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CHAPTER ONE
INTRODUCTION

INTRODUCTION

1.1. General

Investments in the water infrastructure are urgently needed in order to provide all members of the population with drinking water, to improve its quality and to reduce pressure on the environment through the treatment of wastewater. Municipalities, and therefore water utilities, are the main actors in water supply and wastewater treatment projects, thus their capacities are scrutinized. Currently, the water utility sector is also facing serious challenges related to financial, technical and administration. On the other hand, it should be of the utmost importance for national governments to embark on reforms of their water utility sectors. Some countries are already doing this in practice; in other countries reform is still being discussed.

1.2. HISTORICAL BACKGROUND

Water utilities in Egypt have undergone a number of institutional reforms, helping to transform from public to economic organizations and finally to the public enterprise sector. Primary utilities were first constructed in Alexandria and Cairo. In 1879, an English limited liability company was established (Alexandria water company), which continued to work according to the law of limited liability companies and within its organizational structure until 1958, where it was converted to an Egyptian limited joint stock company.

The supply of sufficient potable water at a good quality is an important element of the national water policy in Egypt, and this supply has priority over the other water uses. The proportion of the total population served by piped water is quite high (approx. 95%), but there are still substantial deficits with regard to service quality and quantity, especially in semi-urban and rural areas. The low sanitation coverage (approx. 50% in urban areas and 10% in rural areas), in combination with deficiencies in wastewater treatment, results in severe water quality problems. This has a direct impact on agricultural production, human health and the northern lakes ecosystems (improved water & wastewater service programme – manual of procedure – part 1).

Cairo water utility company began as a French company. In 1961, the Egyptian government took over both companies (Alexandria and Cairo) under law number 117 of

1961 on public institutions. In 1968, both companies were converted to public organization and later to economic organizations in 1979. In 1971, a Presidential Decree (PD) was issued to transfer the responsibility for supervising over utilities from Minister of Housing and Utilities to the concerned Governor.

Since 1980, the Egyptian government sought to solve the financial problems of water utilities through the establishment of economic organizations and public companies. In 1979, Cairo and Alexandria water companies were transformed into economic organizations. Water companies of Behira, Damietta and Kafr Al-Shiekh were established by the decisions of the concerned governor in 1981, 1983, and 1984 respectively. Cairo and Alexandria wastewater companies were also transformed into economic organizations in 1994. In addition, the utilities of Minya, Beni Swief, Fayuom, Aswan, Sharqyia, Gharbyia and Daqahlyia were also converted to economic organizations in 1995.

Converting these utilities to economic organizations is an attempt by the Egyptian government to make them responsible for expenditures and revenues balance. These utilities continued to work as a means to serve the goals of social employment.

Over the last 25 years the financial problems of water and wastewater utilities have been compounding, as a result of lack of managerial and financial autonomy, lack of incentives to improve performance and continued overstaffing. A strong move towards reforming sector structure was initiated in 2004 with the issuance of two presidential decrees (PD): PD 135 was issued to form a water and waste water sector holding company ("HCWW") and transformed the 14 water/wastewater utilities into subsidiaries or Affiliated Companies ("ACs") of that company. At the same time, PD 136 created the Egyptian Water and wastewater Regulatory Agency ("EWRA"), responsible for monitoring and regulating sector performance and setting benchmarks to improve efficiency and quality of service delivery to reach international standards. (improved water & wastewater service programme – manual of procedure – part 1).

1.3. Problem Statement

Due to the poor performance of the Egyptian water and wastewater sector, the government initiated sector reform that aimed at improving service quality, gradually attaining a financial equilibrium and improving staff skills. The Ministry of Housing,

Utilities and Urban Development (MHUUD) charged National Organization for Potable Water and Sanitation Drainage (NOPWASD) with the elaboration of a diagnostic study and recommendations for reforms. This was to be done under the label of decentralization through the creation of commercially oriented companies at the governorate level, just as recommended two decades earlier. However, two new elements were added to the reforms: private sector participation and autonomous regulation, (The Right to Water web site).

The study was presented to the Cabinet of Ministers in 1998. The Cabinet charged (MHUUD) with the elaboration of two documents: a decree on the reorganization of the water and wastewater sector, as well as a law on public utility concessions for water and wastewater. Both were initially approved in principle by Cabinet in year 2000. However, the water concession law was never passed at that time. A decree for the creation of a regulatory agency was also circulated. The process of enacting the reforms took many years. During this time the decree on the reorganization of the sector was modified, creating a Holding Company for Water and Wastewater (HCWW).

Creation of the Holding Company: In April 2004 the decree that created the (HCWW), which was to become a central institution of the sector, was enacted. The existing 7 water and wastewater companies (2 in Cairo, 2 in Alexandria, and the 3 in the Nile Delta) as well as the existing 7 Public Economic Authorities were all transformed into affiliated companies of the Holding Company. While the Holding Company did not become responsible for investment, it was responsible for the acquisition of equipment to modernize its affiliate companies and for training their staff. Also, it became a key interlocutor for foreign donors, (Mowad 2011).

Creation of the regulatory agency: In 2006 the sector reforms were complemented by the creation of a regulatory agency, the Egyptian Water Regulatory Agency (EWRA). The creation of an “autonomous” regulatory agency for utilities was a standard recommendation made by donors for infrastructure sector reforms in developing countries at that time. The agency's tasks include reviewing proposals for tariff adjustments, monitoring the application of technical standards and reviewing customer complaints. The agency also has a mandate to both promote and regulate private sector participation. (EWRA website) These tasks overlap with the tasks of other agencies, such

as (HCWW) (which also reviews proposals for tariff adjustments, alongside (MHUUD) and the Cabinet), the public companies (which also review complaints) and the Public Private Partnership (PPP) Central Unit (which also promotes private sector participation).

Eight years after the reform, where do the water and wastewater sector stand now? What is the current situation of the affiliated companies on the base of technical and financial performance? Does the reform indeed achieve the required results? Those are the main inquires that will be covered later on through this thesis by comparing the status of the affiliated companies before and after the reform on the basis of some technical and financial indicators, which are:

First: Technical Indicators

1. Produced water capacity (PWC).
2. Produced water consumption (PWCons.).
3. Consumed water capacity (CWC).
4. Non revenue water (NRW).
5. Percentage of household with access to water (%HAW).
6. Treated wastewater capacity (TWWC).

Second: Financial Indicators

1. Comparative financial statements.

   Comparative Financial Statement analysis provides information to assess the direction of change in the business.

2. Liquidity Ratio.

   It measure the ability of the company to maintain a sound financial position through the same period of time (A. Hassanien and Khalifa 2008).

$$Current\ Ratio = \frac{Current\ Assets}{Short\ Term\ Liabilities}$$

3. Leverage Ratio.

   It measures the ability of the company to maintain a sound financial position through a large time period (A. Hassanien and Khalifa 2008).

$$Dept/Assets = \frac{Total\ Liabilities}{Total\ Assets}$$

$$Turn\ over\ of\ total\ assets = \frac{Annual\ Volume}{Avarage\ Total\ Assets}$$

1.4. Objectives of Current Research

The main target for the present research is to perform a comparative analysis for the technical and financial performance on six of the affiliated companies as a case study. By analyzing the collected data and show the improvement or the deterioration of the sector.

To reach this target, the research divided into two phases. Phase one is to collect the required data regarding the technical and financial performance of the affiliated companies. Phase two is to analyze the collected data and show the improvement or the deterioration of the sector.

1.5. Study Methodology

The study work plan is divided into two main parts as follows:

1.5.1. Literature Review

Phase one is to discuss the different definitions of performance and also shows the different factors used to measure the technical and financial performance. Also this phase discuss some related previous studies regarding water and wastewater sector reform and performance measuring.

1.5.2. Data Collection

Phase two is to collect the required data regarding the technical, financial and administrative performance of the affiliated companies. The data collected came from different resources such as: Holding Company for water and wastewater – Egyptian Water Regulatory Agency – Ministry of Finance.

1.5.3. Analytical work

Phase three is to analyze the collected data and show the improvement or the deterioration on the performance of the sector. A number of indicators were used to assess the technical and financial performance of the companies before and after reform.

1.6. Thesis Organization

The thesis consists of five chapters as follows:

CHAPTER 1: INTRODUCTION

General overview of current research objectives, problem definition and scope of work.

CHAPTER 2: LITERATURE REVIEW

This chapter discussed performance definition and important technical and financial indicators that should be measured to evaluate companies. Also in this chapter, the main performance measurement indicators are summarized and also some case studies of other countries in the reform of water and wastewater sector.

CHAPTER 3: DATA COLLECTION

The comprehensive raw data collected from the affiliated companies and the holding company for water and wastewater is addressed. Also this chapter presented the studied companies and indicators that will be evaluated.

CHAPTER 4: ANALYSIS & RESULTS

Includes the deep investigation for the obtained results regarding the companies performance, in addition graphical relationships between different parameters were also discussed. It also explains and discusses these results.

CHAPTER 5: CONCLUSION & RECOMMENDATIONS

Includes conclusion from the results of the research in addition to recommendations for future work.

CHAPTER TWO

LITREATURE REVIEW

Chapter 2

LITREATURE REVIEW

2. 1 Introduction

Governments worldwide have shown increasing initiatives in private funding of public infrastructure and services across a wide range of industries and sectors, including power, transportation, water supply and disposal, telecommunications, oil and gas, mining, schools, hospitals, and military training facilities. Improved deliveries of many major public works and services that would not have been possible without private finance have been widely reported. On the other hand, a number of privatized projects suffered disastrous consequences because of construction cost/time overruns, changing market demand, depreciation of local currencies and/or reduction in tolls/tariffs by utilities, (Xueqing, 2005).

Financial administration of Management, Operation, and Maintenance (MOM) is one of the most important functions of any Water and Wastewater Associations. Without proper MOM financial management, theses associations cannot properly operate or maintain its system. Proper financial management will not only help assuring the economic viability and continued existence; it will establish and maintain the confidence of its member. The goals of MOM financial management are to facilitate an effective use of the assets of associations, manage funds to the best benefit of its members, readily explain the financial condition, (Cengiz 2007).

2. 2 Companies Performance

2.2.1 General

Performance evaluation of construction companies gains its importance from the fact today's world is moving rapidly toward globalization (Elyamany et al. 2007). Regarding to the economical situation today, any company should continuously evaluate its performance to predict expected problems and improve its performance. This evaluation should cover technical and financial criterion.

Inter-utility performance comparison is needed in the water and sanitation sector, because the sector offers limited scope for direct competition. Firms operating in competitive markets are under constant pressure to outperform each other. Water utilities are often sheltered from this pressure, and it frequently shows: some utilities are on a sustained improvement track, but many others keep falling further behind best practice. This matters, because a well-run water utility is

essential to people's lives. Only the most efficient, financially viable utilities are able to respond to urban growth, connect the poor, and improve wastewater disposal practices, (The International Benchmarking Network for Water and Sanitation Utilities IBNET).

2.2.2 Performance Definition

The idea of performance relates to how successfully an organization attains its objectives or how effectively it implements an appropriate strategy. Though there is evidence in organizational performance studies that a firm's industry plays a significant role, (Chen 2009).

2.2.3 Performance Measurements

Performance measurement is used as business tool for evaluating management performance, managing human resources and formulating corporate strategy. In the construction industry, studies using a variety of performance measurement frameworks have been implemented since 1990_s. The need of systematically develop Performance Measurement System (PMS) is more acute in construction companies due to their complex managerial work including the simultaneous implementation of various projects and the control of many input resources, (IIhan et al. 2007).

Performance measurement is an integral part of management and thus may have been exercised ever since management has existed. However, in the modern business literature, performance measurement has been traced back to the use of planning and control procedures by U.S. railroads in the 1860_s and 1870_s, (Bassioni et al. 2004).

2.2.4 Technical Performance Indicators

The World Bank defines performance indicators as tools providing a means of measurement of fulfillment of any project's objectives, success, and prediction of obstacles that may hinder operation. According to the World Health Organization, performance indicators are variables whose purpose is to measure change in a process or function. They can be used either on regular time intervals as a means of

assessment of performance over time, or to measure the change resulting from certain conditions. Finally, the International Water Association defined performance indicators as measures of the efficiency and effectiveness of water utilities with regard to specific aspects of the utility's activity and of the system's behavior, (Hassanein and Khalifa 2008).

The International Benchmarking Network for Water and Sanitation Utilities (IBNET) provides a set of financial, technical and process indicators (mainly capturing the institutional context in which the utilities are operating) for the assessment of utility performance in the provision of water and sewerage services. This set of indicators provides the basis for the cross-utility and cross-country comparisons.

These indicators are set into some categories. These categories showed in table (2.1):

Table (2.1) indicators categories (IBNET)

- Service coverage	- Quality of Service
- Water consumption and production	- Billings collections
- Non revenue water	- Financial Performance
- Metering practices	- Assets
- Pipe network performance	- Affordability of services
- Costs and Staffing	- Process indicators

2.2.4.1 Service Coverage

Coverage is a key development indicator. All coverage indicators are impacted by whether the data on population and household size is up to date and accurate. The need to estimate the population served by public water points and/or the number of households per connection may affect the confidence that can be placed in the water coverage measure. Table (2.2) shows the indicators related to category of service coverage.

Table (2.2) indicators of service coverage (IBNET)

INDICATOR	*UNIT*	*DEFINITION*
1.1 Water Coverage	*%*	*Population with access to water services (either with direct service connection or within reach of a public water point) as a percentage of the /total population under utility's nominal responsibility*
1.2 Water Coverage – Household Connections	*%*	*Sub-set of 1.1*
1.3 Water Coverage – Public Water Points	*%*	*Sub-set of 1.1*
2.1 Sewerage Coverage	*%*	*Population with sewerage services (direct service connection)as a percentage of the total population under utility's notional responsibility*

2.2.4.2 Water Consumption and Production

The preferred water consumption indicator is expressed in terms of liters/capita/day. However there are data issues with the use of this indicator, namely

- *Lack of accurate total consumption data (especially when metering is not universal)*
- *Lack of up-to-date census data, or other relevant survey data, to determine*
  - *(i) household size*
  - *(ii) Sharing of connections between households*
  - *(iii) Number of households using public water points.*

Table (2.3) shows the indicators related to category of water consumption and production.

Table (2.3) indicators of water consumption and production (IBNET)

INDICATOR	***UNIT***	***DEFINITION***
3.1 Water Production	*liters/person/ day*	*Total annual water supplied to the distribution system (including purchased water, if any) expressed by* • *population served per day*
4.1 Total Water Consumption	*liters/person/ day*	*Total annual water sold expressed by population served by* • *Population served per day*
Water consumption split by customer type: *4.2 Residential Consumption* *4.3 Industrial / commercial Consumption* *4.4 Consumption by Institutions & others* *4.5 Bulk treated supply*	*%*	*Shows the split of total water consumption into four customer type categories*
Residential consumption: *4.7 Residential Consumption* *4.8 Residential Consumption – connections to mains supply* *4.9 Residential consumption - public water points*	*liters/person/day*	*Shows the average water consumption per person per day by customer category*

2.2.4.3 Non Revenue Water

Non revenue water represents water that has been produced and is "lost" before it reaches the customer (either through leak, through legal usage for which no payment is made). Part of this "lost" water can be retrieved by appropriate technical and managerial actions. It can then be used to meet currently unsatisfied demand (and hence increase revenues to the utility), or to defer future capital expenditures to provide additional supply (and hence reduce costs to the utility).

There is a debate as to the most appropriate measure of non revenue water. A percentage approach can make utilities with high levels of consumption, or compact networks, look to be better performing than those with low levels of consumption or extensive networks. To capture these different perspectives the reporting of three measures of non revenue water has become the norm. Table (2.4) shows the indicators related to non revenue water.

Table (2.4) indicators of non revenue water (IBNET)

INDICATOR	***UNIT***	***DEFINITION***
5.1 Non Revenue Water	*%*	*Difference between water supplied and water sold (i.e. volume of water "lost") expressed as a percentage of net water supplied*
5.2 Non Revenue Water	*m3/km/day*	*Volume of water "lost" per km of water distribution network per day*
5.3 Non Revenue Water	*m3/conn/day*	*Volume of water "lost" per water connection per day.*

2.2.4.4 Metering Practices

Metering of customers is considered good practice. It allows customers the opportunity to influence their water bills, and provides utilities with tools and information to allow them to better manage their systems. Table (2.5) shows the indicators related to metering practices.

Table (2.5) indicators of metering practices (IBNET)

INDICATOR	*UNIT*	*DEFINITION*
6.1 Metering level	*%*	*Total number of connections with operating meter/ total number of connections, expressed in percentage*
7.1 % sold that is metered	*%*	*Volume of water sold that is metered/ Total volume of water sold, expressed in percentage*

2.2.4.5 Piped Network Performance

The number of pipe breaks, relative to the scale of the system, is a measure of the ability of the pipe network to provide a service to customers.

