization has to make designs for time-to-time checks and balances of all employees at all the levels. This will not only smoothen the way to success in achieving collective goals of the organization on a large scale but would also ensure individual progress through transparent accountability of all the jobs or roles in order to maximize intrinsic motivation and job satisfaction.
- Also HRM has the duty for planning, designing and implementing the designed programs to increase the effectiveness in over all functioning of the organization and its way to adapt to new technologies and positive changes.
- HRM of an organization also performs the function of developing mutual trust within the organizational environment.
- Knowledge management is also an important function of the HRM of an organization and is essential as it provides a chance for increasing the organizational performance and enhancing the learning process.
- Another important function of HRM is the selection and recruitment on the basis of the level of experience, qualification and type of work force, which the organization requires.
- HR is also responsible for getting better performance and results from the organization on the whole, including both at the individual and collective level.

- Training need assessment is also an important function of the HRM. Providing the employees chances to develop their capabilities, improve their potential and enhance employability by provision of learning opportunities. This will increase the capacity of the managers to make a significant contribution in achieving organizational goals.
- Besides providing a chance to excel the HRM also ensures the full participation and involvement of the employees in the decision making in an organization. The HRM is responsible for horizontal, upward and down-the-line communication
- One of another function of HRM is developing the pay structures and systems, which are equitable, fair and transparent. Also formulating plans for giving rewards and punishments to the employees on the basis of their performance.

1.14 Rawalpindi WASA

Rawalpindi WASA is responsible for providing water for the daily use to the community of Rawalpindi city. It was established as a result of the requirement of one of covenants of the ADB (Loan No. 1260-PAK (SF)) for the "Urban Water Supply & Sanitation Project. WASA took over of Filtration Plant and Conductance

Main from PHED on 1st July 1996.WASA was Fully Established and became Operational from 1st April 1998.

1.14.1 Organizational Structure Of RWASA

A Managing Director heads the organization of WASA and there are three Deputy Managing Directors i.e. DMD (Engineering), DMD (Finance, Admin & Revenue) and DMD (Operation & Maintenance). The number of WASA employees in various categories is 4226. The Provincial Government allocates the organization's source of property tax to it and expenditure and procurement sanctions are carried under the financial rules of Government of Pakistan. Currently there are many (water) projects being ruined in different parts of the country aiming at providing an access to all people to clean and sufficient water. Below is given (Figure 4.1.2.1) is the organizational chart of RWASA.

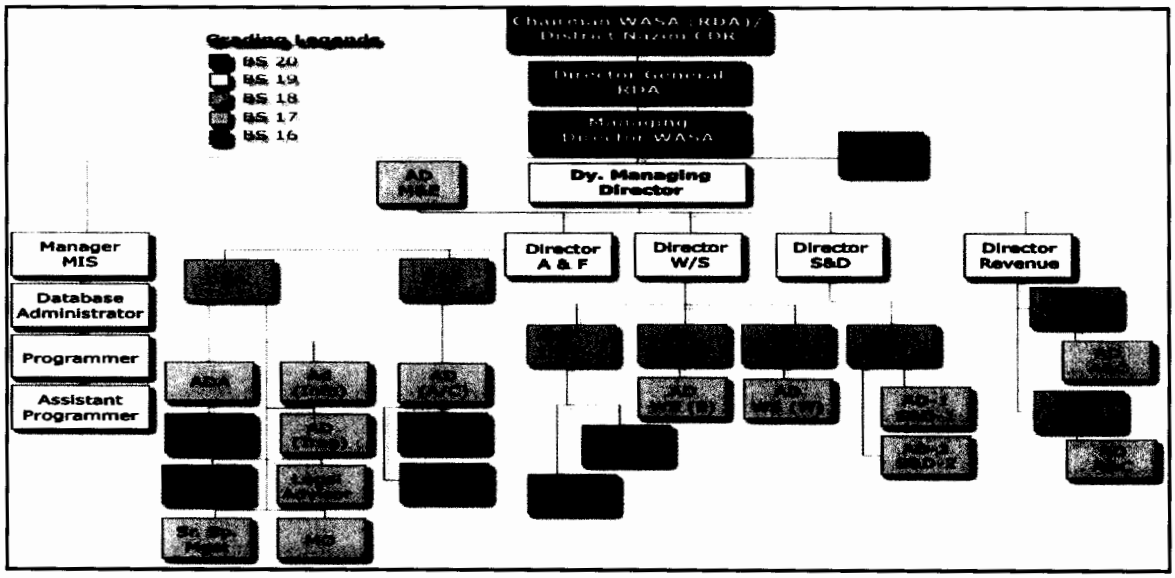


Figure 4.1.2.1: Organizational chart of WASA.

1.14.3 Functions and Responsibilities

The main functions WASA are organization and management of water supply, sewerage system and its billing and revenue collection (water charges) to ensure financial sustainability. Also it takes action against defaulters and

unauthorized connections etc. Besides it is also involved in short term and long term planning for tapping additional water sources and implementing plans to fulfill the communities' water supply and sewage demands on time.

The main sources of water supply are Rawal Lake Filtration Plant, Khanpur Dam, Tomar Service Reservoir and Tube wells. Besides it also has a distribution Network including Water Works.

Its long term Projects include:

- The Rawalpindi Environmental Improvement Project (ADB Funded Project).
- Augmentation of water supply system based on Chirah Dam.

1.14.4 Objectives of RWASA

The objective of Water and Sanitation Agency's are:

- To maintain sustainability of the Rawalpindi environment and to the sustainability of the wider environment.
- To establish and maintain productive and valued staff.
- To apply best practice in operating and maintaining our assets.
- To maintain the WASA as a competitive and financially responsible and accountable entity.
- To manage the business to be commercially successful in the longer term.
- To demonstrate accountability to all stakeholders.

1.14.5 Services Provided By RWASA

RWASA provides high quality water complying with recognized drinking water guidelines. This is achieved through the planning and development of water supply schemes and the operation and maintenance and continuous improvement of existing installations.

The RWASA is responsible for the transport, treatment and disposal of sewage by effectively planning and developing works, and operating and maintaining existing installations to provide services fit for customers' purposes in an environmentally sustainable and economic manner.

The RWASA is responsible for the continuous monitoring, management, operation and maintenance of both the water supply and waste water management. To achieve this, the WASA undertakes the following:

1.14.6 Water Supply

- Continuously monitors and manages the available resources and takes responsible actions to ensure a lasting supply of water is available to our community.
- Monitors and maintains the quality of water available to the community.
- Ensures all water assets are maintained and repaired to protect our environment.
- Undertakes upgrades to the water assets to ensure continuous improvement to the water supply service.

- Provides water supply services to the community including commercial areas, residential areas, and parks.
- Coordinates and maintains records of properties and assets as required.
- Educates the community on the value of water as a precious resource through festivals and other appropriate activities.

1.14.7 Sewerage System

- Monitors and maintains the services of sewage treatment and disposal for the community.
- Ensures all treatment works are maintained and repaired to protect our environment.
- Undertakes upgrades to waste water management assets to ensure continuous improvement to the sewage treatment and disposal service.
- Undertakes continuing research for better ways to dispose and/or re-use treated effluent.
- Provides sewerage services to the community, including beaches, parks and reserves.
- Coordinates and maintains records of properties and assets as required.
- Educates the community on the services provided, and how high levels of effluent treatment offer a sustainable sewage management plan.

1.14.8 The Implementation Mechanism for Carrying out the Projects under RWASA

The Executing Agency (EA) for the Project will be WASA (RDA) under the overall control of TMA, Rawalpindi. The EA will establish a Project Management Unit (PMU) headed by the Project Director (PD)/DMD WASA, located in RWASA. The PMU, comprising professional staff, supported by a team of consultants, will assist TMA, RDA and RWASA in providing policy guidance and implementing the project components; and will support monitoring and evaluation. TMA will associate its solid waste management unit with the PMU to execute the solid waste management.

1.14.9 Performance Evaluation by RWASA

To evaluate the performance and efficiency of the organization, the whole service pattern was studied by means of randomly selecting different representative areas in the locality. Hence the efficiency of WASA's work force (human resource) was calculated.

According to RWASA it was providing water to more than 75% of its customers however it was investigated that RWASA serves approximately 65% of the population in the service area with water supply. The data provided by WASA about the water supply coverage stated that the total population in the service rea in 2005 was found to be about 1,050,000 and the number of house hold water

connections (end of 2005) was estimated to be 83,243. Average number of persons per house was 6.64. Whereas the number of persons served with household connections were 552,734. Out of those (houses) served with independent water connections almost 55,674 or about 10% of the people were using a neighbor's connection. Besides there were 52000 people who served with Convenient Stand post services, while about 4400 households served with regular tanker service. (Status Quo Report RAWALPINDI, 2006)

1.15 Role of the Organizations Involved in the Wastewater Management Process

The role of the organization related to the supply of water, wastewater management and sanitation starts from forecasting the demand for Water Supply, Sewerage and Drainage, preparation of plans and designs for their extension, rehabilitation and replacement of the defected pipe lines etc.

Moreover the construction, improvement, maintenance and operation of Water and Sewerage. Works the main storm water drainage channels, pumping stations, billing and collection of all rates, fees and charges, for the services so provided to the consumers are all the things that are regulated by the water and wastewater management organization.

1.16 Objectives of the Study

The main objectives of this study were:

- To Study the organization's structure and level of commitment to provide services to the public involving the idea of water as a common good.

- To Review the goals, targets and the services provided by the organization.
- To determine the efficiency (level of HR's performance) of the organization.
- To determine the level of competence and the needs/requirements for further trainings of its employees.
- To determine the role and importance of human resource development in increasing the efficiency of an organization dealing with water resource supply, sanitation and management.
- To keep in view the working of water supply, sanitation system and management organization/ department studying whether its existing human force (workers) is capable of fulfilling the requirements and demands of work or the organization needs to hire more work forces.

REVIEW OF LITERATURE

2.1 Water Supply

According to Butterworth at el, (2001) the water among one of the most vulnerable and finite natural resources of the times. Hence there was a need to recognize the economic value of water. Moreover there was a serious need for increasing the participatory approaches for management and development of this valuable resource.

Referring to the limited water resources of the world UNESCO (2003) reported that most areas of the world were water stressed as the demand for water exceeded its supply. Not only this but also it was expected that the situation would become more adverse, as it has been predicted that in the near future more areas would have to experience this water imbalance. The reason would be lack of proper in-time management steps. Water being a common good, is required for household, agricultural, recreational, industrial, and environmental uses. Moreover, there has been a rapid increase in the demand of water for recreational, household, agricultural and environmental uses due to continuous increase in the population. Also due to growing awareness about the importance and need of clean water, the demand for safe and healthy water especially in the developing world has increased much.

UNESCO further reported that the demand for supply of water for the industrial and household purposes is given priority over the other uses in the national water policies of many countries. This was also considered to be one of the major factors contributing towards water stress condition particularly at the

points of household consumption. The problem gets aggravated by many factors including environmental degradation, global climatic change and the changing patterns of Land use. The cost of expanding the existing sources and developing new sources is continuously increasing at the same time due to the reason that most accessible water resources have already been tapped (UNESCO, 2003).

United Nations (2003) reported that water has been acknowledged as one of the limiting factors of times. In the recent scenario due to the rapid infrastructural development and accelerated socio-economic progress of the ever-increasing population of the world, water appeared as a preciously scarce natural resource. Therefore an urgent need has been felt in order to make a focused plan of action for effective management of this valuable commodity. Moreover in the Millennium Declaration United Nations had drawn attention towards the importance of water, and had laid stress that the water related activities hold a great importance as those activities would play the most important role in supporting the activities related to the development and eradication of the poverty (UN, 2003).Also the commitment for equitable distribution of safe and clean water at all levels of world community was one of the targets in the Millennium Development Goals signed in 2000 (of the goal 7) stating the intention to halve the proportion of people without access to basic sanitation and safe drinking water.

Millennium development report (United Nations, 2006) has shown that although there has been a cut in the fraction of people without access to safe water in the past few years i.e. from 30% in 1990 to 20% in 2004, still there were wide disparities among most of the countries around the world.

According to a study carried out by Rose grant et al., (2002), almost 30 countries of the world were considered to be water stressed, out of those 30, 20 were facing absolute water scarcity. Also it was estimated that the number of water deficient countries was likely to reach to 35 by 2020, predicting that there would be a drastic increase in the water consumption pattern in the developing countries.

Seckler et al (1998) presented the most alarming picture. According to him of the developing countries, most of them were likely to face the greatest water deficit and it had been estimated that in the developing world almost one-third of the population would be facing severe water deficit condition by 2025.

It has been reported by UN-HABITAT (1999) that in past generally a demand driven mechanism for water supply was being followed in most of the cities. Through this it was shown that the common practice being followed was investment in new treatment and distribution networks. Ever-since in the present times when the world has been facing problem of rapidly growing population, increasing urbanization along with the scarcity of capital for investment in new water supply development projects, it became very difficult to keep up with the rapidly increasing demands for provision of clean water. Hence, a strong need had been felt to develop innovative strategies for water demand management. Moreover, the idea that the water conservation measures were only meant for reducing service levels i.e as the drought-relief mechanisms had to be changed.

Regarding the availability of safe and healthy water in Pakistan the British Global Services (2000) reported that most of the regions of Pakistan had arid

climatic conditions with scarce ground water availability. Therefore there was a severe shortage of water supply i.e. access to portable drinking water was quit limited in many regions of the country. Moreover poor tube-well designs, construction and maintenance along with over abstraction of ground water was resulting in falling water tables in most of the areas and had therefore imposed quit serious threats to the water supply system on sustainable basis. Apart from that the toxic industrial agrochemicals and sewerage wastes were also playing a major role in rapidly deteriorating the water quality.

According to V. Kala et al., (2008), water scarcity a continuously increasing problem had been increasing with time particularly in the urban areas of the developing countries. It was further predicted that there was possibility of further aggravation of this issue because of rapidly changing hydro-environment up to different levels. This article further indicated that there was a serious need for developing new resource for water supply. Moreover stress had been laid over the need of introducing a new supply based management system to fulfill the demand of water supply, instead of the traditionally used water supply system. It was further reported that the only way to deal with the problem of water scarcity was introduction of such a system. It was learned that the main focus of demand management measures would be to make more efficient use of limited water supplies that are available mostly below the standard supply level. The main thing investigated out was the importance and need of introduction of the intermittent supplies of water to the urban areas in the developing countries in order to address the issue of water shortage. Also it was suggested that a proper planning was required for improving the service delivery system ensuring equitable distribution of water to the consumers. Hence it was suggested that while

operating and designing such networks it was important to keep those realities into consideration.

According to Faustin et al., (2002) the standard tools available for designing the water supply systems mostly needed an unlimited and continuous water supply. That amount of water being supplied was usually according to the demand of water supply. Hence when designing the intermittent supply system it was difficult, this was mostly because of the limited availability of water.

To address that issue a set of new guidelines have been suggested so as to control and design a specific distribution system for intermittent water supply in the developing countries. The main purpose of laying out such guidelines was to obtain an equity level in water supply, also a people driven levels of service (PDLS) on the basis of four parameters i.e. timing of water supply, duration of water supply, the water flow rate (at the outlet point), type and location of connection required (particularly in case of stand pipes).

The methods and techniques recognizing the relation between the level of pressure and the level /amount of outflow being experienced at the connection should be used so as to calculate all of the above mentioned parameters. To further elaborate these ideas a case study has been carried out demonstrating the success of providing an acceptable and equitable service level by means of adopting new guidelines.

2.2 Water Sanitation

Hina .S, (2000) and Chilton et al., (2001) investigated the quality of water in the major cities of Pakistan. It had been detected by both during their studies that the water being supplied in most of the cities of country was contaminated with

pathogenic microorganisms. One of the main reasons for that contamination was found to be wastewater seepage. The sewerage lines that were poorly constructed, poorly maintained sewage systems, lacking proper and safe designing. Because of such inefficiently designed sewage systems the ground water may get contaminated through the seepage and or overflow of poorly managed and designed septic tanks.

Apart from this it was investigated that not only the management of drinking water but also the wastewater management was important for controlling waterborne insect populations, most notably mosquitoes carrying the parasites causing malaria. Malaria alone was responsible for killing about 1 to 2.7 million people each year (with ninety percent of these deaths in sub-Saharan Africa, mainly among children). In present days the rising number of victims of "Dengue fever" and ever increasing patients of "hepatitis, typhoid and gastrointestinal diarrhea" had appeared to be the out come of water pollution (World Health Organization).

World Health Organization (WHO) estimated that nearly 60 per cent of the diseases were infectious waterborne diseases such as typhoid, polio and Hepatitis A and B.

In a survey conducted by media (T.V program) in Karachi, showing one of the most densely populated and industrial centers of Pakistan, an estimate was made indicating that almost more than half of a family's earning was spent on health problems, because of contaminated water supplies and seepage of the rainwater that remains stagnant on the roads and streets, into the drinking water supply channels. Despite of that, the concerned authorities in most areas of the

city that were supposed to manage and regulate the water supply and sanitation all over Karachi were putting a deaf ear to public vows. (Hina.S. 2000).

According to the same source; when the quality of drinking water samples collected from the same area were taken for clinical examination, nearly 100 percent of the tested water was found contaminated. It contained E.coli bacteria that are found in feces and are the causal agents of many serious infectious diseases such as gastro-intestinal diarrhea, jaundice and many others. Apart from this the samples also contained industrial, agrochemical and even radiological pollution causing cancers. Hence, it was demanded that the government and the concerned water management authorities should take serious action to save the lives of millions of people living in the area (Hina.S., 2000).

The most important steps needed in this regard included regulatory and policy reforms, construction, rehabilitation and management of wastewater facilities (WAPDA, 2001).

Chilton et al (2001) also reported that in most rivers of Pakistan untreated effluent was being discharged at various points, resulting in increased levels of the heavy metals concentration.

Regarding the affects of contaminated water being supplied to the community Ensink et al (2005) reported that there was also a high health risk among the farmers in Pakistan, due to the increased use of wastewater in agriculture.

Presence of *Ascaris lumbricoides* was reported during a study conducted in Faisalabad (Pakistan). It was reported that there was an increased risk of

hookworm and intestinal nematode infections among the farmers and their families who were involved in wastewater agriculture activities when a comparison was made with the farming families who were using regular water (non-wastewater) for the irrigation purposes.

Moreover, on further investigation by the Royal Society of Tropical Medicine and Hygiene (2005) it was found that the Textile laborers residing in the same village showed even a very less risk of hookworm infection than the farmers using wastewater. However the risk shown by those textile laborers was higher as compared to that of the farming households using regular irrigation water. It was learned that many farmers living in the urban and peri-urban areas made their living by growing vegetables etc. for this purpose they were using the untreated wastewater. If the use of the wastewater for vegetable cultivation in those areas was banned it would deprive these poor urban and peri-urban dwellers of their livelihood. Also this would affect the food supply in the urban markets.

It was further suggested by the Royal Society of Tropical Medicine and Hygiene (2005) that if the treatment of wastewater was not a possible option; at least there should be a mechanism for separating the toxic contamination i.e. the fecal discharge from that of other wastewater discharge. For this purpose construction of toilets combining regular anthelminthic treatment system, increasing the awareness for the use of footwear, promotion of hand washing and improvement of personal hygiene would prove to be suitable alternatives to safeguard the health of the farming families using wastewater for irrigation purposes.