The rate of water pipe breaks can also be seen as a surrogate for the general state of the network, although it reflects operation and maintenance practices too. It must be recognized, however, that highly aggregated reporting can hide the fact that sections of the network may be perpetually failing, whilst much of the remainder is in reasonable condition. Break rates for different materials, diameters or time periods laid can show where breaks are concentrated. Table (2.6) shows the indicators related to piped network performance.

Table (2.6) indicators of piped network performance (IBNET)

INDICATOR	*UNIT*	*DEFINITION*
8.1 Pipe Breaks	*breaks/km/yr.*	*Total number of pipe breaks per year expressed per km of the water distribution network*
9.1 Sewer System Blockages	*blockages/km/yr.*	*Total number of blockages per year expressed per km of sewers*

2.2.4.6 Costs and Staffing

Unit operational costs provide a "bottom line" assessment of the mix of resources used to achieve the outputs required. The preferred denominator related to operational costs is the amount of water sold. This ratio then reflects the cost of providing water at the customer take off point.

Staff costs are traditionally a major component of operating costs. Understanding staffing levels can often give a quick guide to the extent of any over-manning in a water utility. While it is preferable to be able to allocate staff time to water or wastewater services, this information is sometimes not available. Comparisons are best made between utilities which offer the same scope of service both in terms of total size, and mix of water and sewer service. Note that where outside contractors are used (see indicator 14.1), staff number comparisons should take this into account. Table (2.7) shows the indicators related to cost and staffing.

Table (2.7) indicators of cost and staffing (IBNET)

INDICATOR	***UNIT***	***DEFINITION***
10.1 Unit Operational Cost Water and Wastewater (W&WW)	*US$/m3 sold*	*Total annual operational expenses[1]/Total annual volume sold.*
10.2 Unit Operational Cost Water and Wastewater	*US$/m3 produced*	*Total annual operational expenses[1]/Total annual water produced.*
10.3 Unit Operational Cost – Water only	*US$/m3 sold*	*Annual water service operational expenses[1]/Total annual volume sold.*
10.4 Operational Cost Split - % Water	*%*	*Split of the total cost into water and wastewater*
10.5 Operational Cost Split - % Wastewater	*%*	
10.6 Unit Operational Cost – Wastewater	*US$/WW pop served*	*Annual wastewater operational expenses[1]/ Population served*
11.1 Staff W&WW/'000 water and wastewater	*#/'000*	*Total number of staff expressed as per thousand*

connections	*W&WW conn*	*connections*
11.2 Staff Water /'000 Water connections	*#/'000 W conn*	
11.3 Staff Wastewater/'000 Wastewater connections	*#/'000 WW conn*	
11.4 Staff W&WW/'000 W&WW pop served	*#/'000 W&WW pop served*	*Total number of staff expressed as per thousand people served*
11.5 Staff Water/'000 Water pop served	*#/'000 W pop served*	
11.6 Staff Wastewater/'000 Wastewater pop served	*#/'000 WW pop served*	
11.7 Staff % Water	*%*	
11.8 Staff % Wastewater		
12.1 Labor Costs vs Operational Costs	*%*	*Total annual labor costs (including benefits) expressed as a percentage of total annual operational costs.*
12.2 Electrical Energy Costs as percentage of Operational Costs	*%*	*Annual electrical energy costs expressed as a percentage of total annual operational costs.*
13.1 Contracted-out service costs as percentage of operational costs	*%*	*Total cost of services contracted-out to the private sector expressed as a percentage of total annual operational[1] costs.*

Note 1: Annual operating expenses exclude depreciation, interest and debt service

2.2.4.7 Quality of Service

Historically there has been limited attention paid to measures that capture the quality of service provided to customers. This, in fact, should be a particular focus of performance measurement.

The measures presented above are a limited first step in the process of capturing information on quality of service. Complaints, while relatively easy to track, give only a glimpse of actual company performance - consumers may have become accustomed to poor service and not complain. In other instances it may be difficult for customers to report complaints. Capturing at least some customer derived data, however, is considered to be an important starting point.

Collection of wastewater does not mean that the waste is fully treated before discharge back to the environment. The wastewater treatment indicators will provide an understanding of the amount of effluent that is treated before being discharged. Table (2.8) shows the indicators related to quality of services.

Table (2.8) indicators of quality of services (IBNET)

INDICATOR	***UNIT***	***DEFINITION***
14.1 Continuity of Service	*Hrs/day*	*Average hours of service per day for water supply.*
14.2 Customers with discontinuous supply	*%*	*The percentage of customers with a water supply that is discontinuous during normal operation.*
14.3 Quality of water supplied: nr of tests for residual chlorine	*% of # required*	*The number of tests carried out on samples taken from the distribution system, as a % of the number required by the standard that applies. This may exceed 100%.* *NB: Operational samples, or any others that were not taken to check compliance with the standard, are excluded.*

14.4 Quality of water supplied: samples passing on residual chlorine	*%*	*The percentage of samples tested for residual chlorine that pass the relevant standard*
15.1 Complaints about W&WW services	*% of W&WW conn*	*Total number of W&WW complaints per year expressed as a percentage of the total number of W&WW connections*
16.1 Wastewater – at least primary treatment	*%*	*Proportion of collected sewage that receives at least primary treatment, i.e. involving settlement with the intention of removing solids, but not biological treatment. Both lagoon and mechanical treatment can be included, where appropriate.*
16.2 Wastewater primary treatment only	*%*	*Proportion of collected sewage that receives primary treatment only, i.e. involving settlement with the intention of removing solids, but not biological treatment. Both lagoon and mechanical treatment can be included, where appropriate.*
16.3 Wastewater secondary treatment or better	*%*	*Proportion of collected sewage that receives at least secondary treatment, i.e. removing oxygen demand as well as solids, normally biological. Both lagoon and mechanical treatment can be included, where appropriate.*

2.2.4.8 Billings and Collections

Billing customers and getting paid are two different things. The effectiveness of the collections process is measured by the amount of outstanding revenues at year end compared to the total billed revenue for the year, in day equivalents, and by the total amount collected as a percentage of the billed amount. Table (2.9) shows the indicators related to billings and collections.

Table (2.9) indicators of billing and collections (IBNET)

INDICATOR	*UNIT*	*DEFINITION*
17.1 Average Revenue W&WW	*US$/m3 water sold*	*Total annual W&WW operating revenues expressed by annual amount of water sold and by the number of connections.*
17.2 Average Revenue W&WW	*US$/W conn./yr.*	
17.3 Average Revenue – water only	*US$/m3 water sold.*	*Operating revenues (W only) expressed by annual amount of water sold.*
17.4 Revenue Split - % water	*% of total for W&WW*	*Percentage split of total revenue into water and wastewater*
17.5 Revenue Split - % wastewater		
17.6 Water revenue – residential	*% of total water revenue*	*Percentage split of water revenue by customer type*
17.7 Water revenue – industrial/commercial		
17.8 Water revenue – institutions & others		
17.9 Water revenue – bulk treated supply		
17.10 Wastewater revenue per person served	*US$/person served*	*Operating revenues (WW only) expressed per person served*
18.1 Residential fixed component of tariff	*% of average*	*Any fixed component of the residential tariff as a proportion of the average tariff per connection*

18.2 Residential fixed component of tariff - water *18.3 Residential fixed component of tariff - wastewater*	*bill*	*per year.* *Water & wastewater together, and separated if possible.*
19.1 Ratio of industrial to residential tariff *19.2 Ratio of industrial to residential tariff - water* *19.3 Ratio of industrial to residential tariff - wastewater*	*ratio*	*The average charge (per m3) to industrial customers compared against the average charge (per m3) to residential customers.* *Water & wastewater together, and separated if possible.*
20.1 Collection Period	*Days*	*(Year-end accounts receivable/Total annual operating revenues) * 365*
20.2 Collection ratio	*%*	*Cash income / Billed revenue as a %*

Note 1. W = water service, WW = wastewater / sewerage service

2.2.4.9 Financial Performance

By studying table (2.10) which shows the indictors related to financial performance, it helps answer two important questions: (i) Do revenues exceed operating costs? and (ii) Does the utility's income enable it to service its debts?

These two indicators have been selected from a much larger range of financial indicators (which include leverage, liquidity, profitability and efficiency ratios).

Table (2.10) indicators of financial performance (IBNET)

INDICATOR	***UNIT***	***DEFINITION***
21.1 Operating Cost Coverage	*ratio*	*Total annual operational revenues/Total annual operating costs*
22.1 Debt Service Ratio	*%*	*Cash income / Debt service * 100*

2.2.4.10 Assets

The capital intensity of the utility is indicated by the gross fixed asset value per capita served. Unfortunately there is often limited information available about asset values and until more emphasis is placed on this item the values derived must be treated with caution.

No investment indicators are included as they tend to differ widely from one year to another due to the lumpiness of the investments. At a more detailed level, comparisons of unit costs for particular items of equipment can be very useful. Table (2.11) shows the indicators related to assets.

Table (2.11) indicators of assets (IBNET)

INDICATOR	*UNIT*	*DEFINITION*
23.1 Gross Fixed Assets – water & wastewater	*US$/W&WW pop served*	*Total gross fixed W&WW assets per W&WW populations served.*
23.2 Gross Fixed Assets - water	*US$/W pop served*	*Total gross fixed assets per population served, separately for water (W) and wastewater (WW).*
23.3 Gross Fixed Assets – wastewater	*US$/WW pop served*	

Note: Gross fixed assets are defined to include work in progress.

2.2.4.11 Affordability of Services

Average tariffs need to be put in the perspective of affordability. Household income data, however, is not easy to obtain. The indicator selected here, therefore, compares average per capita tariffs as a proportion of per capita Growth National Income (GNI). The GNI (Atlas method based) will be for the whole country, and not reflect local variations, but is the most appropriate consistent measure currently available for most countries. In case specific household data is available, this data could be commented upon separately.

Some utilities use fixed charge components within the residential tariff (i.e. irrespective of the amount of water consumed). Such tariffs can adversely affect low volume water consumers. They also protect the revenue stream to the utility in periods when consumption is highly variable. Comparison of the fixed component with the average tariff will give an indication of the relative weight of the fixed and variable component of a water bill.

There may be a cross subsidy between industrial consumers and residential consumers. The ratio of the average charges (per m3) to industrial and residential customers provides some quantification of this subsidy. Subsidies are complex and this ratio provides only a simplistic assessment of the situation in any utility.

For many, the cost of connecting to the piped network can be a significant financial hurdle. Comparing connection charges will provide insights into the level to which this hurdle has been raised. It is a particular issue when seeking to connect poorer sections of the community. The indicator provides the absolute level and as a proportion of national GNI per capita. Table (2.12) shows the indicators related to affordability of services.

Table (2.12) indicators of affordability of services (IBNET)

INDICATOR	***UNIT***	***DEFINITION***
24.1 Total revenues per service pop/GNI	*% GNI per capita*	*Total annual operating revenues per population served/National GNI per capita; expressed in percentage*
24.2 Monthly water bill for a household consuming 6m3 of water per month through a household or shared yard tap (but excluding the use of standposts)?	*US$/year*	*Cost in local currency to a household per month of 6m3 water / Exchange rate with US$ * 12*
25.1 Residential fixed		*Any fixed component of the residential tariff (total*

component of tariff	*US$/conn./yr.*	*amount).*
25.2 Residential fixed component of tariff - water		*Water & wastewater together, and separated if possible.*
25.3 Residential fixed component of tariff - wastewater		
25.4 Residential fixed component of tariff	*% of average bill*	*Any fixed component of the residential tariff as a proportion of the average tariff per connection per year.*
25.5 Residential fixed component of tariff - water		*Water & wastewater together, and separated if possible.*
25.6 Residential fixed component of tariff - wastewater		

2.2.4.12 Process indicators

The context factors are distinct from process indicators in that they are, in the short to medium term, beyond the influence of the utility.

Information on the services provided is essential to interpreting the indicator values. The size of the Utility is also relevant, as large utilities can benefit from economies of scale. Table (2.13) shows the indicators related to process indicators.

Table (2.13) indicators of process indicators (IBNET)

INDICATOR	***CATEGORIES***
P.1 What best describes the utility's planning process?	*A. Setting budgets for next year* *B. A multi-year plan that identifies targets and resources for change and improvement* *C. Neither of the above (Describe....)*
The management of your utility undertakes the	

following:	
HR.1 Has a skills and training strategy for all staff?	*Yes / No*
HR.2 Has an annual appraisal and target setting system for managers?	*Yes / No*
HR.3 Has an annual appraisal and target setting system for all staff?	*Yes / No*
HR.4 Has a reward and recognition programme for all staff?	*Yes / No*
HR.5 Has the ability to recruit and dismiss staff (within an agreed plan)?	*Yes / No*
R.1 Who has general oversight of the utility's services and prices?	*A. Local, regional or national government department* *B. Independent board of stakeholders* *C. Independent service & price regulator* *D. Other (Describe....)*
What are the main sources of finance for investment?	
F.1 Grants or Government transfers to the utility?	*Yes / No*
F.2 Borrowing from International Financial Agencies (multi or bi laterals)?	*Yes / No*
F.3 Government owned banks?	*Yes / No*
F.4 Commercial banks or bond holders?	*Yes / No*
C.1 Does the utility offer more than one level of service for household or shared water supplies?[1]	*Yes / No / Not applicable*

C.2 Does the utility offer more than one level of sanitation or sewerage service/ technology for households?[2]	*Yes / No / Not applicable*
C.3 Does the utility offer a flexible / amortized repayment option to spread the costs of connection to the water and/or sanitation network?	*Yes / No / Not applicable*
C.4 – See 19.2	
How does the utility find out the views of its customers?	
C.5.1 Letters, telephone calls etc from customers	
C.5.2 Inviting customers' views through radio, TV or other publicity	*Yes / No*
C.5.3 Questionnaire survey	*Yes / No*
C.5.4 Other	*Yes / No*
	Yes / No (Describe...)

Context information

Density of water connections	*#/km*
Density of sewer connections	*#/km*

2.3 PREVIOUS STUDIES

There are some studies discussed the firm's performance. Further, many of these studies focused on construction firms and projects.

Charles et al. (2004) made an empirical study of strategic performance of global construction firms. For sample of 24 large international construction firms originating in U.S., Europe and Japan, they concluded that:

1. A universal formula for success is elusive-critical success factors can be uniquely derived from different modes of operational, financial, technological and human-related conditions.
2. Causes of failure are diverse, thus construction firms must consistently check the downside risks of all measures.

Bassioni et al. (2004) reviewed the main performance measurements frameworks and their application by U.K. construction firms. They studied the relationship among the basic performance criteria as shown in Figure (2.1).

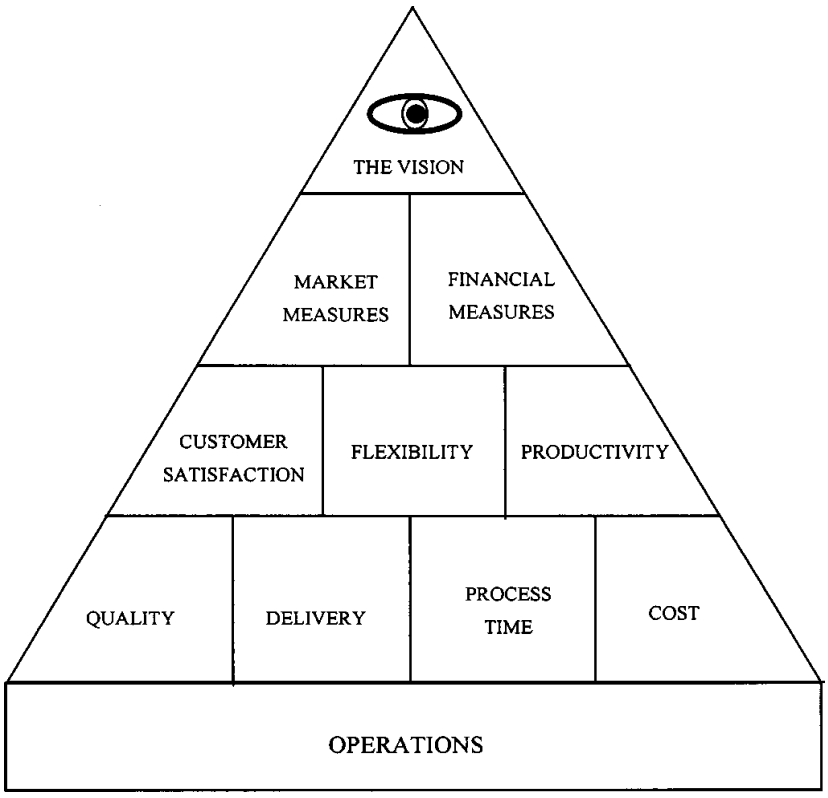

Fig. (2.1) Performance Pyramid (Bassioni, et al. (2004))

Bassioni et al. (2004) reviewed the performance measurement framework in U.K. (KPI, Balanced Scorecard and European Foundation for Quality Management (EFQM)) model and they concluded that their research need exists to develop more comprehensive performance measurement frameworks that incorporate the relevant aspects of different performance frameworks, models, and improvement methods.