Hina, S., (2000) also reported that the poor microbial quality within the water distribution system was responsible for the severe health problems. According to the Human Development Report (2006) Sanitation meaning handling (and disposal) of human excreta in a safe and sound way was of extreme importance in the waste management process. The report indicated that approximately 58% with 37% population of South Asia and Sub-Saharan Africa did not have an access to proper sanitation. Moreover, in the same report it was stated that due to lack of understanding among the people towards the concept of sanitation many of the huge budget sanitation programmes had either failed or had achieved a very little success all around the world.

The Human Development Report (2006) also aimed at devising a structure for understanding the various determining factors. Besides human excreta sanitation also included other domestic waste disposal including solid and liquid wastes.

2.3 Water Supply and Wastewater Management

Qadir et al. (2007) reported that one of the global concerns was the degrading water quality and Water supply. It had been predicted that with the ever-growing demands for water around the world this problem would be intensified. Moreover, due to the impacts of natural catastrophes, the unexpected natural disasters and changing climatic conditions the marginal-quality water would become an important component for the agricultural water supplies, particularly in the countries facing water-scarcity.

In the urban and peri-urban areas one of the major types of marginal-quality water was the wastewater. Recycling of the wastewater had been carried

out through centuries for agricultural practices; as a means of safe disposal in many of the cities of the world such as Berlin, London, Milan and Paris (AATSE, 2004). In recent years the importance of the waste-water had been felt increasingly especially in the regions facing water-scarcity. It was reported that in Pakistan; a water-scarce country, 26% of the vegetable production was being grown through wastewater irrigation (Ensink et al., 2004). Similarly, in many other countries of the world wastewater was reported to be used for the vegetable growth such as in Hanoi. About 80% of the vegetable production in Hanoi was investigated to be obtained through urban and peri-urban areas by means of wastewater irrigation (Lai, 2000). In Ghana, diluted wastewater was learned to be used for informal irrigation on an estimated area of about 11,500ha; this area being informally irrigated was estimated to be much larger than the area under formal irrigation (Keraita and Drechsel, 2004).

According to documentation, the environmental impacts and health risks resulting from the use of the wastewater for irrigation purpose. The partially treated wastewater or the failure to treat and manage the wastewater properly would result in creating adverse health effects. Due to use of this untreated wastewater the farmers and their families would be exposed to high health risks especially from viruses, bacteria and parasitic worms (Angelakis et al., 2003). It has been learned that the aspects related to Health and environment were much sensitive issues therefore it was not suitable to use and/or replace the conventional or other possible non-conventional irrigation unless they were treated adequately and applied safely (Salgot et al., 2003; Gerba et al., 2003).

Amongst the main reasons of increasing conflicts and disputes over the water use one of them was told to be the lack of proper integrated approaches, and the

fragmentation in planning and management. Apart from that the improper policies were also enlisted among the reasons of rising water disputes. (URT, 1995).Thus a serious need for managing the available water resources in an efficient way was felt, to solve the water dispute issues and to make it possible that multiple users have an access to the available water resources. An integrated water resource management methodology has been adopted by Tanzania, keeping these issues in view (URT, 1995).

According to P.Francisco et al., (2010) in the Water Sanitation Program funded by World Bank an investigation was carried out on the various methods to supply sustainable, safe and sanitary water to the people in Greece and Spain. It was claimed that almost 70 percent of the total available world water was being used for the agricultural purposes including the water pumped from the underground reservoirs and that of the rivers too. Hence, if the treated municipal wastewater was utilized for the agricultural activities it would result in decreasing the share of irrigation out of the total volume of the available water. Apart from that it would also result in reduction in the discharge of the wastewater. In most of the arid, semi-arid and Mediterranean countries the practice of reusing the treated municipal wastewater has been adopted since quite long. In this way the water scarcity issue has been addressed in a very effective way by those countries. Specifically for carrying out the agricultural practices as the treated wastewater had long-term effects on the crops cultivated for human consumption.

2.4 Human Resource Management, its Importance and Role in Development and Efficient working of an Organization

Bergen, G.J., (1996) stated that in the competence-based organizations if the complete management style and an over all organizational structure were observed, it would be found that a competence-based human resource management (HRM) system existed in all such organizations. In such situations the management of an organization's competency and the extent of empowerment in that organization could be checked by means of this type of competency-based HR system. Also such system would enable the organization to achieve its collective goals. The petro-chemicals industry could be taken as an example, where a competence-based HRM system could be witnessed practically. It could be clearly seen in such an industry that through the instruments of HRM, how the core competences of an organization were directly linked to the personal competences of an organization's employees.

The ABLE (2000) states that the evaluation of the Human Force of organization i.e. employees should be designed in such a way that it serves the purposes such as enhancing the job performance, encouraging professional growth, improving the quality of the program and should meet the core indicators of performance. The Staff should have a focus on consistently improving their performance and must set the stage for advancement and accomplishment. In this way the results of evaluation would become a rewarding- tool. Hence continued effective and efficient performance of the individual staff member would be encouraged, and planed.

Robbins et al., (2009) wrote that there were various types of organizations, according to him there were different types of organizational hierarchy and structures adopted under each type of organization. It was further stated that the functioning, processes and ways different organizations are run with, also varies with its type. Moreover, various methods of improving the organizational efficiency have been enlightened under this book.

According to Robbins, (2005) in the rapidly changing environment of the present times the organizations have to face a serious problem of adopting and changing new technologies and methodologies of operation. This clearly shows that there is a strong need for the HRM to continuously bring about positive changes.

Also Foster. N., (2005) supported the statement of the ever changing environment; it has been further told that both the organizations and their HR have to encounter many uncertain and unexpected situations such as globalization; technological innovations; the rising political and economic instability. Moreover, the ongoing process of re-defining the roles and activities of organizations; trade unions; employers; the ever growing ecological and ethical challenges in the world of business and new emerging economies are contributing to this changing environment, where the organizations are operating.

According to Mackey et al., (2003) one of the new concepts is extent and speed of global change (development) with reference to opportunities for trade, for currency exchange, transfer of information through electronic media, also the political influence and pressure and the labors mobility. Sometimes there are dynamic and at others there are turbulent changes rapped up in the world of work

reflecting global development as the shift of industrial era to the information age also called as digital era.

Losey, M., (2005) States that quick technology development forces some organizations to change their strategies i.e. forcing them to make advancements/changes and developments. Also in some cases forces the organization to mix their products and change organization and delivery methods (develop/improve) of their HR.

Wiesner et al., (2003) stated that the process of globalization involves the integration of market and nation-states, which have enabled the corporations, countries and the individuals to quickly and freely move across the borders. The advancements in the field of technology have played important role in providing freedom from administrative autocracy and have enabled the HR to advance independently. This new environment of global competition has enabled the organizations around the world to increase their comparative advantage through HR management systems.

Zanko, M., (2003) included all the factors that are mentioned above and has stated that these factors contribute to organization/business operating in the environment that is in the process of change (development). Moreover, he had further explained that change (development) is an underlying theme i.e intertwined within the issues/trends of HRM. There is a severe need for the HR to embrace this phenomenon of change (development), so as to ensure the selection of right people (employees), with the right type of skills, knowledge and abilities. Moreover, creating a culture which positively contributes towards the phenomenon of change (development).

Plessis, J.A., (2007), Lines (2004) and Farquharson et al.,(2002) stated that in the future the HR could play an important role in the organizational change (development) to attain the competitive advantage. If the change is resisted it provides a hindrance in implementing planned changes (development), as it covers the behaviors resulting in slowing down the process of planned organizational change. In the times when the changes are on their way when the employees feel that they are being treated fairly and taken good care off. The HR could improve the attitudes and feelings of resistance among the employees towards the positive change.

Dolan et al., (2004) stated that one of the responsibilities of HR is to make the employees feel that they are being valued and their benefits are being given importance as they are considered very important part and assert for the organization for if the psychological contacts are broken they result in generating many organizational problems e.g mistrust, litigation and anger.

Jordan et al., (2005) stated that if the employees feel that the psychological contacts being embedded in nature, are violated will have a clear impact on the motivation and commitment levels of the employees (towards the company/organization). If the psychological contact among the employees and the employers are strong and positive then it will be easy to overcome any negative impacts resulting due to some change.

According to Eleni et al., (2006) it has been identified by various researchers that HRM practices and the various measures taken for organizational performance are interconnected. Also certain HRM practices play

very important role in developing and increasing the competitive advantage of the organizations.

Accordingly the HR practices are positively linked to the overall performance of the organization. The survival of the organization depends upon the management of its human resource so as to increase the productivity, improve the overall efficiency, customer service, profitability and increases in the value of the firm.

According to Werbel D.J et al (2005) the Strategic human resource management addresses the need to create vertical linkages of human resource management (HRM) attributes with corporate strategy as well as horizontal linkages that integrate practices among HRM functions. Most models commonly focus on either vertical or horizontal linkages. Three categories of person–environment fit to create both vertical and horizontal linkages. Based on a strategic contingency framework, it demonstrates how person–environment fit relates to organizational competencies that supports corporate strategy. Furthermore, it was demonstrated how person–environment fit can be used to promote internal alignment of HRM practices. Implications of this approach to strategic human resource management were also discussed.

According to Weihrich, H., (2008) Management was an evolving science and was of extreme importance to the entire global community. Emphasis had been laid on efficient and effective management also it had been stressed that management was the most important tool for smooth running and proper functioning of all types of organizations, in all fields weather related with water supply, business, public health, political or social sector. Various aspects were

explained that needed special care and were of grave concern in management process. Also instructions have been stated about efficiently performing the management functions.

Additionally, other researchers (CCH, 1995) had investigated the extent that HRM practices should be effectively grouped together to provide efficient and consistent communication to employees about the critical skills and behaviors required to create and sustain a competitive advantage. Rather than focusing on either horizontal or vertical linkages, a theoretical approach to strategic human resource management should combine both of these dimensions.

Organizational culture had been shown to have a strong relationship to firm performance when was aligned with firm values and strategy (Joyce et al, 2003).

Rothwell et al (1988) stated that if the organization wanted to achieve high levels of competitiveness then it is necessary to have changes in the relationship between the management and the employees of the organization as it is necessary to have a staff to take full advantage of the service delivery and new techniques to achieve excellence in the international markets. While doing so the main issues involve the proper management of generating the expatriates, establishment of high commitment level among the organization employees, introduction and practice of a good reward system.

METHODOLOGY

3.1 Study Area

In order to carry out the research on the Human Resource efficiency of RWASA 12 Union Councils of Rawalpindi city were selected randomly. The sample size was taken to be three houses in each of the selected UC. In this way the primary data was collected i.e. the data for the pattern of water consumption (for drinking purpose).The main methodology adopted was by means of interviewing the Tube-well operators, supervisors and also the customers of Rawalpindi WASA.

3.2 Interviews

To get the level of service delivery by RWASA the individual interviews were carried out by the customers in the main study area (representative area selected) whereas in order to collect the data, three types of interviews were taken, these included;

- Individual interviews with some of the employee of RWASA directly related to the water supply chain i.e. the tube-well operators.
- Also interview with the supervisor who knew the job and responsible for the recruitment of tube-well operators.
- Moreover some of the customers were also interviewed.

By interviewing the tube-well operators some general information was collected regarding the duties allotted to them and the type of extra load they

were given (other than their original duties). Moreover, they were also asked about the facilities they were given including different allowances other then their original pays.

Using the personal observation some data was noted, while taking interviews by the individual tube-well operators. This interview method was very advantageous as it provided a simple and quick means of collecting the required information. It also unearthed the informal contacts that could not be known through the organization chart otherwise. Moreover, those interviews helped in analyzing the rising frustration among the employee, and might otherwise have remained unnoticed by the organizational management.

During the interviews some problems were also faced which included the perception of the tube-well operators as they suspected that the data was being collected for some reporting purpose by their own head office, to know about their performance/ presence on duty. Therefore, some of the tube-well operators exaggerated while responding about the queries about their responsibilities. Also some of the Tube-well operators ran way and disappeared from the sight (intentionally). Therefore, their absence from their duty places was also a major constraint while collecting the data. Hence the process of individual interviewing was quiet lengthy and slow. Due to all of these limitations a small success was obtained to interview the tube-well operators, so the results obtained from the discussions with those operators were concluded to be the generalized behavior of all of the tube-well operators.

3.3 Questionnaires

The questionnaires were also used to calculate the drinking water consumption pattern and to measure the duties and level of responsibilities of the tube-well operators.

The questionnaires were designed on the basis of the required data. Some of the questions were semi-structured and/or were kept open-ended and others were kept closed-ended.

3.4 Observations

Some of the information was also collected on the basis of personal observation particularly at the sight of tube-wells and the filter plants by observing the physical conditions of the machinery and the surroundings.

3.5 Statistical Analysis

The data collected was analyzed through various statistical applications and the correctness of the claims made by RWASA were cross- checked.

3.6 Using Multiple Sources of Information

Also some of the information was obtained from the RWASA's website and from open discussions with the people within the area(s) where the WASA was supplying water. Moreover door-to-door interviews were also conducted to get information about the level of satisfaction of the consumers/customers depending on RWASA's water supply system.

RESULTS AND DISCUSSIONS

4.1 Study Area

In order to carry out the research on the Human Resource efficiency of RWASA 12 Union Councils of Rawalpindi city were selected randomly. The sample size was taken to be three houses in each of the selected UC. In this way the primary data was collected i.e. the data for the pattern of water consumption (for drinking purpose).The following observations (data) were noted;

4.2 Population Size and Total House Count in the Study Area

The total area and number of houses including the population size of the selected area was investigated, also the water supply mechanism and the level of services provided by WASA Rawalpindi were figured out. The table **4.2.1** below shows the population size of the area under study:

4.3 Pattern and Volume of Water Consumption (Per Capita)

It was investigated that the drinking water consumption in most of the UCs was quit low as compared to the international standards i.e. 5 liters/ capita /day.

Table: 4.2.1

The table shows the population size of the area under study.

UC 1		
UC 2	26374	2974
UC 5		
UC 8	26198	2595
UC 10		
UC 12	25705	2909
UC 13		
UC 14	22622	2516
UC 15		
UC 17	27793	3393
UC 36		
UC 46	27780	3247

4.4 Average Water Consumption Pattern in the Study Area (For Drinking)

The below figure would show average of water consumption in each of the selected UC (of the study –area).

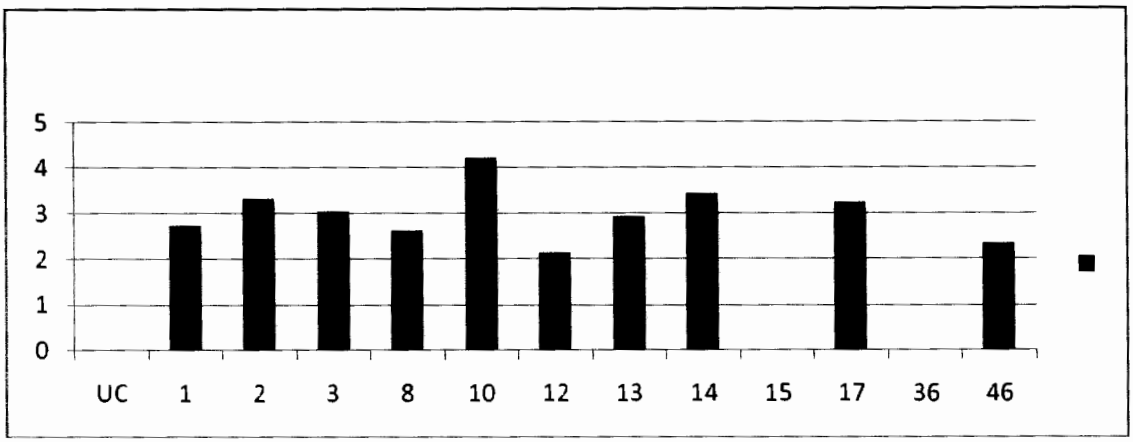


Figure: 4.4.1 Average drinking water consumption pattern in the selected area (of study)

4.5 Maximum and Minimum Water Consumption

The maximum amount of water consumed in each of the UCs is given in the table 4.5.1 below;

From this table (4.5.1) it is shown that the maximum level of water being consumed was in UC 15 and it was about 6 liters per day. However in most of the UCs the water consumption pattern per capita per day remains below 5 liters which is the standard amount of drinking water requirement.

Table: 4.5.1

Pattern of maximum level of water consumed in each UC for drinking purpose.

1	Rata Amral	3.75
2	Millad Nagar, Dhok Ratta	3.75
3	Mazhar Abad, Hazara Colony	4.25
8	Fauji Colony, Peerwadhai	3.0
10	Khayaban-e-Sirsyed (North)	5.0
12	Dhok Najju	2.75
13	New Katarian	5.0
14	F-Block satellite Town	5.0
15	Saidpur Scheme	6.0
17	Dhok Babu Irfan	4.0
36	Mohan Pura	3.75
46	Chachi Mphalla	5.0

The pattern of minimum level of water consumption in each of the selected UC is given IN TABLE 4.5.2 below;

This table (4.5.2) shows that most of the UCs has a low water consumption level (for drinking purpose). The UC 14 stands first in the lowest level of drinking water consumption, although the lowest level of drinking water required for survival is about 2.5 liters of water per capita per day.

Table: 4.5.2

Pattern of minimum water consumed in the each UC for drinking purpose.

UC	Area Name	Drinking Water (liters)
1	Rata Amral	1.75
2	Millad Nagar, Dhok Ratta	3
3	Mazhar Abad, Hazara Colony	2.25
8	Fauji Colony, Peerwadhai	2.25
10	Khayaban-e-Sirsyed (North)	2.5
12	Dhok Najju	1.5
13	New Katarian	2
14	F-Block satellite Town	1
15	Saidpur Scheme	1.25
17	Dhok Babu Irfan	1.25
36	Mohan Pura	2.25
46	Chachi Mphalla	0.75

4.6 EVALUATION OF THE PERFORMANCE EFFICIENCY

The data shown in the table below (4.6.1) clearly states that the individual and collective efficiency of the tube-well operators is not satisfactory and is one of the major reasons of the failure of WASA Rawalpindi to fulfill its main objective i.e. "provision of safe and clean water at all the community levels." And also puts a question at the other objective of the organization (RWASA) i.e. "To establish and maintain productive and valued staff."