WORLD BANK GROUP (2004) discussed the reform of water sector in Senegal and they concluded that this reform is a successful process and one of the most important successes is the existence of a good working relationship between the players, and this relationship is perceived as a partnership. SONES (Société Nationale des Eaux du Sénégal (state asset-holding company in Senegal)) concentrates on overall sector development and contract enforcement, and leaves the day-to-day operation of the system to Sénégalaise des Eaux (Senegelese water utility)SDE. SDE has created an efficiently managed system, increasing capacity through employee training, and has introduced state-of-the-art technology such as electronic leak detection and computerized billing.

El-Mashaleh, et al. (2006) studied the impact of Information Technology (IT) on construction firm performance. For sample of 74 construction firms, they used the regression analysis to test the relationship between performance and (IT), and these analyses provide that:

1. IT is positively associated with firm performance, schedule performance and cost performance.
2. For every 1 unit increase in IT utilization, there is an increase of about 2% in firm performance, 5% in schedule performance and 3% in cost performance.
3. No relationship is found between IT use and customer satisfaction, safety performance and profitability.

El-Mashaleh et al. (2007) analyze and critique both the performance measures and metrics used traditionally in the construction industry and the benchmarking models developed to data for the industry. They were collect data from 74 construction firms which include:

- General contractors.
- Construction management companies.

- Design/build firms.
- Subcontractors.

These companies are involved in residential, commercial, industrial and heavy/highway construction.

They showed that:

1. Data Envelopment Analysis (DEA) is applicable to benchmarking the company-wide efficiency of construction firms.
2. The discriminatory power of the models increase with the number of DMU (decision marking unit) used to generate the model.
3. Significant progress was made in the identification of the number of variables metrics and DMU participating firms needed for an applied study of this type.
4. The proper metrics to consider for the model were identified based on an exhaustive search and analysis of the literature and determining a consensus.
5. Existing models were thoroughly critiqued and found to be inadequate for company-wide analysis Of course each model is important and made enormous contributions. Each of the four existing models critiqued is very effective in measuring what they were designed to measure.
6. As with nearly all research, more data will make the results more definitive, as well as making the model more accurate.

IIhan et al. (2007) developed an implementation model and practical methodology to measure and compare the performance of construction companies through three steps:

1. Develop a set of indicators for performance measurement and analyze the relative weightings of the indicators was carried out.
2. Calculate the performance score of construction companies using a study of 34 Korean construction companies.
3. Carried out a performance evaluation and system analysis.

IIhan et al. (2007) showed some issues need to be considered to apply their implementation model:

1. Choose appropriate performance measures when establishing the measure system.
2. The KPIs (key performance indicators) should satisfy the condition.
3. The scoring rubrics for computing performance scores need to be designed in consideration of the data characteristics.
4. The feasibility of the system should be verified for use of the PMS for performance management.
5. Technical and systematic feedback is necessary for a sustainable PMS through periodical monitoring and analysis.

Donia, (2007) discussed the potable water quality problems in Egypt and she summarized these problems as:

1. The deterioration of operation efficiency of water treatment plants.
2. The ageing of water supply networks which affects the water quality and results in increasing the loss in produced water with percentage 20-50% according to formal statistics.
3. The weakness of technical experience required for operation and maintenance of water treatment plants.
4. The increase of organic and chemical pollution of surface water and groundwater.
5. The use of one fixed system for the water treatment plants all over the country and this is not compatible with the types of pollution in different places.
6. The actual price of water is not compatible with the real production.

BCT Technology Enterprises GmbH (2007) discussed in their study report for Improved Water and Wastewater Service Program (IWSP) tariff policy around Egypt and they conclude that the prevailing water/wastewater tariff system in Egypt is a more or less unified system that applies for the whole country, and wastewater tariffs are a mere percentage of water tariffs. This means that water and wastewater tariffs are not system-based and hence do not reflect the actual cost per company. Water tariffs are divided into five customer categories (domestic, commercial, investment, government/services, and construction) with a certain progression for domestic customers (up to 30 m^3/month and more than 30 m^3/month). Table (2.1) as an example for Sharkia Governorate illustrates the situation.

Table (2.14) (Water and Wastewater Tariffs for Sharkia 2007) (IWSP study report 2007)

Customer Category	**Water Tariff (LE / m^3)**	**Wastewater Surcharge**
Domestic		35%
< 30 m^3/month	0.23	
> 30 m^3/month	0.30	
Commercial	0.53	60%
Investment	0.85	60%
Government	0.40	60%
Construction	0.50	60%

Also they said that Tariffs are set by MHUUD and tariff increases are determined by a committee within the MHUUD and have to be approved by the cabinet. Except for Alexandria and Cairo, no tariff increases have been approved since 1995. On the one hand, the decrease (in real terms) of the already low tariff levels has contributed to the deterioration of the financial situation of the A.C.'s and on the other hand did not give any incentives for the economic use of water. The current tariff structure (low progression) does also not allow for proper demand management. Besides some conditions under the European Union Water Sector Reform Program (EUWSRP), no tariff policy is in place. Probably such a policy will be worked out parallel to the Water Law and once the EWRA is operational. So far, HCWW is striving for tariff increases but not for a comprehensive adjustment of the tariff system as such.

USAID (2008) discussed the reform of water sector at 37 countries around world and found that the objectives of reform were:

1. Autonomy and accountability of the water utility.
2. Incentives for reform, penalties for failure.
3. Progressive performance standards.

4. Cost-reflective pricing.

Also USAID summarized some points to achieve these objectives, these points are:

1. Decentralization.
2. Corporatization & corporate governance reform.
3. An effective regulatory agency.
4. Incentive-based operating contracts.
5. Private sector participation.
6. Shift from capital grants to sustainable financing mechanisms.

Hassanien and Khalifa (2008) mentioned that the important financial indicators in studying performance of water and wastewater companies were:

1. **Liquidity Ratios**.
2. **Operational Ratios**.
3. **Leverage Ratios**.
4. **Profitability Ratios**.

1. Liquidity Ratio.

The liquidity ratios measure the ability of the utility to meet its short-term financial obligations in a timely manner. These obligations are usually due within a period of 1 year. The liquid position of any utility refers to the solvency of the utility's overall financial position or the ease with which it can pay its bill. The current ratio is one of the most important liquidity ratios indicative of the utility's liquid position. (Hassanien and Khalifa 2008).

$$Current\ Ratio = \frac{Current\ Assets}{Short\ Term\ Liabilities} \approx 2.6\text{-}3$$

2. Operational Ratio.

They are used to measure the speed with which the accounts are converted into cash or sales. The asset turnover ratio illustrates the efficiency with which the utility has been using its assets to generate sales. (Hassanien and Khalifa 2008).

$$Turn\ over\ of\ total\ assets = \frac{Annual\ Volume}{Avarage\ Total\ Assets} > 1.5 - 2$$

3. Leverage Ratio.

The leverage ratio indicates the dependence of utilities on debts as a method of finance. Debts associated with the debt to equity ratio are usually long-term debts that commit the utilities to paying interest in addition to the principal borrowed. A utility with a low ratio denotes stronger capitalization which can absorb greater risk. (Hassanien and Khalifa 2008).

$$Dept/Assets = \frac{Total\ Liabilities}{Total\ Assets} \leq 0.5 \approx 0.6$$

4. Profitability Ratio.

Measures of profitability are numerous, each relating the profit generated by the utility to its sales, equity, or assets. The importance of these ratios lies in their ability to reflect the efficiency of liquidity, asset management and debt management of utilities on their operating revenues. (Hassanien and Khalifa 2008).

$$Return\ on\ Equity = \frac{Net\ Profit}{Owner\ Equity} > 10 - 15\ \%$$

$$Return\ on\ Assets = \frac{Net\ Profit}{Total\ Assets} > 5 - 10\ \%$$

IIhan et al. (2007) defined different types of KPI and identifies that a KPI has two dimension knowledge specificity and time specificity.

IIhan et al. (2007) concluded that:

1. KPIs provide a snap shot of a company's specific business situation.
2. KPIs are often generated from the transaction level and filtered up to be used by the executive management for decision making purposes.
3. A theoretical framework and its subsequent application to each and every business process will enable businesses to identify the lack of information and identify the requirements for additional applications implemented to capture such needs.
4. KPIs also provide a consistent approach to viewing performance data the same way across the company and therefore creating a consistent information environment that is free from data transmittal bias due to reference of the individual responsible for distributing such information.

At end of this chapter it can be summarized that the reform of water and wastewater sector has been tried in many developing countries and resulted in this process on the development of the financial and technical performance for water and wastewater companies. But this development just happened when there is interesting of success factors and the work on periodic monitoring of technical and financial performance indicators for these companies.

CHAPTER THREE

DATA COLLECTION

Chapter 3

DATA COLLECTION

3. 1 INTRODUCTION

In chapter two, it mentioned some definitions for performance, performance measurement and performance indicators. Also there were some performance indicators mentioned to measure performance in water and wastewater companies. Also that chapter discuss some case studies for measuring performance and sector reform.

According to information mentioned before, this chapter will discuss the selected indicators to measure companies' performance and also the criterion of companies selection as a case study.

3. 2 COLLECTING DATA

The purpose of the conversion of the Holding Company for Water and Wastewater (HCWW) is to manage the portfolio of water and wastewater companies' assets in governorates, including shares, instruments, bonds and any other tools or other financial instruments. The purpose of establishment of the Affiliated Companies (ACs) is to undertake the responsibilities for purification, desalination, supply, transportation and sale of potable water, as well as collection, treatment and safe disposal of wastewater. (The 3rd annual report of EWRA 2009).

Accordingly, the 14 Affiliated Companies ("ACs") established are:

1. Cairo Water Company.
2. Cairo Wastewater Company.
3. Alexandria Water Company.
4. Alexandria Wastewater Company.
5. El-Behira Water and Wastewater Company.
6. Aswan Water and Wastewater Company.
7. El-Menia Water and Wastewater Company.
8. Beni-Swief Water and Wastewater Company.
9. El-Fayoum Water and Wastewater Company.
10. El-Daqahlia Water and Wastewater Company.
11. El-sharkia Water and Wastewater Company.
12. Kafr-elshiekh Water and Wastewater Company.
13. Damietta Water and Wastewater Company.
14. El-Gharbia Water and Wastewater Company.

In 2005, five companies were established, these companies are:

1. The red sea Water and Wastewater Company.
2. North and South Sinai Water and Wastewater Company.
3. Asyut Water and Wastewater Company.
4. Sohag Water and Wastewater Company.
5. Luxor Water and Wastewater Company.

Another four companies were established in 2006, these companies are:

1. Marsa matrouh water and Water and Wastewater Company.
2. Giza Water and Wastewater Company.
3. El-Monofia Water and Wastewater Company.
4. Qena Water and Wastewater Company.

Presidential decree (PD) No. 117 of 2010 was issued to transfer control over water and wastewater facilities' assets from the New Urban Communities Authority (NUCA) to the (HCWW).

Table (3.1) shows a list of (ACs) and population in the served area: (The 3rd annual report of EWRA 2009).

Table (3.1) List of Affiliated Companies (The 3rd annual report of EWRA 2009)

No.	Company Name	Population in Served Area
1	Cairo Water Company.	8,237,954
2	Giza Water and Wastewater Company.	7,053,130
3	Alexandria Water Company.	4,632,900
4	El-Behira Water and Wastewater Company.	5,100,481
5	Aswan Water and Wastewater Company.	1,297,110
6	El-Menia Water and Wastewater Company.	4,603,927
7	Beni-Swief Water and Wastewater Company.	2,504,280
8	El-Fayoum Water and Wastewater Company.	2,779,319
9	El-Daqahlia Water and Wastewater Company.	5,493,397
10	El-sharkia Water and Wastewater Company.	5,883,877
11	Kafr-elshiekh Water and Wastewater Company.	2,873,896
12	Damietta Water and Wastewater Company.	1,183,239
13	El-Gharbia Water and Wastewater Company.	4,297,728
14	The red sea Water and Wastewater Company.	384,750
15	North and South Sinai Water and Wastewater Company.	645,067
16	Asyut Water and Wastewater Company.	4,253,216
17	Sohag Water and Wastewater Company.	4,064,473
18	Luxor Water and Wastewater Company.	502,960

Table (3.1) contd.

19	**Marsa matrouh Water and Wastewater Company.**	**390,709**
20	El-Monofia Water and Wastewater Company.	3,512,050
21	Qena Water and Wastewater Company.	3,276,551
Total		72,971,014

3. 3 CURRENT SITUATION FOR WATER AND WASTEWATER SECTOR

3.3.1 WATER SUPPLY SOURCES:

Surface water is the main source of water supply at the corporate level, followed by groundwater and desalinated water. (The 3rd annual report of EWRA – 2009 - 2010).

The total amount of water produced is 24 million m^3/day at the corporate level. According to Figure (3.1) which shows the sources of potable water around Egypt, which is 86.19 % of this amount comes from 961 surface water plants, 13.51% comes from 1703 artesian operations and 0.3% comes from 26 desalination water plants. (The 3rd annual report of EWRA – 2009 - 2010). This means that the surface plants represent a greater dependence in the provision of quantities of potable water. Accordingly, it should study all these quantities of produced water delivered to citizens or the quantities delivered less than that produced. Also it should discuss the improvement of quantities of water producing and water consuming.

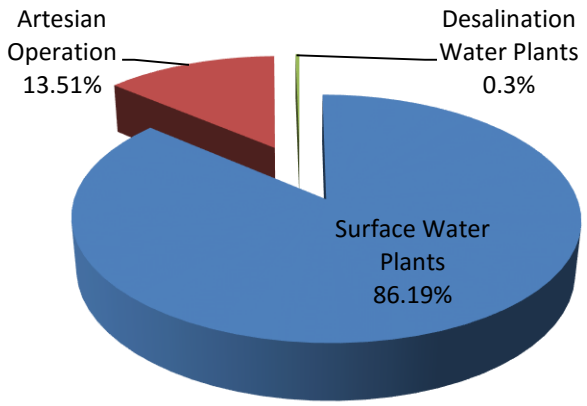

Fig. (3.1) The Amount of Water Produced at the Corporate Level (The 3rd annual report of EWRA2009)

3.3.2 AVERAGE PER CAPITA SHARE OF WATER PRODUCED:

The population of Egypt covered by water service is estimated at 72,115,734 capita, the average per capita share of water produced at the corporate level at year 2009 to be 259 liters/day. Figure (3.2) show the daily average per capita share of water produced for each company (The 3rd annual report of EWRA – 2009 - 2010). By discussing Figure (3.2), it will be found that the greatest share is for Cairo Company 752(l/c/d) Which is a very large value, and to verify this value there was a visit to Great Cairo Water Company were to bring an average per capita share of water produced in Cairo Governorate in 2012 including all activities and services and it was 600 l / c / day. Also the report of Egypt description by information stated that the per capita drinking water produced in the Cairo Governorate in 2007 reached 1184 l /c / day. And also Alexandria Company has a big value of this amount reached to 580 (l/c/d), and lowest share is for El-menia Company which is 105 (l/c/d) and Aswan Company which is 108 (l/c/d). Also this figure shows that the average share all over Egypt is about 259.19 (l/c/d). On the other hand it was found that the average share for Lower Egypt Governorates is about 273.7 (l/c/d) and this share for Upper Egypt Governorates is about 180.2 (l/c/d). This means that the government of Egypt pays attention with Lower Egypt Governorates more than Upper Egypt Governorates.