Table 4.6.1 (below) Indicating the efficiency levels of the tube well operators

1	2799	12	6	74A	Ratta Awral Street No. 12,24, 25, 26, 27,28, Trallic Colony, Syed Mir Colony, Jhonpra	Street No. 25	3	1	1	100	1	1	100	100%
2	2666	11	5	75A	Gali No. 15,22, 20, 21,26, 24 Dhoke Ratta	street No. 21	2	2	0	0	2	1	50	25%
3	1780	12	1	81	Hazara Colony Gali No. 63, Mazharabad Gali No. 1, 2, 6, 25, 26, 30, 31	Mazharabad Gali No. 26	1	5	1	20	5	1	20	20%
8	2326	6	1	92A	Gali No. 1,2 Dhoke Awan, Raja Mushtaq Wali Gali, Qaim Din Wali Gali, Masjid Wali Gali, Gali NO. 3, 4, Fooji Colony.	Gali NO. 4, Fooji Colony	3	0	0	0	1	0	0	0%
10	2100	14	3	102A	Behind Awan Market Sector-2 Khayban-e-Sir Syed	Sector-2	2	4	0	0	8	2	25	13%
12	2607	13	7	104	Dhoke Naju Margalah School	Dhoke Naju Margalah School	2	7	0	0	8	6	75	38%
13	2597	9	9	1	F-Block, Katarian	F-Block, Katarian	2	5	1	20	0	0	0	10%
14	2255	14	4	108	E Block stellite town, Ziyarat Yousaf Block, New Pariya, Masjid Noor	E block satellite town	2	3	0	0	4	1	25	13%
15	2545	12	1	6	Chishti Abad, F-Block	Chishti Abad, F-Block	2	5	2	40	3	1	33	53%
17	3041	22	6	10	Gulshan Dadan Khan	Main Double Road Gali No. 1, 2, Dhoke Babu Irfan, Gulshan Dadan Khan	2	4	3	75	4	2	50	63%
36	2500	11	4	72A	Mohanpurra St25	Mohanpura	3	1.5	0.5	33	1.5	0.5	33	33%
46	2910	13	10	63	Millad Nagar	Underground Tank Chachi Mohallah,Ariya Mohallah No. 2	3	10	2	20	4	2	50	35%
Total	39126	149	57				27	47.5	18.5	21	39.5	17.5	44	33%
		Average Efficiency Of Operators :												

(Table: 4.6.1 indicating the performance of the tube-well operators)

4.7. Rate of Change of Tube Wells with respect to the number of houses.

The following table describes the relationship between dependent variable Y (water supply hours to houses) and explanatory variable(s) X (Number of Tube wells).The rate of change of tube wells with respect to supply of houses comes out to be **0.42** which means that when supply to houses increases the number of tube wells would also increase by a factor of 0.42 as shown in table 4.7.1 below;

Table: 4.7.1

Rate of change of Tube wells with respect to houses

6	2	7.93	2
5	4	7.51	3
1	10	5.83	5
1	1	5.83	5
3	12	6.67	4
7	15	8.35	1
9	5	9.19	0
4	7	7.09	3
1	8	5.83	5
6	8	7.93	2
4	3	7.09	3
10	14	9.61	0

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2}$$

Where n is the number of sample taken,

"X" represents number of operational tube wells and

"y" represents supply to houses.

4.8 Accuracy of the Claims of RWASA

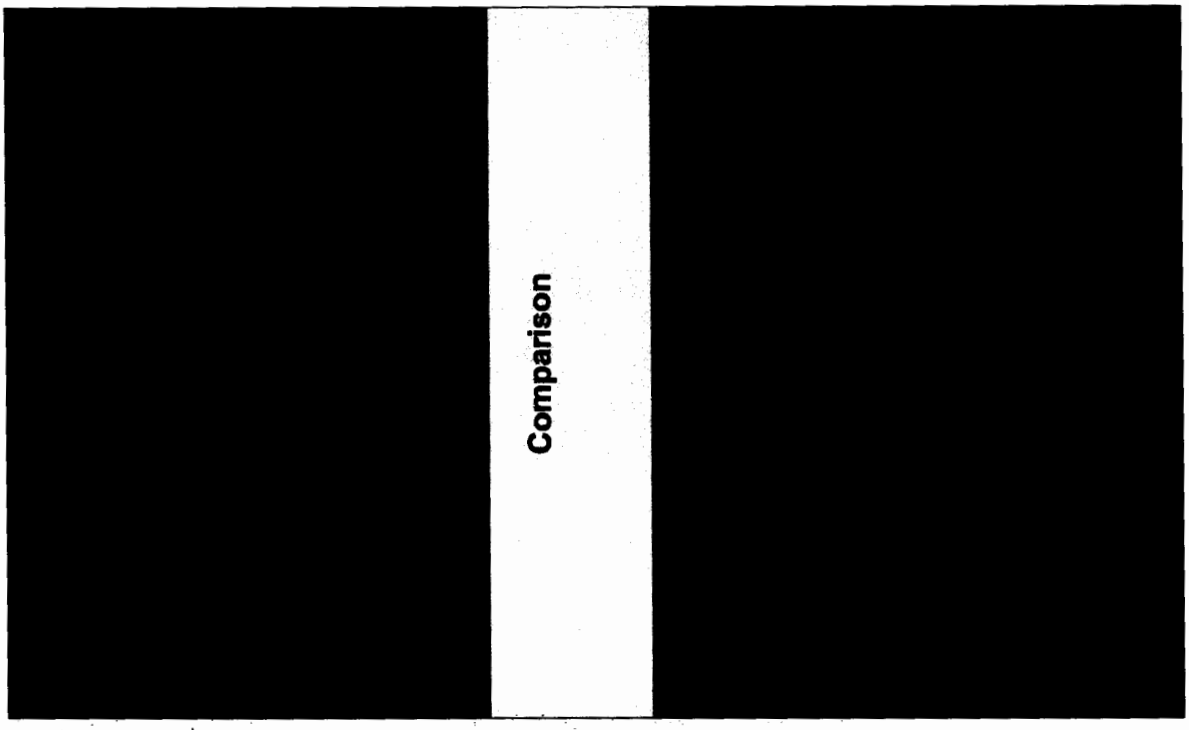
When questioned about the service efficiency the RWASA claimed that the water is being supplied in the morning on an average **3.96** hours and in the evening **3.46** hours daily. Whereas when taken the standard deviation in morning and evening times as per observations was found to be **-1.00** and **-1.59** respectively. This means that adequate water was not being supplied by WASA on daily basis. Hence the efficiency of services provided by RWASA was not found to be up to the mark.(see table **4.8.1**)

While using the formulas given below the standard deviation between the both timings was calculated:

$$Mean = \frac{\sum x}{n} \qquad S\tan dard \quad Deviation = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

Table: 4.8.1

Water supply Timings (Government)



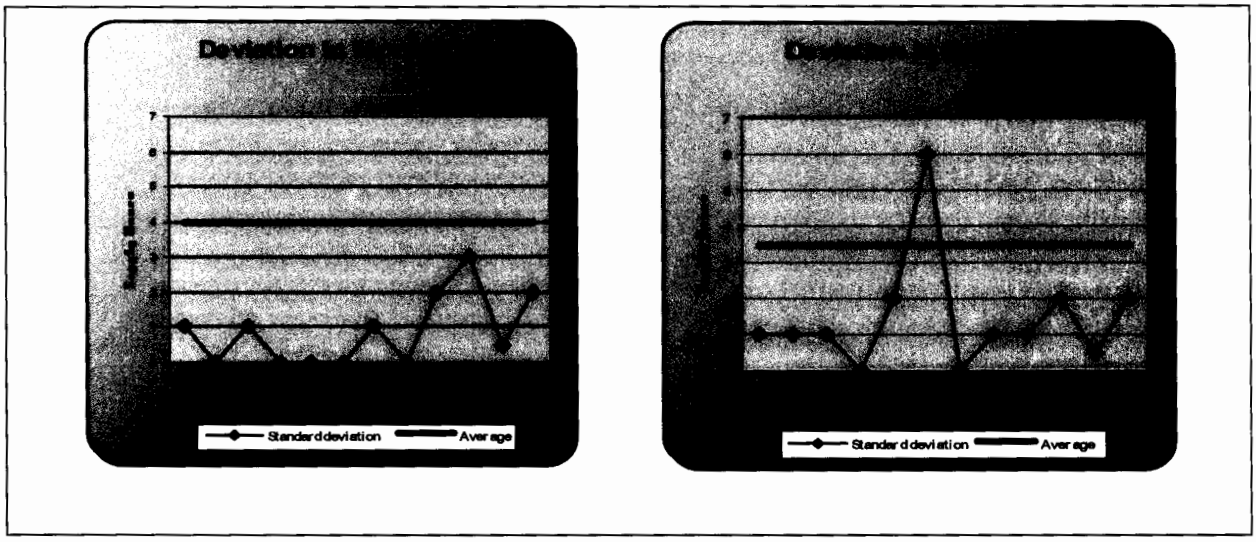


Figure: 4.8.1.Comparison between morning & evening water supply hours

The above figure (4.8.1) clearly shows the deviation from the mean and the skew- ness below the average supply.

4.9 Relationship between Number of Houses and the Tube Wells

The results show that the numbers of houses increases, the number of tube wells should also increase. The correlation between the number of houses and operational number of tube wells was found to be 0.0671.

Correlation coefficients could range from -1.00 to +1.00.

The value of -1.00 represents a perfect negative correlation

A value of +1.00 represents a perfect positive correlation.

A value of 0.00 represents a lack of correlation.

The figure of correlation found here was very minor (0.0671) that it fell under "Not efficient and very weak correlation". (see Table 4.9.1. below)

$$r = \frac{n\Sigma x\ y\ -\ (\Sigma x)\ (\Sigma y)}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2]\ [n\Sigma y^2 - (\Sigma y)^2]}}$$

n is number of points in pattern
x stands for pattern values
y stands for data values
r is an estimate of cross-correlation between pattern

Table: 4.9.1.

Relationship between Number of Houses and the Tube Wells

2799	5	[illegible]	[illegible]	[illegible]
2666	6	[illegible]	[illegible]	[illegible]
1780	1	[illegible]	[illegible]	[illegible]
2326	1	[illegible]	[illegible]	[illegible]
2100	3	[illegible]	[illegible]	[illegible]
2607	7	[illegible]	[illegible]	[illegible]
2597	9	[illegible]	[illegible]	[illegible]
2255	4	[illegible]	[illegible]	[illegible]
2545	1	[illegible]	[illegible]	[illegible]
3041	6	[illegible]	[illegible]	[illegible]
2500	4	[illegible]	[illegible]	[illegible]
2910	10	[illegible]	[illegible]	[illegible]
30126	57	[illegible]	[illegible]	[illegible]

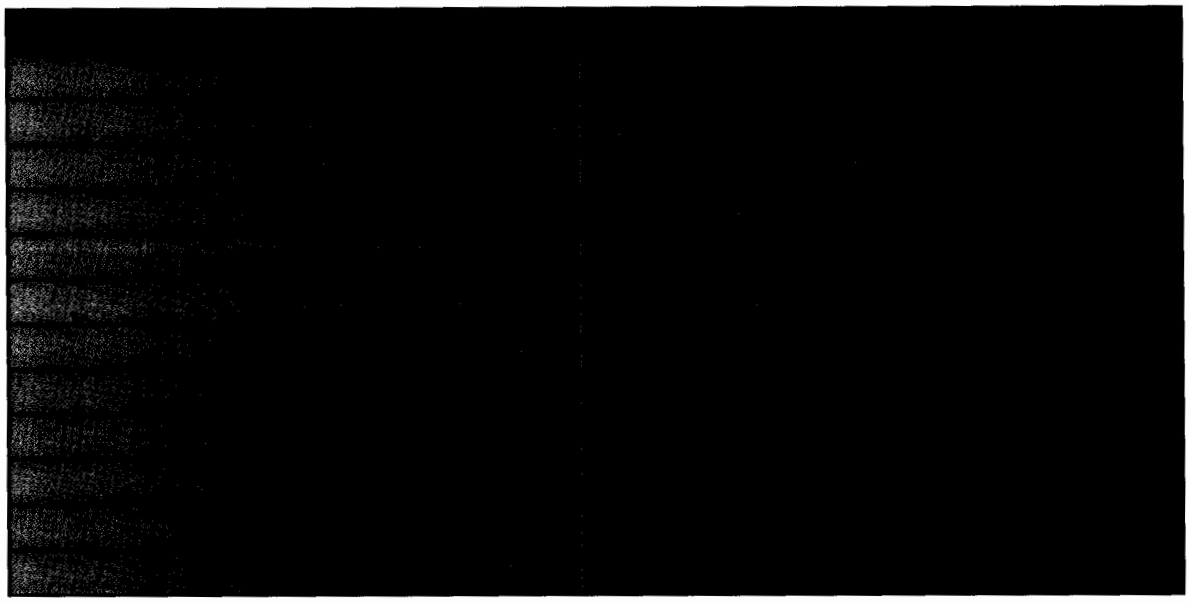
Figure: 4.9.1.Correlation between No. of Houses & No. of Tube Wells

4.10 Comparison between the Water Supply Efficiency in Morning and Evening

When the efficiency of the morning supply and the evening supply of water was calculated it was observed in the table 4.10.1 that the variation in the evening was more then in the morning. Further as calculated in the table 4.11.1 in morning the water supply was more consistent as compared to the evening water supply.

Table: 4.10.1.

Comparison between the water supply efficiency in Morning and Evening



4.11 Efficiency of Water Supply

The below table 4.11.1 shows that in morning the water supply efficiency was more and was found to be 66.93%, whereas the water supply efficiency in evening was found to be about 72.16%.

Table: 4.11.1.

Efficiency of Water Supply

	2.65	2.5
	3.96	3.46
	66.93%	72.16%

$$C.V = \frac{\delta}{\bar{x}} \times 100$$

Where δ is standard deviation

And $\bar{x}$ is mean of the data.

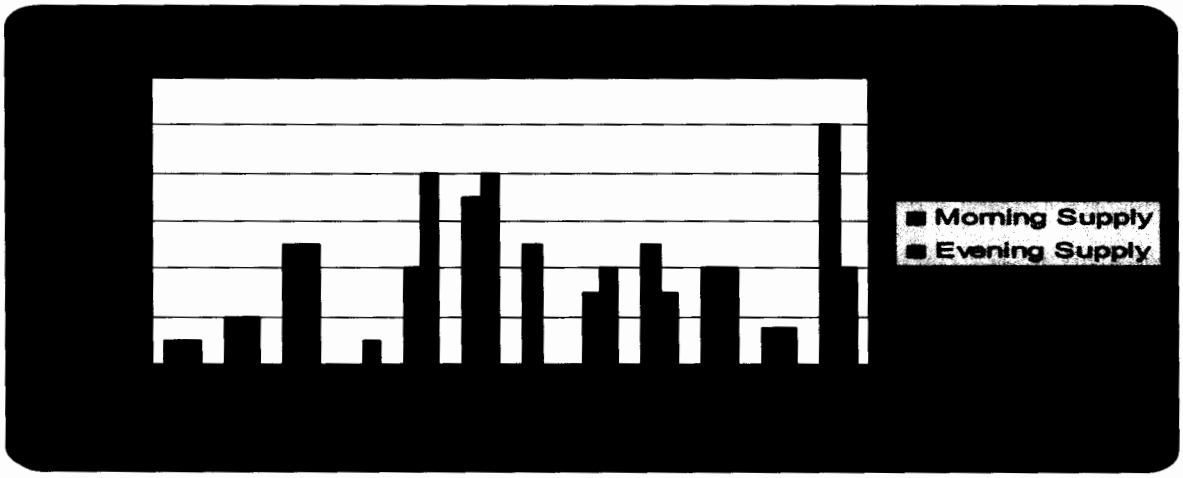


Figure: 4.11.1. Efficiency of Water Supply

The above figure (4.11.1) illustrates the morning and evening water supply efficiency levels. It is evident that water supply during morning is more consistent then that of the evening water supply.

4.12 T-test

When T-test was applied to determine that whether to accept or reject the claim made by WASA i.e. it was supplying water for about 7.4 hours/day in each locality. Therefore when the hypothesis was placed to test that WASA was supplying water greater then four hours and the alternate hypothesis was less then four hours. Assuming the confidence interval 95%. By using the t test formula given below:

$$t = \frac{\bar{X} - \mu}{\frac{s}{\sqrt{N}}}$$

The t -test value comes out to be **-10.04** which lies outside the interval of -1.796 so the hypothesis was strongly rejected and the alternate hypothesis was accepted i.e. water supply level was less as compared to the supply level claimed by WASA. (Table 4.12.1).

Table: 4.12.1.

Total Hours Water Supply

2	4
1	1
2	4
0	0
2	4
6	36
1	1
1	1
3	9
5	25
1	1
4	16

$$Mean = \frac{\sum x}{n}$$

$$S\tan dard \quad Deviation = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

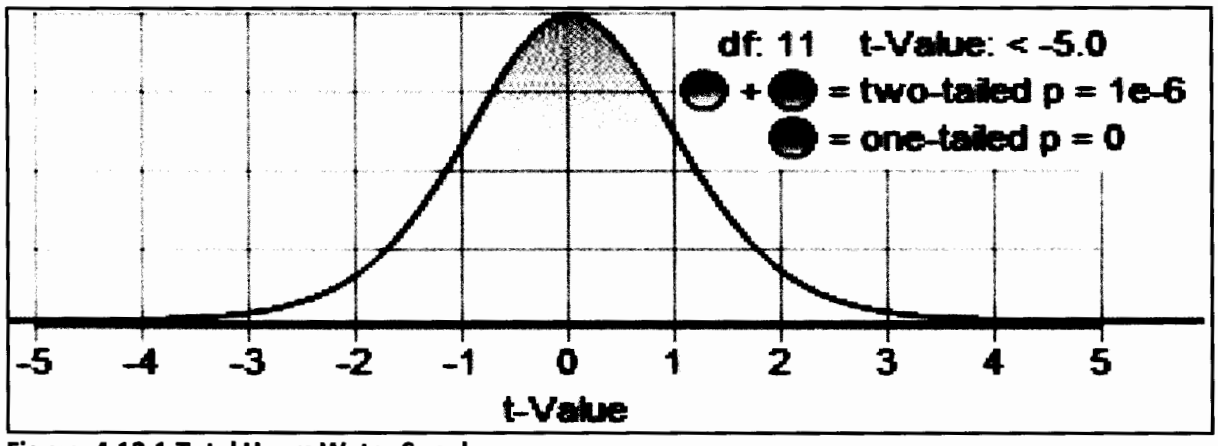


Figure: 4.12.1.Total Hours Water Supply

4.13 DISCUSSION

Pakistan is amongst those countries of the world where there is a severe shortage of clean drinking water. Most of the water being supplied for daily household use is either contaminated or is insufficient to fulfill the daily requirement of the community.

The major reasons behind these problems include poor organizational structure and inefficient management of water supply channels. Moreover in the water supplying and managing organizations there is a severe shortage of skilled and trained manpower at all levels from bottom to the top. From common worker to those involved in decision making processes of the organizations all are either incompetent, uninterested to improve the existing condition or are corrupt. Due to all these problems the development and management of the existing water reservoirs has also became a challenge.

Rawalpindi is one of the mega cities of Pakistan. It is often confused and termed as twin city with the capital city of Pakistan i.e. Islamabad, due to the close vicinity of both the cities with one another. The whole city of Rawalpindi is divided into small administrative units called Union Councils or U.Cs, so as to ease the process of administration. Thus ensuring good governance and management at all levels.

WASA Rawalpindi (RWASA) is the main body (organization) responsible for water supply in the whole city on equitable basis. Besides supplying water other responsibilities of RWASA are management of sewerage system, billing and revenue collection from all over the community.

RWASA has the mandate to provide clean and healthy water to all the levels of the community on equitable basis this commitment of RWASA complies with one of the MDGs i.e. "Excess for all to safe and clean drinking water."

The main purpose of carrying out this study i.e. "Research on the HR efficiency of Organization related with water Supply, Management and Sanitation." was to determine the over all performance of the organization which is directly linked with the performance/ efficiency of its work force.