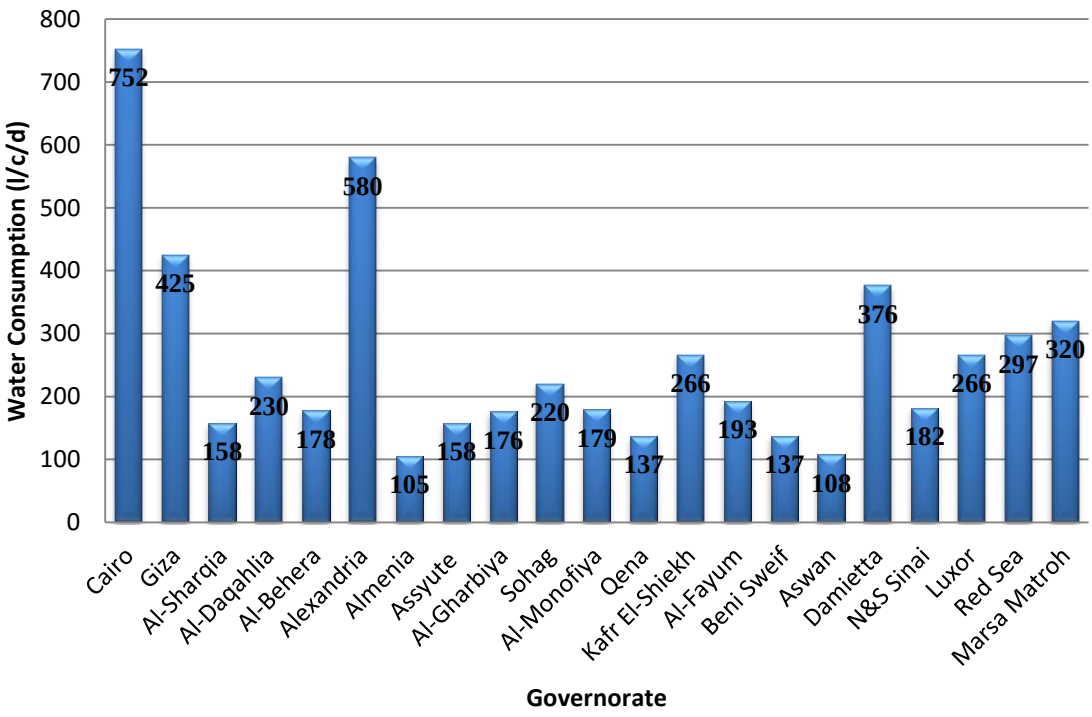

Fig. (3.2) Average Per Capita Share Per Day of Water Produced (Liter/Day) (The 3rd annual report of EWRA 2009)

Table (3.2) shows the average amount of water produced per day at the corporate level and daily average per capita share of water produced for each company.

Table (3.2) Average Amount of Produced Water (The 3rd annual report of EWRA 2009)

Sr.	Company	Population	Average amount of water produced (m^3/day)	Average per capita share per day of water produced (liter/day)
1	Cairo Water Company.	8,237,954	6,192,160	752
2	Giza Water and Wastewater Company.	7,053,130	2,996,294	425
3	Alexandria Water Company.	4,504,750	2,615,000	580
4	Al-Behira Water and Wastewater Company.	5,100,481	908,709	178
5	Aswan Water and Wastewater Company.	1,297,110	139,493	108
6	Al-Menia Water and Wastewater Company.	4,603,927	483,675	105
7	Beni-Swief Water and Wastewater Company.	2,504,280	342,434	137
8	Al-Fayoum Water and Wastewater Company.	2,775,087	535,015	193
9	Al-Daqahlia Water and Wastewater Company.	5,350,075	1,231,576	230
10	Al-sharquia Water and Wastewater Company.	5,883,877	928,135	158
11	Kafr-elshiekh Water and Wastewater Company.	2,806,243	745,302	266
12	Damietta Water and Wastewater Company.	1,183,239	445,178	376
13	Al-Gharbia Water and Wastewater Company.	4,297,728	755,580	176
14	The red sea Water and Wastewater Company.	384,750	114,100	297
15	North and South Sinai Water and Wastewater Company.	645,067	117,500	182
16	Asyut Water and Wastewater Company.	3,759,286	592,364	158
17	Sohag Water and Wastewater Company.	4,064,473	889,220	219
18	Luxor Water and Wastewater Company.	502,960	133,961	266
19	Marsa matrouh Water and Wastewater Company.	390,709	124,885	320
20	Al-Monofia Water and Wastewater Company.	3,512,050	628,801	179
21	Qena Water and Wastewater Company.	3,276,551	450,264	137
Total at the corporation level		72,115,734	21,369,627	259

3.3.3 WASTEWATER COLLECTION AND TREATMENT:

The total amount of collected wastewater is estimated at 9,083,503 m^3/day at the corporate level. By studying Figure (3.3), it shows that the total primary treated wastewater is 2,277,658 m^3/day, about 22% of the total collected wastewater, while the total secondary treated wastewater is 6,337,927 m^3/day about 60% of the total collected wastewater. The total amount of untreated wastewater is 1,935,299 m^3/day about 18% of the total collected wastewater, (The 3rd annual report of EWRA – 2009 - 2010). This means that large amounts of collected wastewater were treated while primary or secondary (about 82%). Accordingly, it should study the improvement of treatment of collected wastewater and if it increased or decreased.

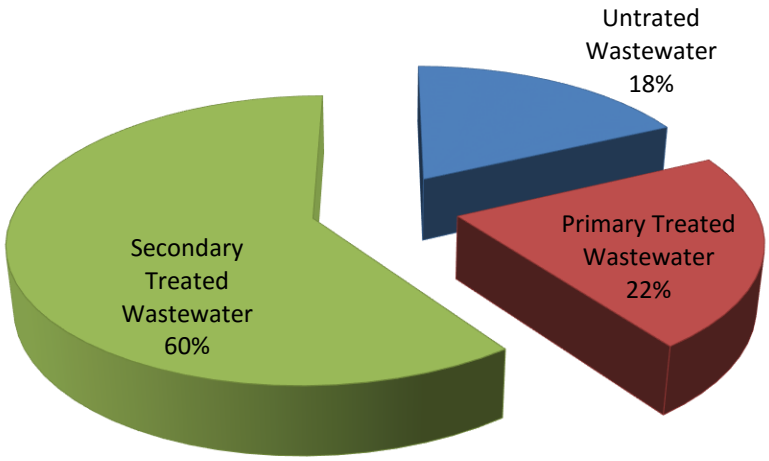

Fig. (3.3) Types of Collected Wastewater Treatment Across Egypt (The 3rd annual report of EWRA 2009)

3. 4 METHODOLGY OF DATA COLLECTION

Data collected from different authorities such as; a) Holding Company for Water and Wastewater (HCWW), b) Affiliated Companies (A.C.'s), c) Egyptian Water Regulatory Agency (EWRA), d) Ministry of finance.

Six firms were selected as a test sample for this study, three firms from Upper Egypt and three firms from Lower Egypt. These firms are:

1. Aswan Company for water and wastewater.
2. Beni-Swief Company for water and wastewater.
3. El-Fayoum Company for water and wastewater.
4. El-Daqahlia Company for water and wastewater.
5. El-Gharbia Company for water and wastewater.
6. El-Sharkia Company for water and wastewater.

The criterion of selecting firms is that firms were transformed from economical organizations to Affiliated Companies (A.C.'s).

From survey have been done in (HCWW), Ministry of Finance and some A.C.'s, we can collect some data for the selected companies, these data are:

First: Financial Data:

1. Balance Sheet for National Organization from 2002 to 2004.
2. Income statement for National Organization from 2002 to 2004.
3. Balance sheet for affiliated companies from 2005 to 2007.
4. Income statement for affiliated companies from 2005 to2007.
5. The development of the national investment in water and wastewater sector.
6. Coverage percentage of operating and maintenance cost.

Note: All these data are shown in appendix 1 to appendix 6

Second: Technical Data:

1. The development of potable water sector.

   These data shows the water capacity (m^3/day) for each governorate before and after transformation, source of water.

2. Percentage of potable water coverage.

   These data shows the population which covered with potable water in each governorate and the percentage with the whole population in the governorate.

3. Development of wastewater sector.

   These data shows the wastewater capacity (m^3/day) for each governorate before and after transformation and the percentage of treated and untreated water before and after transformation.

3. 5 EVALUATION CRITERIA

According to performance indicators that collected from affiliated companies and that mentioned in the previous chapter under IBNET indicators, it can be selected these indicators:

3.5.1 Technical Indicators

1. Produced water capacity (PWC).
2. Produced water consumption (PWCons.).
3. Consumed water capacity (CWC).
4. Non revenue water (NRW).
5. Percentage of household with access to water (%HAW).
6. Treated wastewater capacity (TWWC).
7. Quality of service.

3.5.2 Financial Indicators

1. Comparative financial statements.
   Comparative Financial Statement analysis provides information to assess the direction of change in the business.

2. Liquidity Ratio.

   It measures the ability of the company to maintain a sound financial position through the same period of time (Hassanien and Khalifa 2008).

$$Current\ Ratio = \frac{Current\ Assets}{Short\ Term\ Liabilities}$$

3. Leverage Ratio.
   It measures the ability of the company to maintain a sound financial position through a large time period (Hassanien and Khalifa 2008).

$$Dept/Assets = \frac{Total\ Liabilities}{Total\ Assets}$$

$$Turn\ over\ of\ total\ assets = \frac{Annual\ Volume}{Avarage\ Total\ Assets}$$

CHAPTER FOUR

DATA ANALYSIS & PERFORMANCE MEASURMENTS

Chapter 4

DATA ANALYSIS & PERFORMANCE MEASURMENTS

4. 1 INTRODUCTION

Heretofore, it has been indicated that the objective of this study is to investigate the effect of reform on both the technical and financial performance of the (HCWW). Some parameters were selected as indicators for the technical performance. Among these parameters are:

- Produced water capacity (PWC).
- Produced water consumption (PWCons.).
- Consumed water capacity (CWC).
- Non revenue water (NRW).
- Percentage of household with access to water (%HAW).
- Treated wastewater capacity (TWWC).

On the other side, financial performance was investigated based on:

- Comparative financial statement.
- Leverage ratio.
- Liquidity ratio.

The study period covers 6 years interval, ranged from the fiscal year ended 2002 to the fiscal year ended 2007. It is noted that three of the six years period precede the reforming process, while the other three years follow the reforming process. In the next section of this chapter the change of the different technical and financial evaluation parameters will be deeply investigated.

4. 2 ANALYSIS OF TECHNICAL PERFORMANCE

4. 2.1 Produced Water Capacity (PWC)

The produced water capacity (PWC) was selected as the first parameter for the technical performance evaluation. The development in the quantity of the daily produced water was investigated through the six years period. Six different governorates were selected as a test-bed for this study. The change in the PWC of the selected six governorates will be discussed in the following section.

4.2.1.1 El-Gharbia Governorate

Figure (4.1) is graphical presentation for the variation of the daily produced water capacity for El-Gharbia Governorate. A closer inspection for this figure clearly indicates that no considerable variation in the quantity of the produced water through the first three years period started 2002 and ended 2004. Another thing shown rather clearly is the great jump in this quantity in the first year of reforming from 461775m^3/day in 2004 to 648800 m^3/day in 2005(Description by information 2009 – 8th edition). Again, no considerable variation can be observed in this quantity through the last two years 2006 and 2007. This indicates that the government of (A.R.E) acting in (HCWW) was high interesting in this sector starting at the year of reform (2004 – 2005) only.

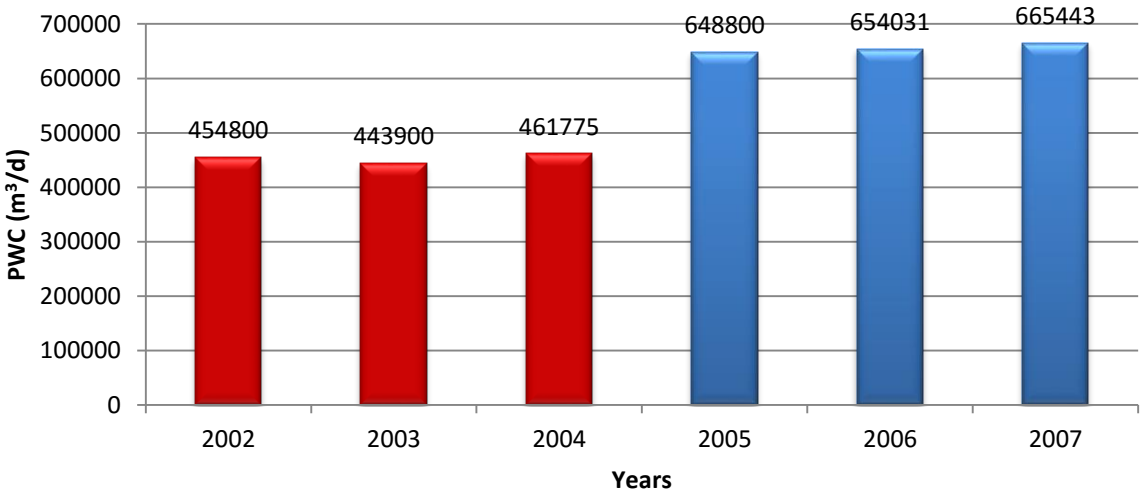

Fig. (4.1) (PWC) for El-Gharbia Governorate

Figure (4.2) is another presentation for this data where the vertical axis represents the annual rate of development in the produced daily water quantity. Some findings can be observed through a careful inspection to this figure. For instance, the produced water capacity decreased by about 2.4% in year 2003 compared by the previous year. It can be considered that this decreasing because of some artesian plants have been stopped and there was no replacement by surface plants. Moreover, this quantity has been increased by about 4.03% in year 2004. As shown before, a sharp increase was

clearly observed in this quantity of produced water in the first year after reforming about 40.5%. This increasing reflects that there were a lot of water treatment plants projects under construction many years ago and these projects finished sequentially in this year. Contrarily, such quantity has slightly increased in the last two years 2005 and 2006 at a corresponding percentage of 0.81% and 1.74% respectively.

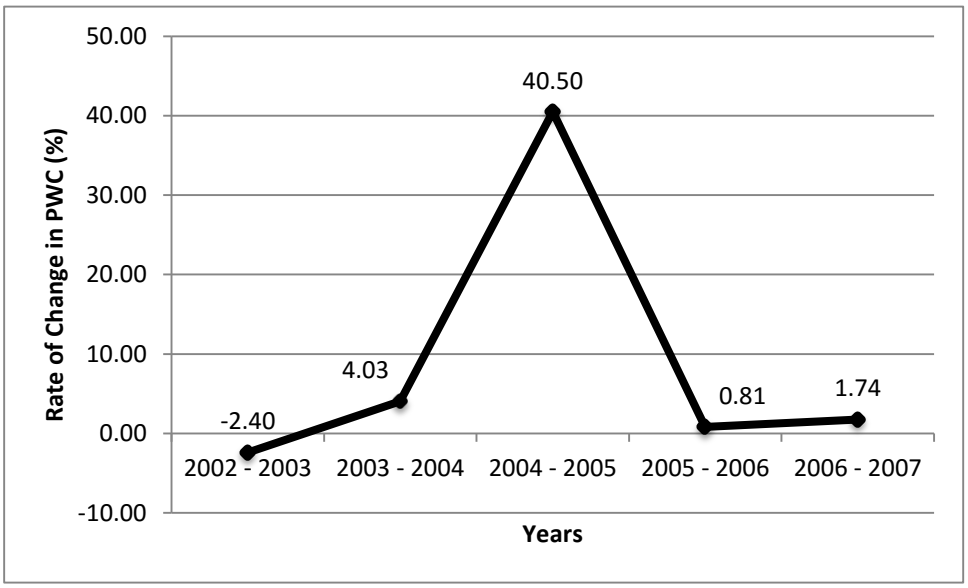

Fig. (4.2) (RPWC) for El-Gharbia Governorate

4.2.1.2 El-Sharkia Governorate

In El-Sharkia Governorate, the produced water capacity has no considerable change in the studied years except the last year as shown in Figure (4.3). Another thing shown more obviously is the zero variation for this quantity (588,288 m^3/d) before and after years of reforming (2004 – 2005). An inspection to Figure (4.4), it is found that the annual rate of development in the produced daily water quantity decreased by about 0.67% in year 2003 compared by the previous year. Also, this quantity has been increased by about 6.75% in year 2004. As shown before, there is no change in these quantities in the first year after reforming definitely; such quantity has considerably increased in the last two years 2006 and 2007 at a corresponding percentage of 0.67% and 7.14% respectively. Also by studying Figure (4.3), we can found that the rate of change in PWC in El-Sharkia Governorate at whole years of

study increased by about 14.4%. This means that the overall change in PWC was in continuous improvement