It was not possible to cover all the aspects of the organization in the limited time (available time). Therefore, the water supply system was taken as the sample area of study. It was found that the main sources for supplying water for daily household use were tube-wells. It was further learned that there were about 280 tube-wells being operated all around the city, lying in different Union Councils of the city. Apart from supplying the water for daily household consumption, those tube-wells were also supplying water to the filter plants; sources of drinking water.

Due to spread boundaries of the study area (Rawalpindi) and a large number of tube wells spread around the whole city, 60 tube-wells were selected for collection of detailed data. This was done through applying the method of random sampling.

It was observed that usually there were two people (tube-well operators) deployed at each tube-well who were assigned the duty of operating the tube-well (motor) at fix hours as per decision of the authorities. Moreover they were assigned duties alternately in two shifts i.e. morning and evening. But sometimes an additional duty for the third time was assigned to either of the two operators.

When the performance level/efficiency of the tube-well operators was determined it was found that the collective level of efficiency of the operators was only 33%. Also, the percentage efficiency of every individual operator was also not encouraging. This of course had a serious effect on the overall performance of the organization, as the less efficiency of HR means a lower level of performance of the organization.

When the reasons for this extent of low performance level (of the employees/operators) were sorted out following details were found;

The tube-well operators were working on BPS 4 and were getting about Rs.7000-Rs.12000 per month. This amount in present days, when the prices of food and basic amenities of life are mounting at the sky, it is almost impossible for the poor tube-well operators to run their families with such small amount of money. Most of the tube-well operators were the only bread earners of the families.

Therefore, it was frequently observed that whenever any tube-well was visited mostly the motor was found running but the operator was found absent from the site (place of duty). Later it was investigated and found that most of the tube-well operators were also running their side businesses (selling fruits or vegetables) or were doing part time jobs. They use to come at the time of switching-on the tube-well motor, then went to their other businesses (part time), and returned back at the time of switching-off the motor.

This increased the risk factor of any technical and/or electrical hazard occurring during operation of the motor in the absence of the operator and if it so happens then there would be no one around to fix it on time, it may result in serious problems.

Moreover, it was learned that the tube-well operator were not provided any other facilities such as housing, schooling for their children, transportation and other allowances etc, this further aggravated their problems. However, medical allowances were being given to them as per organization's (WASA's) rules and regulations.

Another problem was the process of recruitment of the operators, which was an open challenge to the merit system. As it was learned through the individual interviews that most of the tube-well operators were either primary/middle pass or were totally illiterate, and were employed on the basis of references (political/ personnel). But according the administrative wing of RWASA, the organization was previously hiring the illiterate tube-well operators. Whereas, it has changed its criteria for hiring tube well operators i.e it was decided that in future the operators would be hired only if they would have a minimum of matriculation certificate with science subjects.

Further it was found that there was no preliminary requirement /demand (by RWASA) of having any experience/ tanning courses prior to the recruitment to the post (tube-well operator). This will increase the chances of operational risks during the performance of duty. Apart from this it was also learned that no proper professional tannings were given to the operators even after being hired/recruited.

According to the administrative wing during hiring process, preference was given to the experienced people (operators). Moreover, the administration was of the view that there is no technicality involved in this job therefore, neither any training is required prior to this job, nor tanning of any type would be imparted /required during the course of job.

However, it was also learned that the PCRWR (technical collage Gujarkhan has recently conducted some trainings under the REIP project.

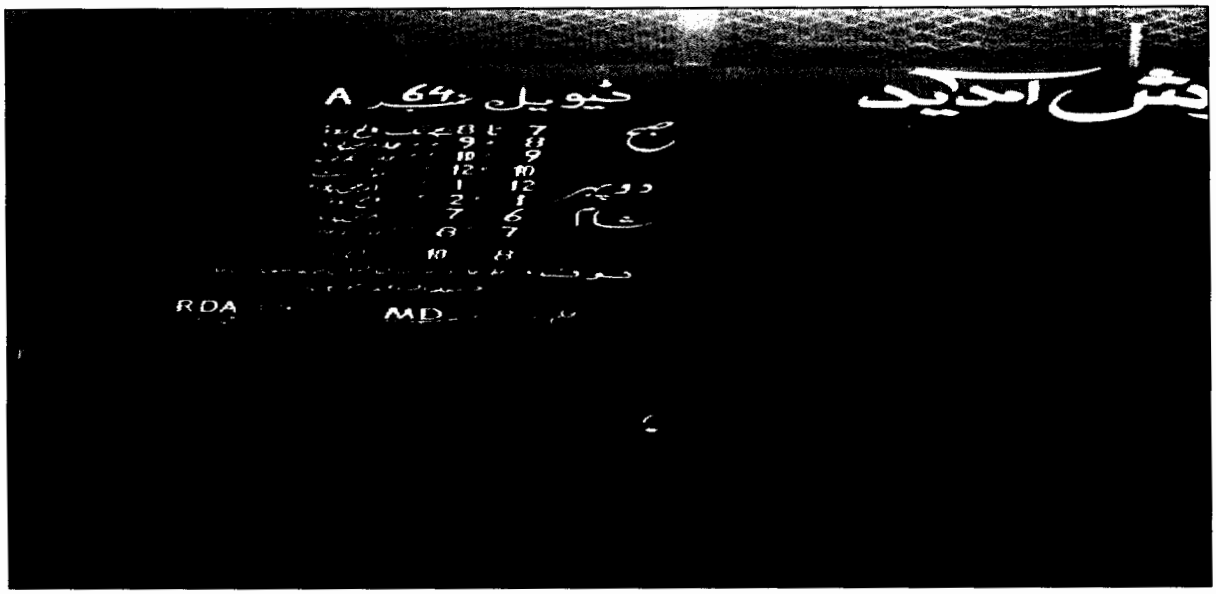


Figure: 4.13.1. Tube well chamber showing the water supply timings

Another prominent reason for the low performance of the operators was over loading of duties. It was observed that the total duty timings of tube-well operation were 8 hrs/day (standard). For the convenience of the worker (operator) the duties were divided into two shifts i.e. evening and morning. Each operator was assigned a single shift (for there were average two operators working on a single tube-well and rarely there were three or one operator), this was a just allocation of duty. But it was observed that in some cases where the filter plants or any other tube-wells were found in close vicinity with one tube-well, extra duty was placed over a single tube-well operator. Due to this additional duty the work timings of a single operator were increased from his daily work hours and no extra pay was given to that operator. This situation was creating

further frustration and mismanagement resulting in inefficient performance of the operators.

Figure: 4.13.2.Showing the inner side of a tube-well chamber

It was also observed that the operators were not provided with any type of working tools/equipment/kits / uniforms/gloves etc to avoid any type of hazard, during the job performance. When this was inquired, the administration informed that the workers (operators) have been provided with uniforms previously, but they demanded for money to be given to them instead of purchasing uniform (money should not be wasted on purchasing uniforms for them instead it should be given to them) so that they can fulfill any of their other requirements.

Figure: 4.13.3.Filtration plant at D.A.V collage road RWP

Another problem that was observed was the maintenance of the personal logbooks, and the maintenance of the tube-well, chamber and filtration plan. The operators were not only given the duties of maintaining the tube-wells, but were also told to register the complaint in case any fault occurs in any of these, and were told to keep record of their duty in the logbooks. But when the tube-wells were visited it was observed that the physical conditions of the tub-well, the chamber and filtration plant were not satisfactory. Leaks were observed in the pipes (tube-well) and filtration plants.

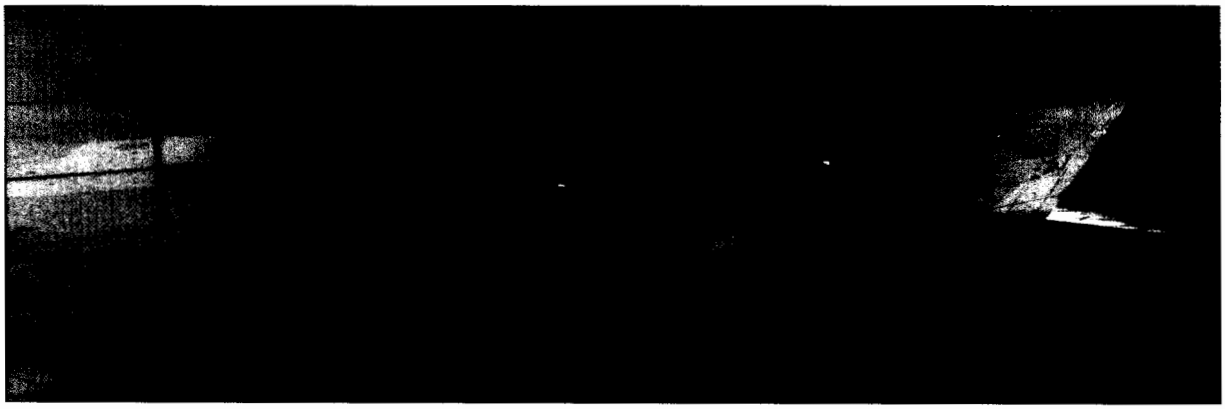


Figure: 4.13.4(a).Showing the garbage littered under the filtration plant taps.

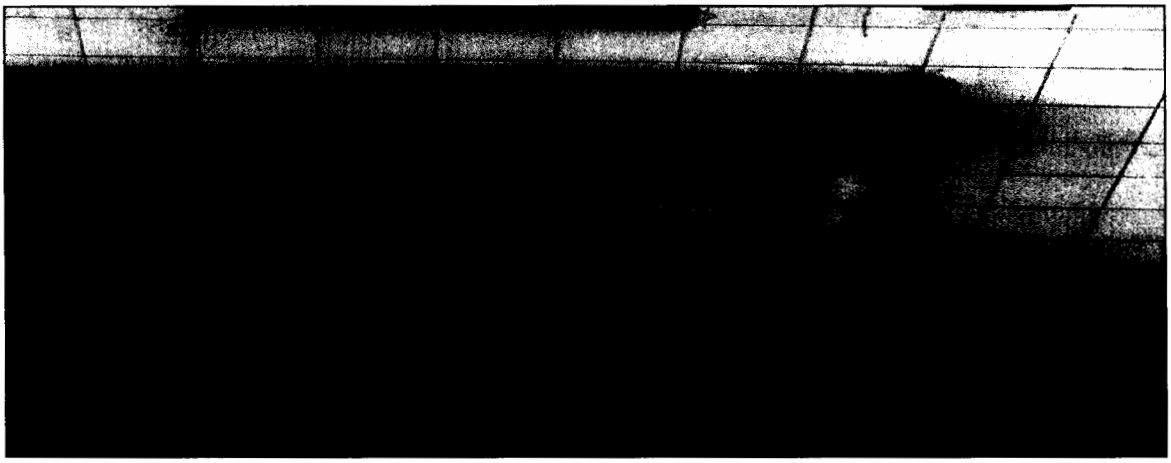


Figure: 4.13.4(b). Showing algae on the walls of the filter plant

Moreover, the garbage was found littered around the filtration plant and tube-well, and the walls of the filtration plants were often found covered with algae and the footing of the filtration plant occupied with standing water, resulting in a foul smell in the surroundings. This standing water increases threats to the community's health by providing breading places to the mosquitoes and flies etc resulting in a number of diseases.

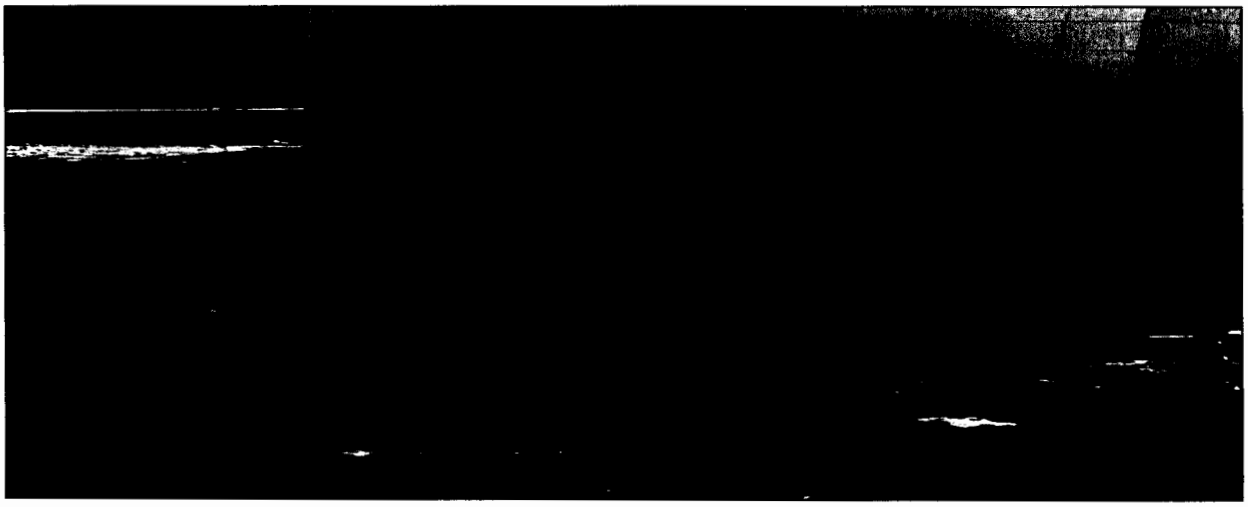


Figure: 4.13.5. Standing water around the filtration plant resulting in foul smell

Also inside the chamber the bare electric wires were observed to be spreaded all over the floor. Thus increasing the risk of electrical hazard.

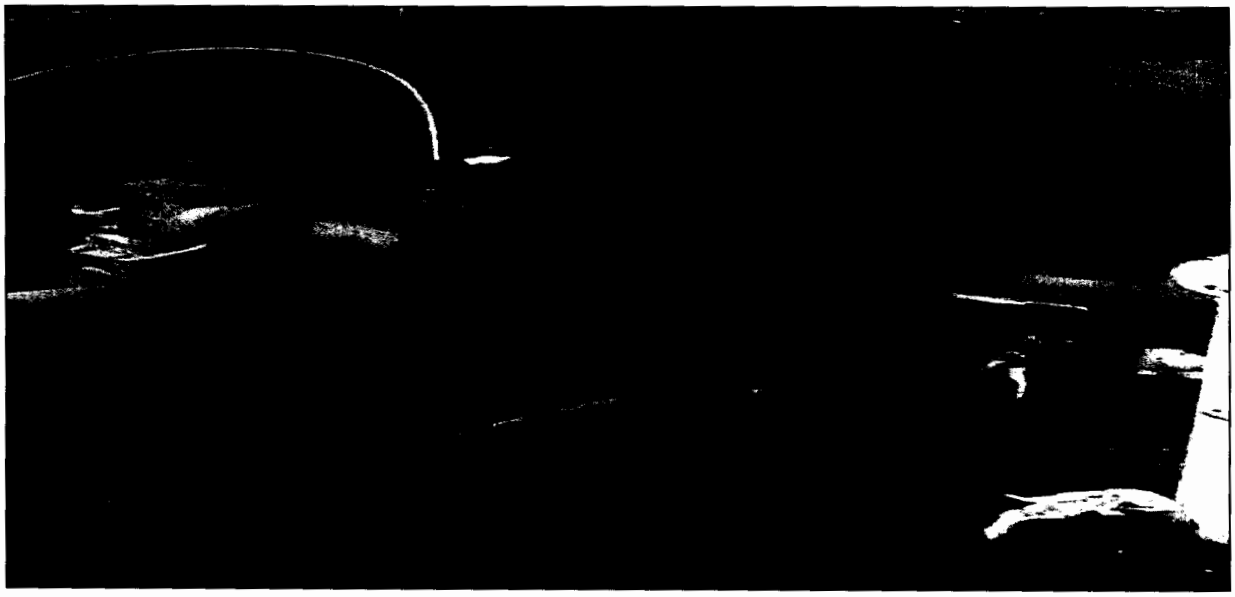


Figure: 4.13.6.Water leaking and standing at the ground inside the tube-well chamber.

Figure: 4.13.7. Filtration plant tap tired with a shopping bag to stop leakage.

Figure: 4.13.8. Motor leakage due to improper maintenance also garbage littered around the tube well motor (inside the tube well chamber).

Moreover, in some areas it was found that WASA was not supplying water in compliance of its mandate and the MDGs and the people still had to rely on the well water or on water bores made in their houses or were compelled to purchase water through WASA water tanks.

4.14 RECOMMENDATIONS

The efficiency of the human force of the organization could be improved by adopting the following;

The existing structure of the organization and water supply should be further improved. Water meter must be fitted so as to keep a check and record of water out flowing (from the reservoir).The newly hired tube-well operators must be imparted some technical training before assigning the duty. Also regular in-house trainings should be given to the workers at all levels of the organization so as to improve the overall efficiency and increase their competence.

The inspection teams should be constituted so as to inspect that either the operators are discharging their allotted duties and are fulfilling their responsibilities. An urgent and effective complaint system should be introduced and the public should be given access to the decision makers to voice their problems related to water supply.

The wages of the tube well operators should be increased so that they do not have to go for part time or side jobs/business and work with full commitment and honesty.

Other facilities should be given to the tube well operators such as housing, schooling alliances to reduce their worries/problems so that they give full attention and show commitment to their job.

Overtime (extra payment) should be given to those imparting extra duties. There should be separate tube well operators allocated to different tube wells. Moreover, a separate operator should be hired for every filter plant.

Helping tools/ equipments etc should be provided to all the operators. Fines should be charged on those who were found to be absent from their duty places in times of their duties. Also fines should be charged from those who do not wear proper uniforms. A monthly or weekly inspection should be done to check the condition of the tube wells and filter plants and if found in a bad condition the tube well operators (responsible) should be punished.

The logbooks of the operators must be checked on daily basis by their respective supervisors. And the supervisors must be made to send a weekly report to the offices above, which should then combine those weekly reports to formulate a monthly report of the performance of the workers. Afterwards, this monthly report should be sent to the director of water supply directorate. The respective Director would then take notice of the low performing employees; on the basis of that report. In this way the whole process should be made to work efficiently and effectively.

Reward and punishment system at all levels of the organization would also improve the performance level of the organization. The tube well operators must also be given a chance to excel through providing them a chance to increase their qualification along with a possibility of further promotions. Departmental courses

should be introduce to improve and increase the efficiency of the operators and hence the overall efficiency of the organization.

A yearly efficiency calculation/evaluation of overall organization would help in solving some of the problems. Also there is a dire need to reduce/ check the increasing public and political pressures that the tube-well operators face during dispersion of their duties.

Moreover a regular transfer system should be introduced so that a single operator is not kept for long in a same area; to check if any operator gets cover from some political or pressure groups. Supervisory control system with a central monitoring system can be introduced to replace the human dependency.

4.15. CONCLUSION

From the over all study carried out to analyze the efficiency of RWASA which is the main body supplying water to the Rawalpindi city it was determined that the whole water supply and management system needs to be managed and designed in such a way that it provides efficient training and facilities to its work force so that they might be able to develop an efficient and effective service delivery system in which access of clean and safe water is given to all the levels of the community. In this way not only the community health standards would be maintained but this would also make us capable of complying with the MDG goal 7 i.e. safe and equitable supply to all by 2015.

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