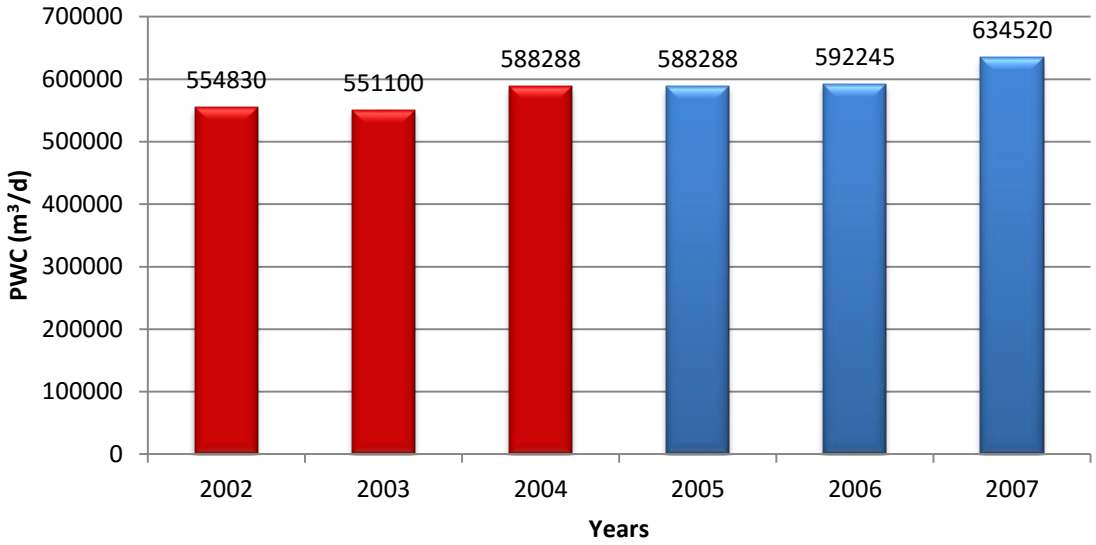

Fig. (4.3) (PWC) for El-Sharkia Governorate

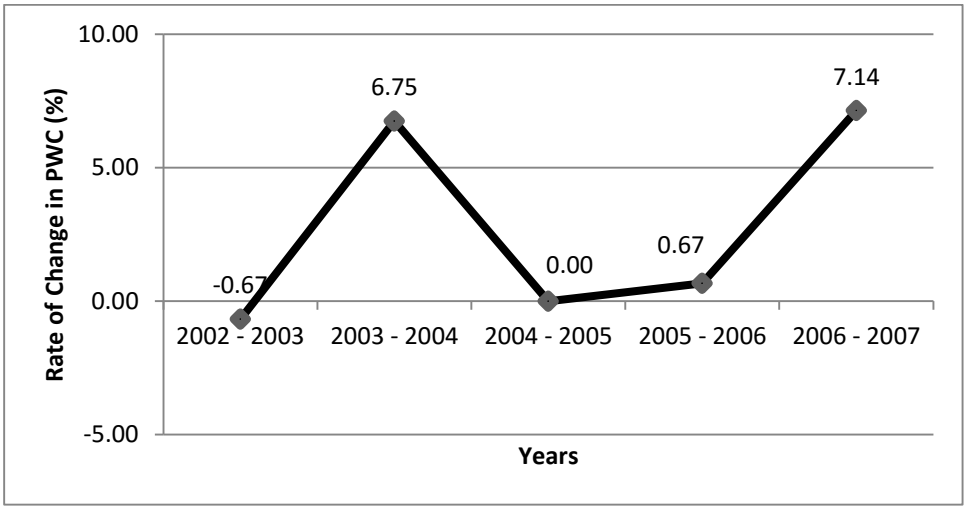

Fig. (4.4) (RPWC) for El-Sharkia Governorate

From previous analysis, it is found that the per capita potable water production for El-Sharkia Governorate was (143 l/c/d) in 2002 and it increased until it reaches (116 l/c/d) in 2007. This means that there was a shortage in per capita water production in this governorate. Comparing these values by standard values (175 – 220) l/c/d (Egyptian code 102/1, 2010), it will be found that until 2007 there was a shortage in this value.

4.2.1.3 El-Dakahlia Governorate

Variation of the daily produced water capacity for El-Dakahlia Governorate is represented graphically in Figure (4.5). Consideration for this figure clearly indicates that the quantity of the produced water capacity has a moderate variation through whole studied years. At the year of reforming (2004 – 2005), there is a small variation in this quantity (798,660 m^3/d) in 2004 to (843,360 m^3/d) in 2005. Again, no considerable variation can be observed in this quantity at 2006. Finally, this value is considerably increased in the last year 2007.

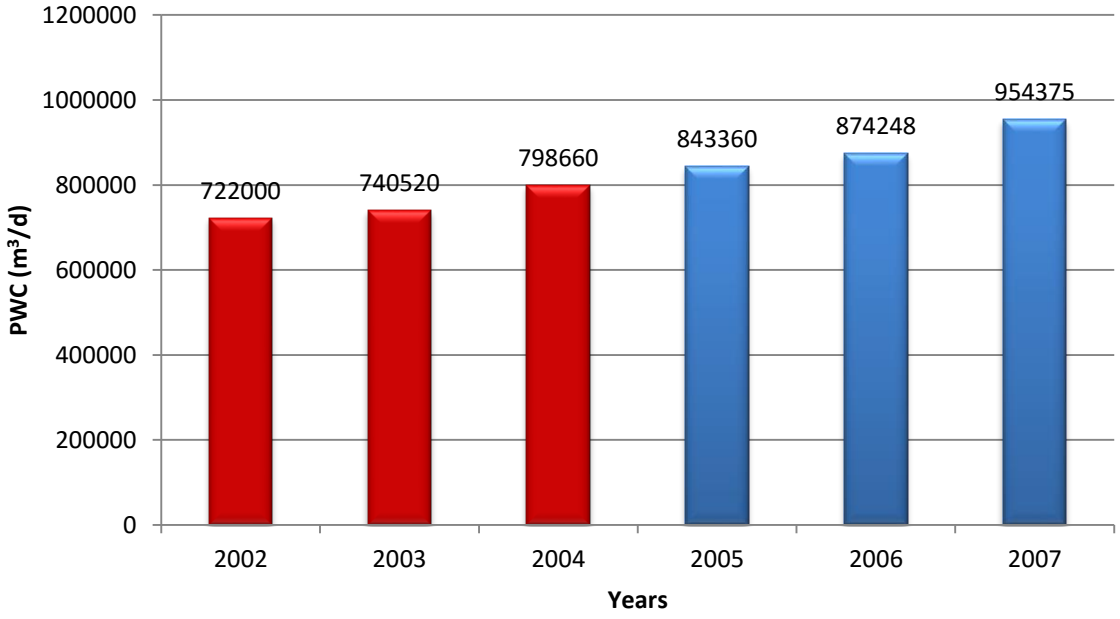

Fig. (4.5) (PWC) for El-Dakahlia Governorate

Another presentation for data mentioned before is shown in Figure (4.6) which shows the change in annual rate of development in the produced daily water quantity. For illustration, the produced water capacity increased by about 2.57% in year 2003 compared by the previous year. Furthermore, this quantity has been increased by about 7.85% in year 2004. As shown before, there is a small change in this quantity of produced water in the first year after reforming while this quantity increased to a corresponding percentage of 5.6% at year 2005 and 3.66% at year 2006, such quantity has considerably increased at year 2007 to a corresponding percentage of 9.17%. Another inspection to Figure (4.5), it shows that the overall change in PWC in El-

Dakahlia Governorate was increased from 722000(m^3/d) in 2002 to 954375 (m^3/d) in 2007 with rate of increasing about 32.2%. This percentage of increasing reflects the interesting of government to improve water service sector in this Governorate.

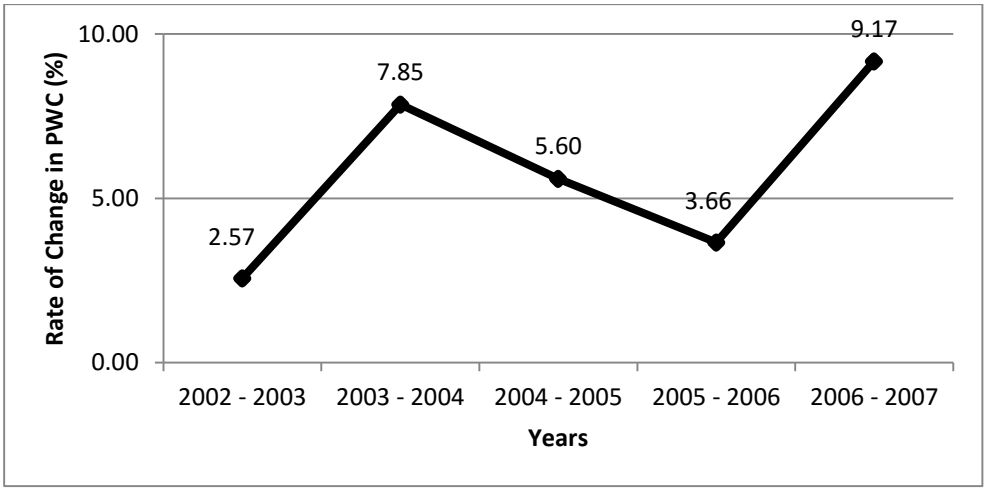

Fig. (4.6) (RPWC) for El-Dakahlia Governorate

4.2.1.4 El-Fayoum Governorate

Figure (4.7) represent the variation of the daily produced water capacity for El-Fayoum Governorate. A closer inspection for this figure clearly indicates that there is a sharp increase in the quantity of the produced water at year 2003. Another thing shown rather clearly in this figure is that there is no considerable change in this quantity through the remaining years (2004 to 2007).

Figure (4.8) is another presentation for the data mentioned before while the annual rate of development in the produced daily water quantity has sharp increase by about 39.91% in year 2003 compared by the previous year. Such quantity has slightly increased in years 2004, 2005 and 2006 at a corresponding percentage of 3.24%, 3.19% and 0.46 respectively and there is no change in this percentage at last year 2007. On the other hand when comparing the improvement of PWC in El-Fayoum Governorate through years of study, Figure (4.7) shows that there is a big increase in this quantity from 320160 (m^3/d) in 2002 to 481618 (m^3/d) in 2007. This increase, as discussed before, jumped in the first year of study, after that there is a small increase each year as shown in Figure (4.8).

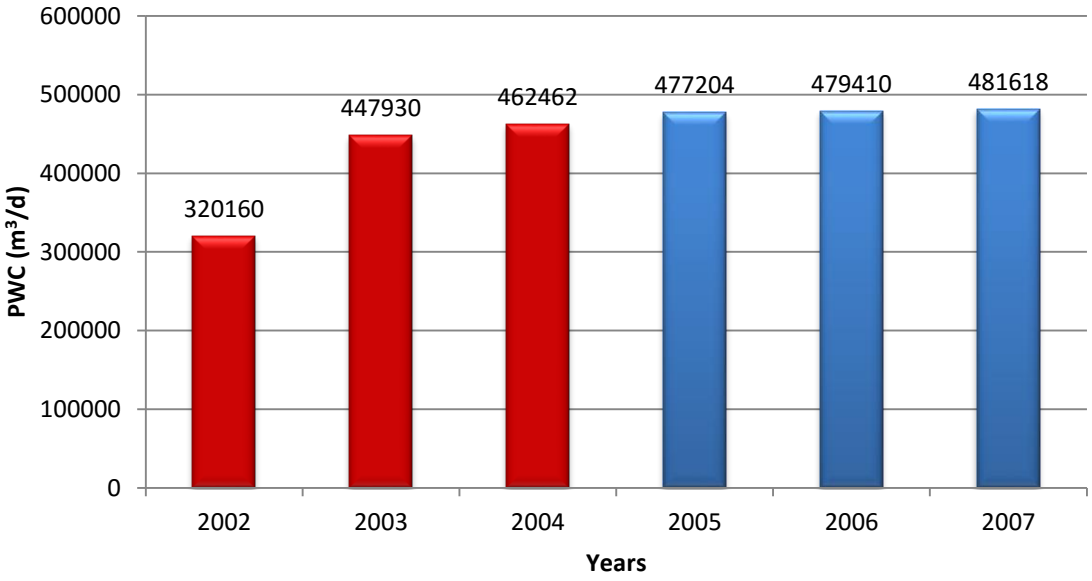

Fig. (4.7) (PWC) for El-Fayoum Governorate

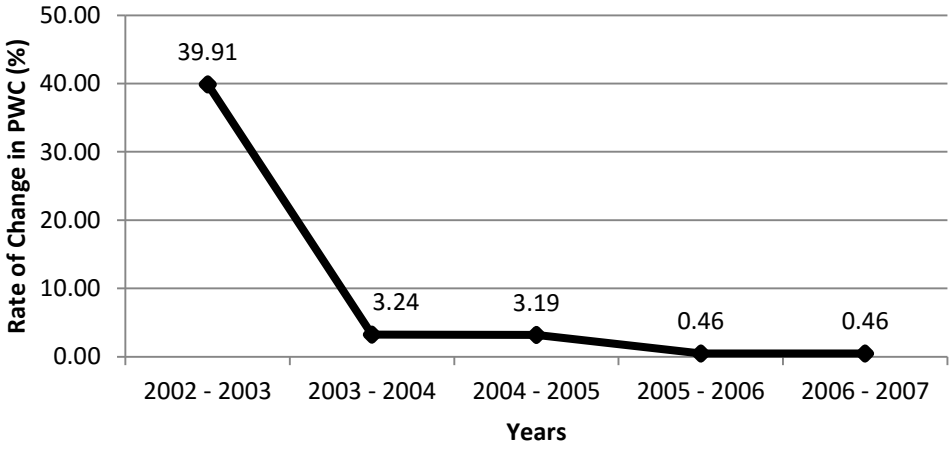

Fig. (4.8) (RPWC) for El-Fayoum Governorate

4.2.1.5 Beni-Swief Governorate

By studying Figure (4.9) which shows the variation of daily produced water capacity in Beni-Swief Governorate, it clearly shows that there is some increase in the quantity of the produced water through the first year period started 2002 and ended 2003. Another thing shown in this figure that there is a slight increase through years started 2004 and ended 2006. Again there is a high increase in this quantity in the last year from 235412 m^3/d in 2006 to 288054 m^3/d in 2007. There is another finding that

can be produced from Figure (4.9). These findings that the improvement of PWC in Beni Swief Governorate at whole years of study increased from 185760 (m^3/d) in 2002 to 288054 (m^3/d) in 2007 with rate of increase about 55%.

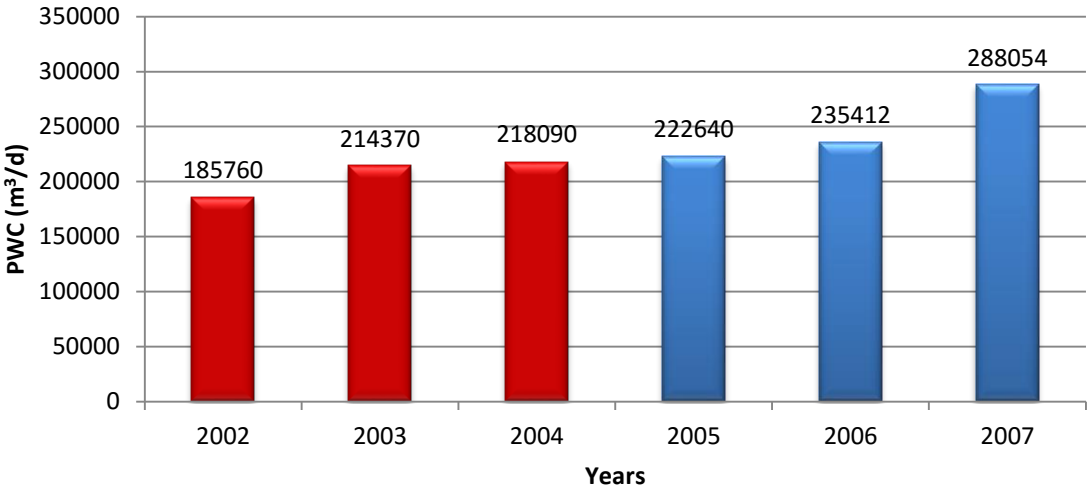

Fig. (4.9) (PWC) for Beni-Swief Governorate

Figure (4.10) is another analysis for produced water capacity in Beni-Swief Governorate, which is present the annual rate of development in the daily produced water quantity. From this figure, it can be found that this rate increased by about 15.40% in year 2003 compared by the previous year. Moreover, this rate has been increased by about 1.74%, 2.09% and 5.74% in years 2004, 2005 and 2006 respectively. As shown before, a high increases was clearly observed in the quantity of produced water in the last year about 22.36%.

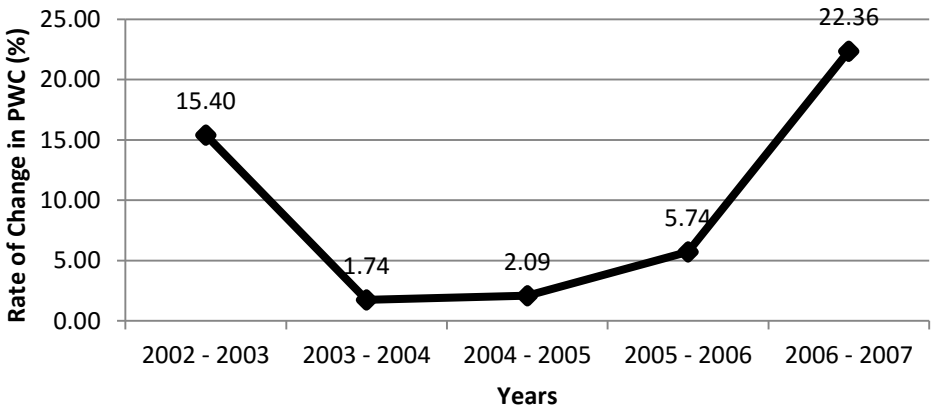

Fig. (4.10) (RPWC) for Beni-Swief Governorate

4.2.1.6 Aswan Governorate

The variation of the daily produced water capacity for Aswan Governorate is shown graphically in Figure (4.11). A clear inspection for this figure clearly indicates that there is some increase in the quantity of the produced water from (207360 m^3/d) in 2002 to (233200 m^3/d) in 2003. Another thing shown more obviously is there is a slight variation for this quantity in the first year of reforming from (233968 m^3/d) in 2004 to (248292 m^3/d) in 2005 and (276199 m^3/d) in 2006. Again, no considerable variation can be observed in this quantity at last year 2007.

Another presentation for the data mentioned before, Figure (4.12) shows some motivating results which can be observed through a careful inspection to this figure. For example, the produced water capacity increased by about 12.46% in year 2003 compared by the previous year. As shown before, this quantity has no change, while it was increased by about 0.33% in year of reform 2004. Furthermore, there is a slight increase in the quantity of the produced water in years 2005 and 2006 while this quantity increased to a corresponding percentage of 6.12% at year 2005 and 11.24% at year 2006, such quantity has considerably increased at year 2007 to a corresponding percentage of 2.86%.

Finally, it can be said that the PWC had simple development for studied governorates after conversion into holding companies, but there was one governorate has big development for this amount which is El-Gharbia Governorate, where increased PWC by 40.5% in the year conversion. This large increase is due to several reasons,including:

- Inadequate water produced for the citizens before conversion.
- Increase the budget of potable water projects.

The other governorates have moderate increases in the year of conversion, that PWC in El-Sharkia Governorate have zero increase in conversion year while this rate of increase in El-Dakahlia Governorate was 5.6%. At the same time the rate of increase of PWC in El-Fayoum Governorate was 3.19% in the conversion year and it was 2.09% in Beni-Swief Governorate. But in Aswan Governorate the rate of increase in PWC was 6.12%.

The other thing can be concluded by studying Figures (4.1) to (4.12) is that the governorates of Lower Egypt take more importance rather than Upper Egypt governorates. This finding shown from the improvement of PWC. That in Lower Egypt governorates the average of PWC have range between 63000 (m^3/d) to 95000(m^3/d). but in Upper Egypt governorates the average of PWC have range between 28000 (m^3/d) to 48000(m^3/d).

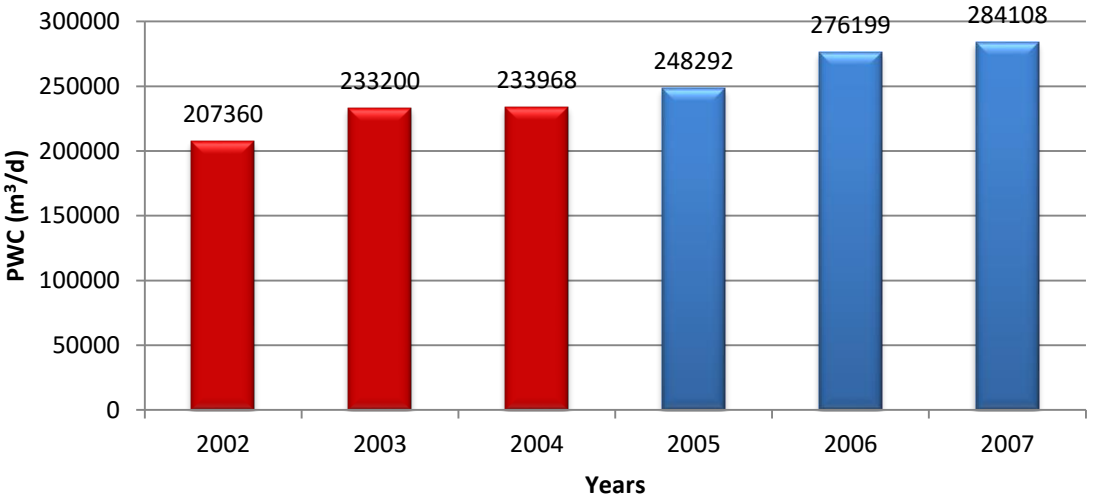

Fig. (4.11) (PWC) for Aswan Governorate

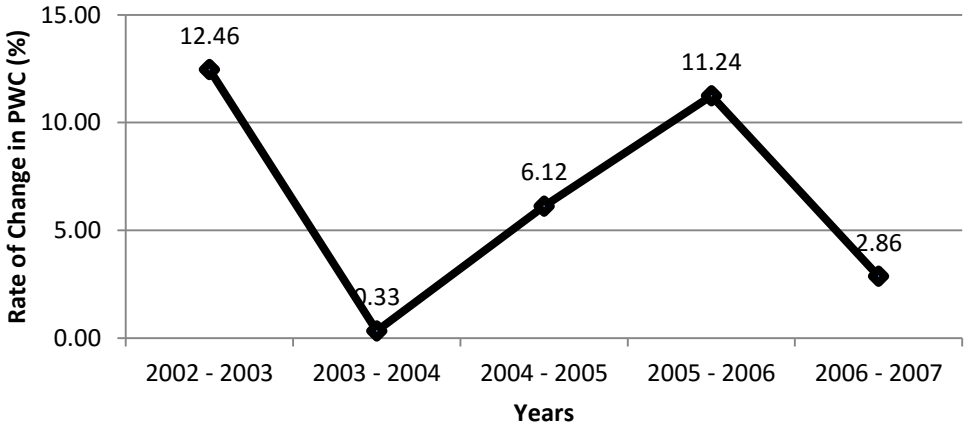

Fig. (4.12) (RPWC) for Aswan Governorate

4. 2.2Produced Water Consumption (PWCons.)

At the national level, the total domestic water used in Egypt is estimated at about 5.5 billion m^3 per year or 8 % of total water capacity. This corresponds to an average of about 200 litres per capita per day (l/c/d), or almost twice as much as in Germany. However, actual domestic water capacity is lower because of network losses, which will be shown later in the consumed water consumption development and also in the data collected concerning the network losses. Furthermore, water consumption varies considerably between different localities in Egypt.

4.2.2.1 El-Gharbia Governorate

Figure (4.13) is graphical presentation for the variation of the daily produced water consumption for El-Gharbia Governorate. A closer inspection for this figure clearly indicates the same results of Figure (4.1) for instance no considerable variation in the quantity of the consumed water through the first years period started 2002 and ended 2004. Another thing shown rather clearly is the great jump in this quantity in the first year of reforming from 117.5 l/c/d in 2004 to 162 l/c/d in 2005, (Description by information 2009 – 8^{th} edition). Again, no considerable variation can be observed in this quantity through the last two years 2006 and 2007.

By studying Figure (4.14) which shows another presentation for this data where the vertical axis represent the annual rate of development in the daily produced water consumption. Some interesting findings can be observed through a careful inspection to this figure. For instance, the water consumption decreased by about 4.17% in year 2003 compared by the previous year. Moreover, this quantity has been increased by about 2.17% in year 2004. As shown before, a sharp increase was clearly observed in water consumption in the first year after reforming about 38.04%. Contrarily, such quantity has slightly increased in year 2005 at a corresponding of 0.55% and decreased at year 2006 at a corresponding percentage of 0.25%. By comparing the results illustrated from Figure (4.13) by results from Figure (3.2), we can found that PWCons. increased from 163 l/c/d in 2006 to 176 l/c/d in 2010. This means that there is an improvement in this sector while this improvement is low.

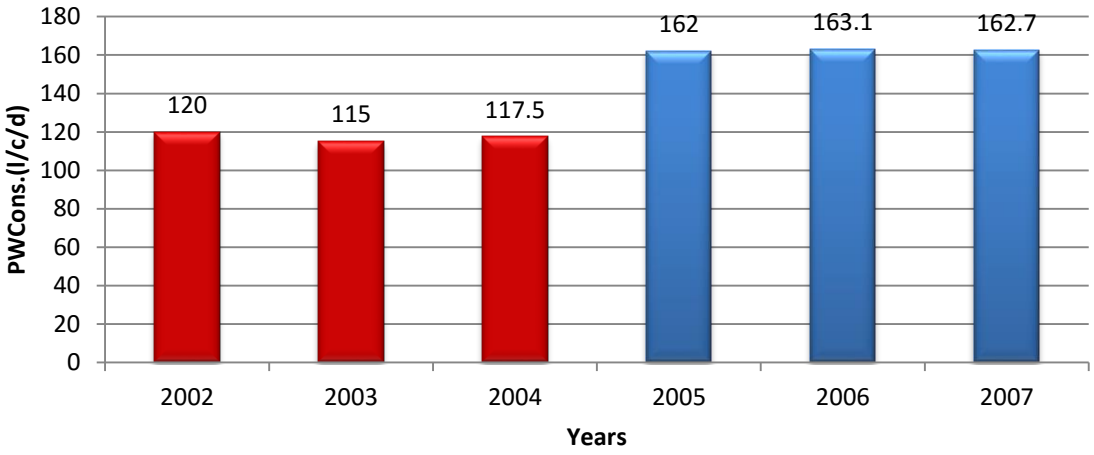

Fig. (4.13) (PWCons.) in El-Gharbia Governorate

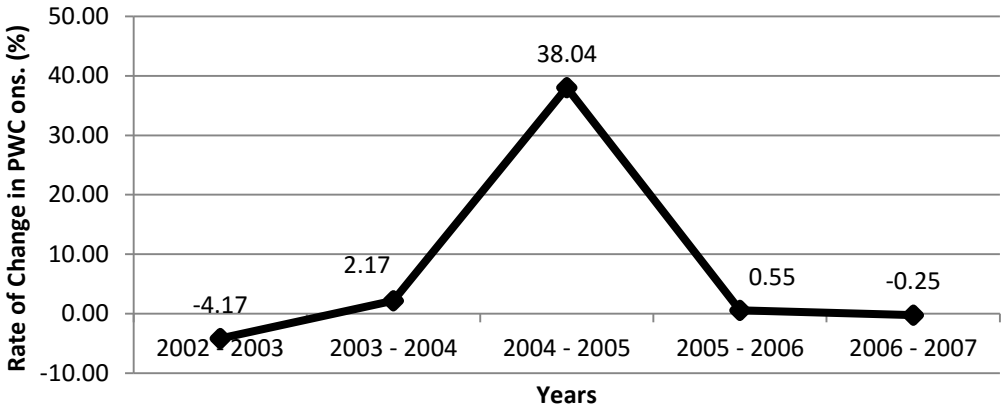

Fig. (4.14) (RPWCons.) in El-Gharbia Governorate

4.2.2.2 El-Sharkia Governorate

Figure (4.15) and (4.16) represent the variation of produced water consumption for El-Sharkia Governorate. By studying this figure and comparing its results by results obtaining from Figure (4.3), it is found that water consumption clearly affected by amount of water capacity. A closer inspection for this Figure (4.15) clearly indicates that there is a big variation in water consumption between every two years. Another thing shown more obviously is there is a high increase in water consumption in the year of reform (110 l/c/d) in 2003 to (114.9 l/c/d) in 2004, stated differently, water consumption increase from 2003 to 2004 by 4.45%. Again, there is a considerable decrease in this water consumption in the first two years after reform (113 and 110.7

l/c/d) in 2005 and 2006 respectively with rates of (1.65% and 2.04%) caused by the increase in the amount of water capacity that is not matched with the corresponding increase in population for these years. Finally there is a high increase in this consumption in the last year 2007 (116 l/c/d) with rate of 4.79%. another thing should be study is the change in PWCons. in 2006 which is 110.7 l/c/d by the PWCons. in 2010 which is 158 l/c/d. This means that there is an improvement in this sector while this improvement is good.

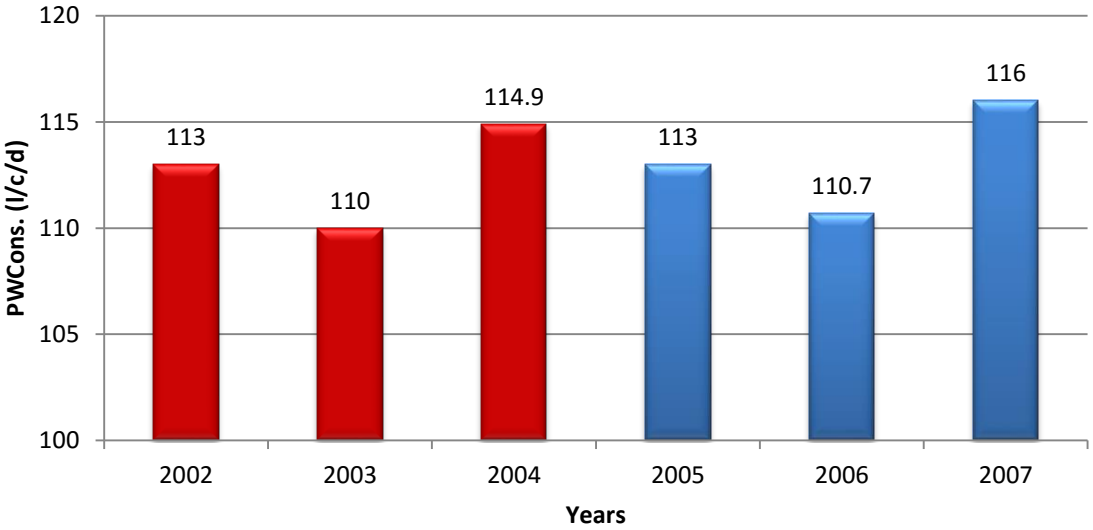

Fig. (4.15) (PWCons.) in El-Sharkia Governorate

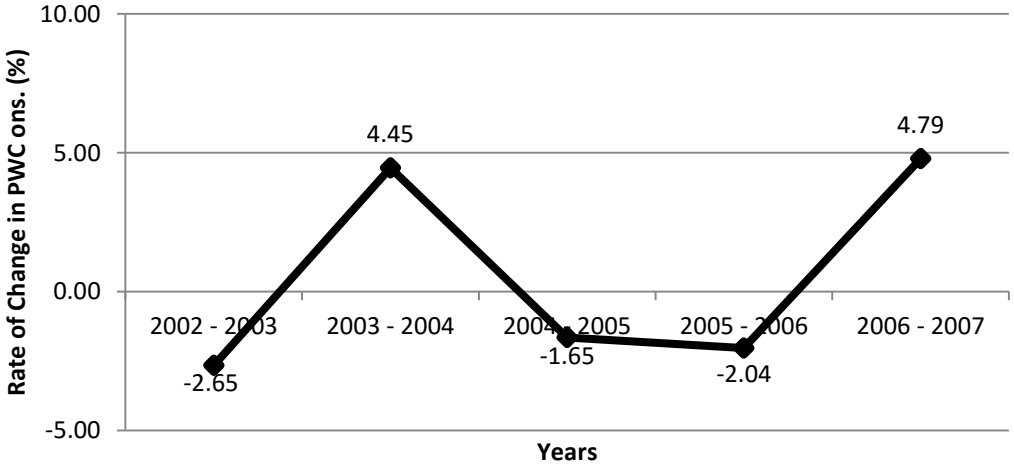

Fig. (4.16) (RPWCons.) in El-Sharkia Governorate

4.2.2.3 El-Dakahlia Governorate

Variation of the produced water consumption for El-Dakahlia Governorate is represented graphically in Figure (4.17). A careful inspection to this figure clearly indicates a slight variation in the quantity of the produced water through whole studied years. Another thing shown more obviously that there is slightly variation for this quantity in the first year of reforming from (162 l/c/d) in 2004 to (168 l/c/d) in 2005. Again, no considerable variation can be observed in this quantity in 2006. There is a considerable increase in this quantity in 2007 about 6.56%. Comparing these results with results from Figure (4.5), shows that the increase in PWC matches with increase in population. This match maintain no reduction for PWCons. and helps to increase it. Also when comparing PWCons. in 2006 which is 175 l/c/d by the same value in 2010 which is 230 l/c/d as shown in Figure (3.2). It means that PWCons. increased by rate of 31.4% which is considered a big improvement.

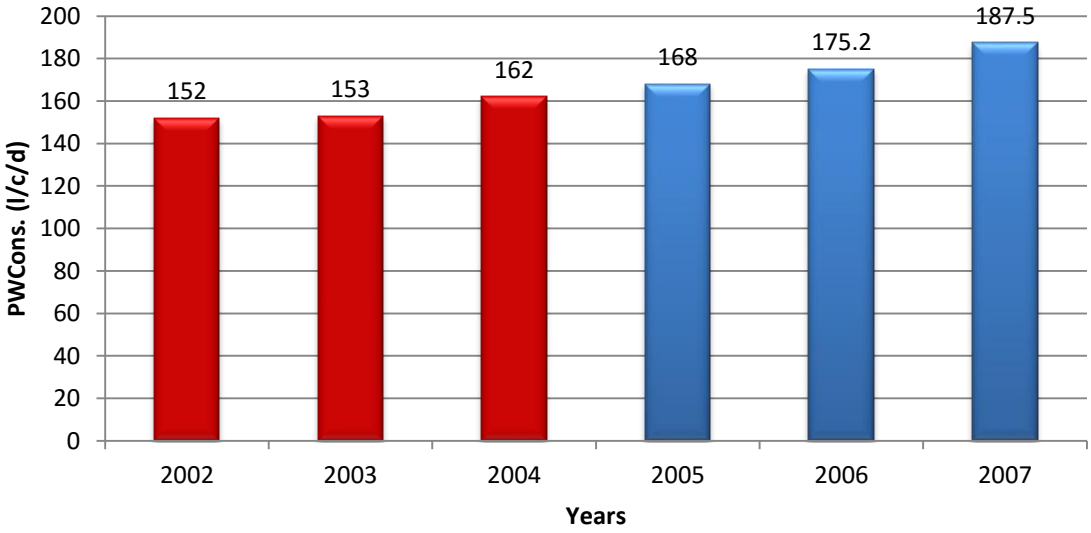

Fig. (4.17) (PWCons.) in El-Dakahlia Governorate

Figure (4.18) is another presentation for data mentioned before. By careful inspection to this figure some motivating results can be observed through. For illustration, the water consumption increased by about 0.66% in year 2003 compared by the previous year. Furthermore, this quantity has been increased by about 5.56% in year 2004. As shown before, there is no considerable change in this quantity of daily

water consumption in the first year after reforming while this quantity increased to a corresponding percentage of 3.57% at year 2005 and 4.11% at year 2006, such quantity has considerably increased at year 2007 to a corresponding percentage of 6.56%.

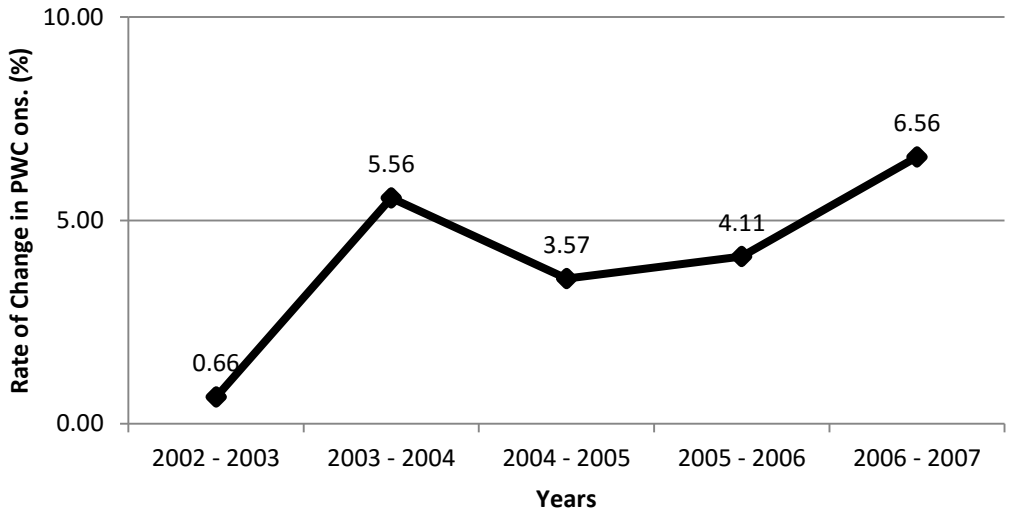

Fig. (4.18) (RPWCons.) in El-Dakahlia Governorate

4.2.2.4 El-Fayoum Governorate

Figures (4.19) and (4.20) are graphical presentation for the variation of the produced water consumption for El-Fayoum Governorate. A closer inspection for these figures clearly indicates that there is a sharp increase in this quantity of water consumption at year 2003 with rate of 36.96%. Another thing shown clearly from this figures is that there is no considerable change in this quantity through the remaining years (2004 to 2007) which is slightly increased in years 2004 and 2005 at a corresponding percentage of 1.1% and 1.09% respectively. On the other side, slightly decreased in years 2006 and 2007 at a corresponding percentage of 1.1% and 1.09% respectively. Comparing these results with results from Figure (4.7), shows that the increase in PWC matches with increase in population except in the last two years (2066 & 2007) where PWCons. start to decline.

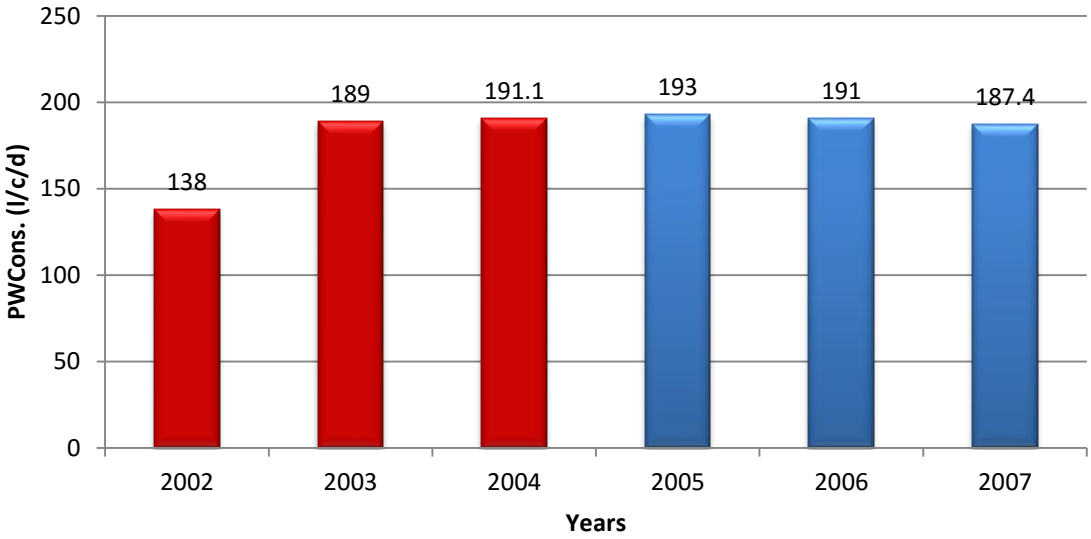

Fig. (4.19) (PWCons.) in El-Fayoum Governorate

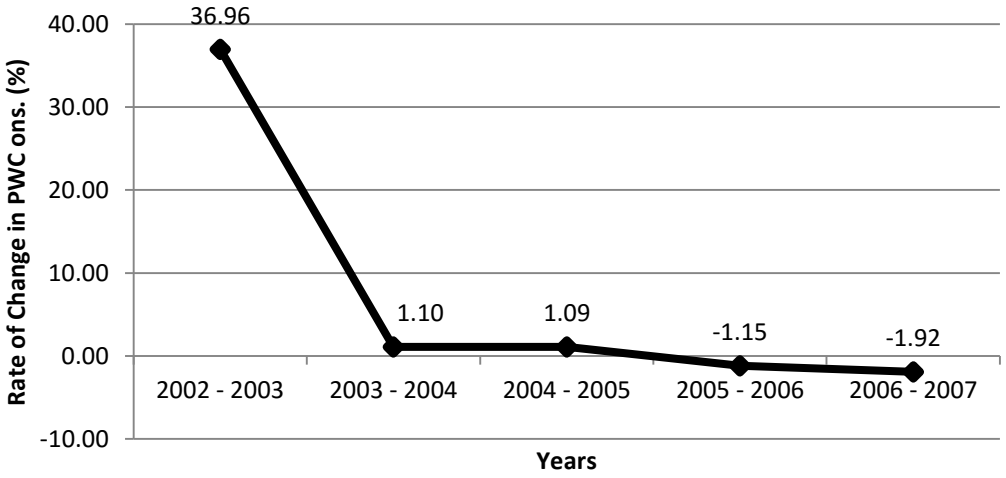

Fig. (4.20) (RPWCons.) in El-Fayoum Governorate

4.2.2.5 Beni-Swief Governorate

Produced water consumption for Beni-Swief Governorate is represented in Figure (4.21). This figure shows the same results obtaining from Figure (4.9). This reflects that the improvement of producing water capacity was matching with population increases for this governorate.

By studying Figure (4.22), it will be found that the annual rate of development in the produced water consumption. increased by about 12.79% in year 2003 compared by the previous year. Moreover, this quantity has been decreased by about 0.52% in

year 2004 and then increased by about 0.31% and 5.84% in years 2005 and 2006 respectively. As shown before, a high increases was clearly observed in this quantity of water consumption in the last year about 16.49%.

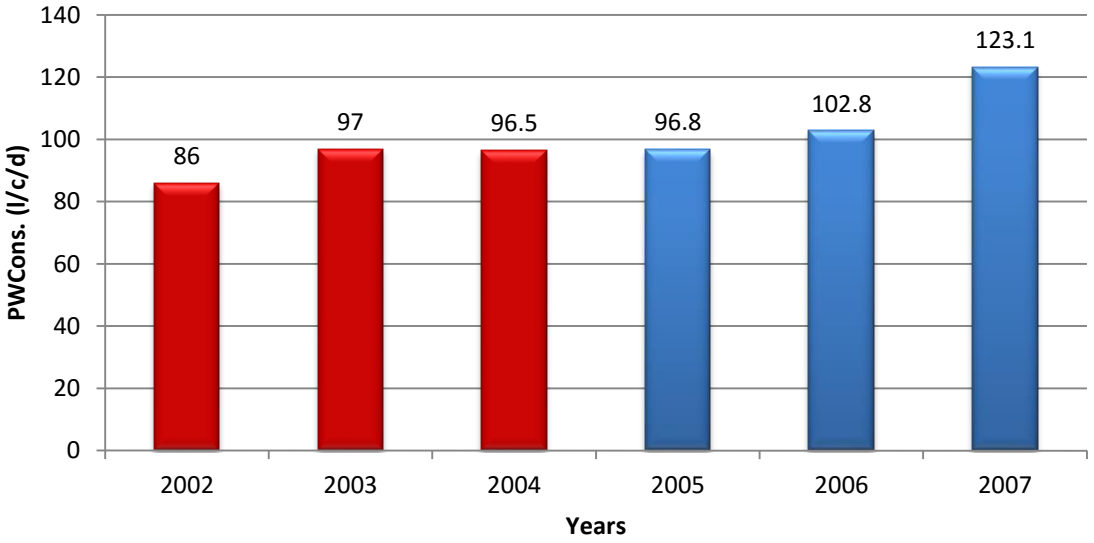

Fig. (4.21) (PWCons.) in Beni-Swief Governorate

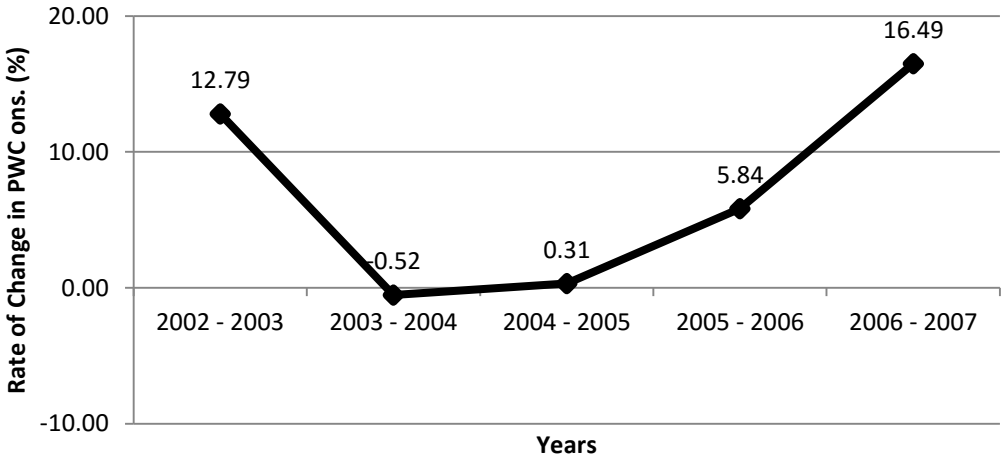

Fig. (4.22) (RPWCons.) in Beni-Sweif Governorate

4.2.2.6 Aswan Governorate

Variation of the produced water consumption for Aswan Governorate represented graphically in Figure (4.23). A reflection consideration for this figure clearly indicates that there is some increase in the quantity of the water consumption from (192 l/c/d) in 2002 to (212 l/c/d) in 2003. Another thing shown more obviously is there is slightly variation for this quantity in the first year of reforming from (208.9 l/c/d) in 2004 to (218 l/c/d) in 2005 and (232.1 l/c/d) in 2006. Again, no considerable variation can be observed in this quantity at last year 2007.

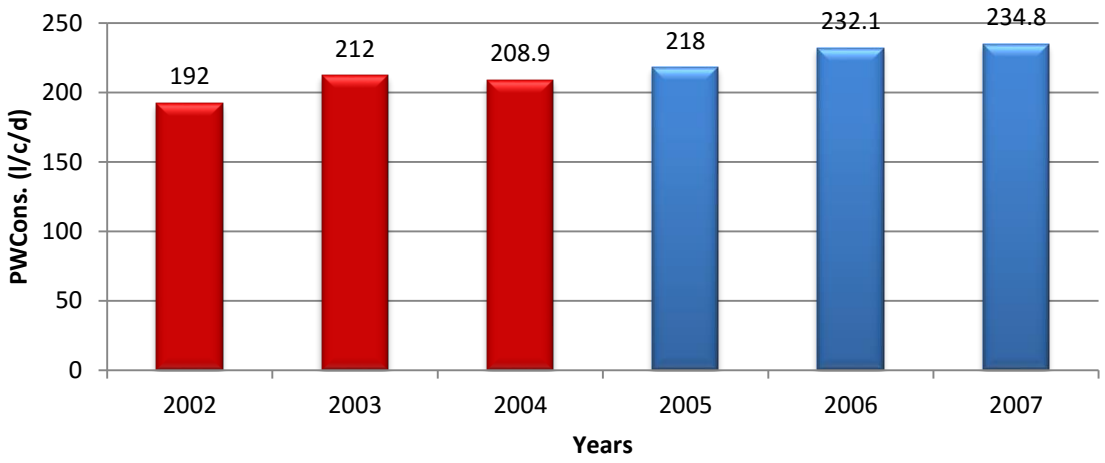

Fig. (4.23) (PWCons.) in Aswan Governorate

Another presentation for data mentioned before, Figure (4.24) shows "where the vertical axis represent the annual rate of development in the produced water consumption" some motivating results which can be observed through a careful inspection to this figure. For illustration, the daily water consumption increased by about 10.42% in year 2003 compared by the previous year. As shown before, while it was decreased by about 1.48% in year of reform 2004. Furthermore, there is some increase in this quantity of daily water consumption in years 2005 and 2006 while this quantity increased to a corresponding percentage of 4.09% at year 2005 and 6.16% at year 2006, such quantity has considerably increased at year 2007 to a corresponding percentage of 1.15%.

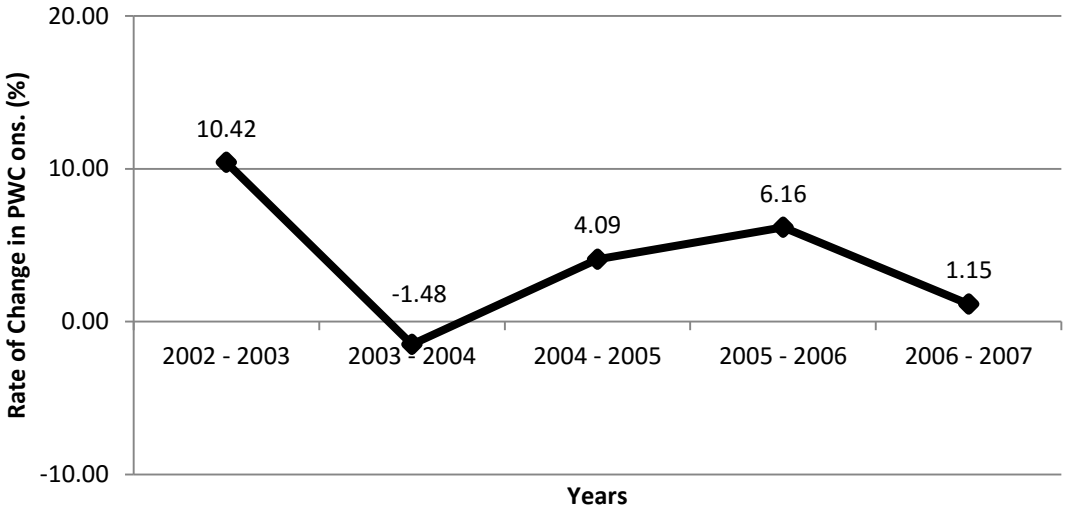

Fig. (4.24) (RPWCons.) in Aswan Governorate

4. 2.3 Consumed Water Capacity (CWC)

The consumed water capacity is the amount of water consumed by the customers through the network. This amount is measured by meters. This information will help in illustrating how much the production increase affect the customers. As shown in the Figures 4.25 to 4.36 the increase in the amount of water produced increase the amount of water consumed but not as much as it should, this may be due to the networks inefficiency. Consumed water for studied Governorates varied as shown in Table (4.1) for years from 2002 to 2007:

Table (4.1) (CWC from 2002 to 2007) (Description by information 2009 – 8th edition)

Governorate	(CWC) m^3/day	
	Year 2002	Year 2007
El-Gharbia	323,287	511,659
El-Sharkia	290,672	520,197
El-Dakahlia	509,200	696,312
El-fayoum	300,904	323,306
Beni-Sweif	116,640	201,474
Aswan	130,572	195,052

4.2.3.1 El-Gharbia Governorate

By studying of two Figures (4.25) and (4.26), notes that the Consumed Water Capacity for El-Gharbia Governorate less than the amount of water produced and can attribute this to some leakage in the networks as we mentioned earlier, or the lack of precision in the measurement of the amount of water consumed.

However, comparing Figure (4.25), which shows the rate of change in the amount of water consumed with the Figure (4.1), it is clear that not all produced water reach to citizens but there are some losses. Table (4.2) shows the rates of change of the quantity of water produced and consumed throughout the studied years. Hence it is clear that there is a marked improvement in the rates of the amount of water consumed over the years of the study.

Table (4.2) (changes in rates of PWC & CWC)

No.	Years	RPWC%	RCWC%
1	2002-2003	-2.4	12.95
2	2003-2004	4.03	0.95
3	2004-2005	40.5	13.83
4	2005-2006	0.81	1.3
5	2006-2007	1.74	20.37

By studying Table (4.2), it was found that RPWC differ than RCWC. As example in 2002 – 2003 RPWC was -2.4% while RCWC was 12.95%. This means that when RPWC decreased in 2003, RCWC increased. This difference reflects the importance of deliver water quantity to citizens is larger than the importance of producing water. The other important finding can be illustrated from table mentioned before, that RPWC in (2004 – 2005) increased by 40.5% while RCWC increased by 13.82%. This means that there is a shortage in producing potable water before this period. But when there was an additional quantities produced, all these additional quantities did not reach to citizens by the same rate of increasing. This means that the sector of water & wastewater in this governorate need reevaluation to avoid all these big losses. It is clear in 2006 and 2007 that this reevaluation begins that RCWC reached to 20.37%. Also by studying Table (4.2) with Figure (4.1) and Figure (4.25), it is clearly indicate that in 2002 the difference between PWC & CWC was 29% and it becomes 23% in 2007, which is a good indicator that there is an improvement in performance of delivery water quantities in El-Gharbia Governorate.

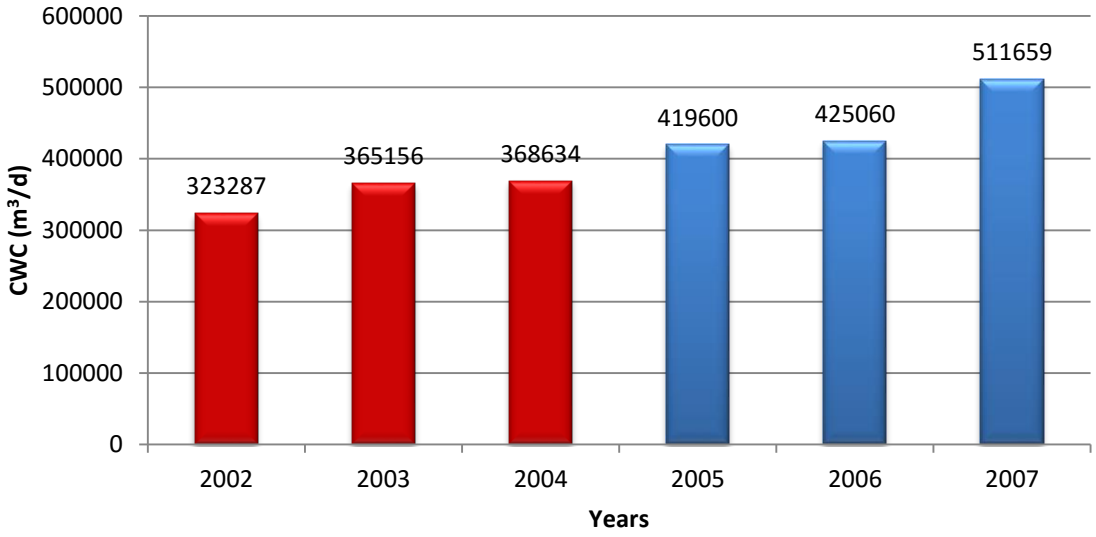

Fig. (4.25) (CWC) in El-Gharbia Governorate

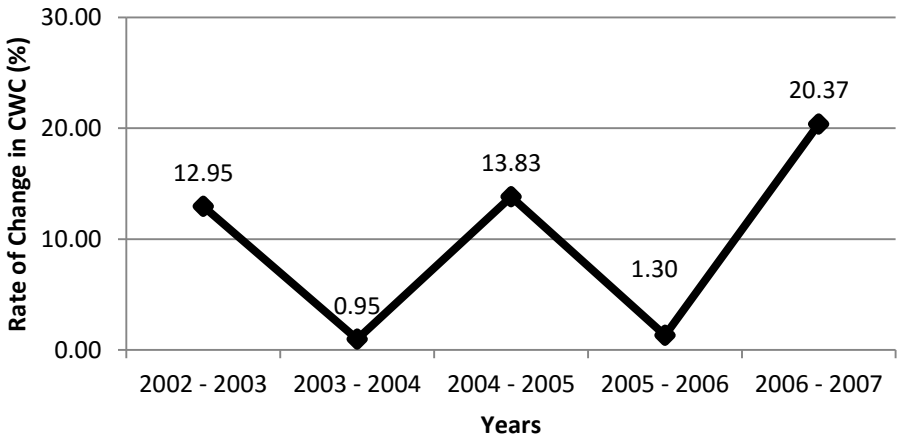

Fig. (4.26) (RCWC) in El-Gharbia Governorate

4.2.3.2 El-Sharkia Governorate

Figure (4.27) shows the change in the amount of water consumed in Sharkia Governorate. It is clear that this amount was estimated at (376 832 m^3 / day) in 2004 to become a (422 820 m^3 / day) in 2005 and then increase after that until it reach (520 197 m^3 / day) in 2007, (Description by information 2009 – 8^{th} edition).

Confirms these findings, the rate of increase in the consumed water capacity shows in Figure (4.28). It is clear from this figure that there is a steady increase in the amount

of this water, there was that it increased (2.89%) in the period (2003-2004) to (12.2%) in the period (2004-2005) and then to (23.12%) in the period (2005-2006). Comparing these quantities with other in Figure (4.3), it shows that while there was no major increase in PWC in years (2003 to 2006) but there was salient increase in CWC. This increasing due interesting in avoiding the defects that were causing the lack of delivery of water to citizens.

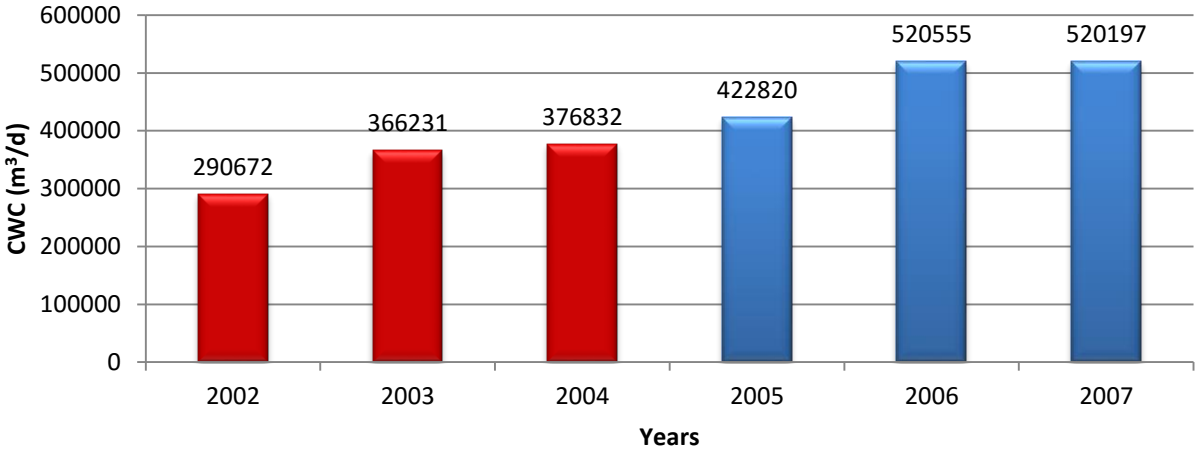

Fig. (4.27) (CWC) in El-Sharkia Governorate

Also by comparing results obtained from Figure (4.4) with results obtained from Figure (4.28), it was found that RPWC in period 2002 – 2003 was -0.67% while RCWC was 25.99%. After that RPWC began increasing till it reach 7.14% in period 2006 – 2007. Through 2002 to 2007 RPWC had no stability while it increased and decreased many times that it reached to Zero percent in period 2004 – 2005. At the same RCWC decreased in period 2003 – 2004 from 25.99% to 2.89%. After that it began increasing until 2006 that it reached to 23.12%.This means that there was a chaotic behavior in water and wastewater sector in El-Sharkia Governorate through years of study. That because there was no stability in improvement through years of study.

There was another finding can be illustrated from studying Figures (4.27) and Figure (4.3). This finding that the difference between PWC and CWC in 2002 was 47.6% but in 2007 it becomes 18%. This reflects that it is the first step in improvement of water and wastewater sector in El-Sharkia Governorate.

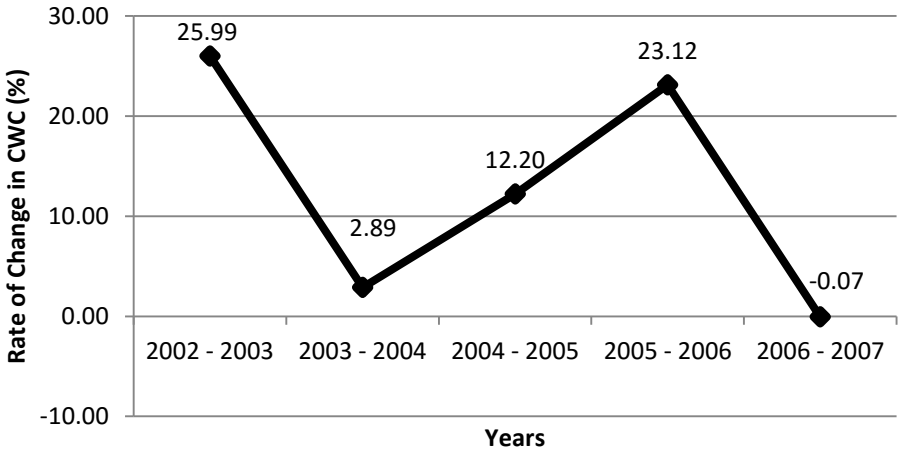

Fig. (4.28) (RCWC) in El-Sharkia Governorate

4.2.3.3 El-Dakahlia Governorate

Variation of the consumed water capacity for El-Dakahlia Governorate represented graphically in Figure (4.29). A careful inspection for this figure clearly indicates that no considerable variation in the quantity of the water capacity through years before reform started 2002 and ended 2004. Another thing shown more obviously is that there is high increase for this quantity in the first year of reforming from (526524 m^3/day) in 2004 to (621978 m^3/day) in 2005. Again, no considerable variation can be observed in this quantity at 2006 and there is considerable increase in this quantity at 2007.

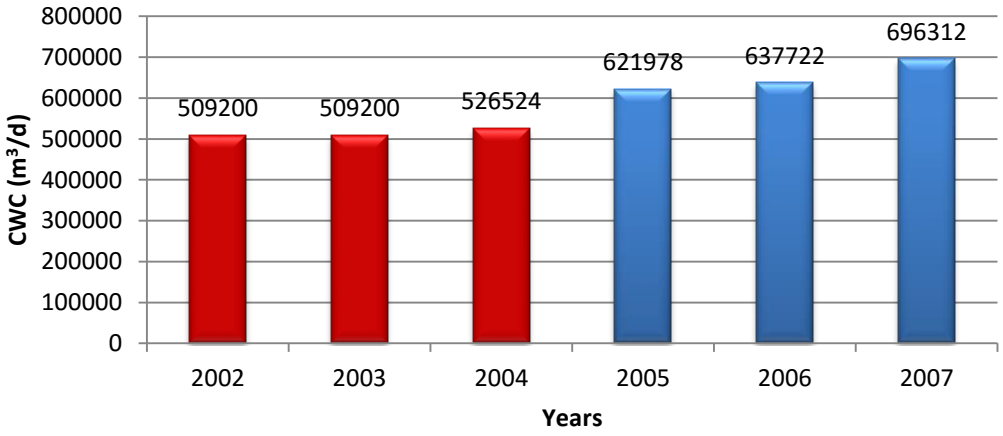

Fig. (4.29) (CWC) in El-Dakahlia Governorate

Another presentation for data mentioned before, Figure (4.30) shows the annual rate of increase in the consumed water capacity. Some motivating results can be observed through a careful inspection to this figure. For illustration, the consumed water capacity has no change in year 2003 compared by the previous year. Furthermore, this quantity has been increased by about 3.4% in year 2004. As shown before, there is high increase in the quantity of daily water consumption in the first year after reforming, about 18.13%. Moreover this quantity increased by a corresponding percentage of 2.53% and 9.19% in year 2006 and 2007 respectively.

Comparing these results with those in Figure (4.5), it shows that the increase in CWC matches with the increase in PWC in the first two years. After one year of reform there is a huge increase in CWC (18.13%) regarding the increase in PWC (5.6%) but in year 2006 & 2007 the increase in CWC less than in PWC but finally in 2007 the two rates of increasing (PWC & CWC) are same. Analysis before shows the confusion in water sector in this governorate, this confusion could be due to lack of possibilities, lack of adequate number of water meters, frequent leaks at networks.

On the other hand, there are some findings when comparing results from Figure (4.30) and Figure (4.6). These findings can be concluded that in period 2002 – 2003 there was no any change in CWC while PWC increased by 2.57%. Then RCWC began increasing till 2005 and then reduced again. At the same time with RCWC, RPWC decreased till 2006. As mentioned before in El-Sharkia Governorate, also these results reflect the chaotic behavior for El-Dakahlia A.C.

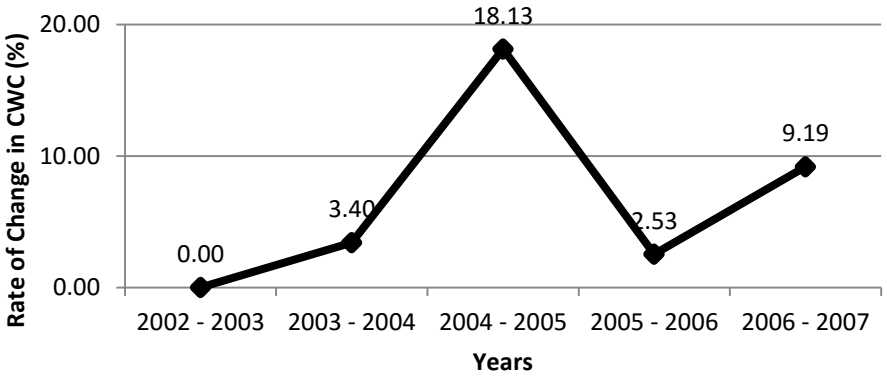

Fig. (4.30) (RCWC) in Al-Dakahliah Governorate

4.2.3.4 El-Fayoum Governorate

El-Fayoum Governorate saw significant change in the consumed water capacity after reform. This is evident from Figure (4.31), where the increased amount of water consumed (307 824 m^3 / day) in 2004 to (320 359 m^3 / day) in 2005, with an increase of about (4.07%). It can be also noted through the same figure that the rate of increase of the consumed water capacity is taking to decline in subsequent years. Figure (4.32) marked the change in the rate of annual consumed water capacity in El-Fayoum Governorate. A careful inspection to Figure (4.32) and Figure (4.8), it will be found that:

1. While the RPWC increased in (2002 – 2003) by 39.91% but the RCWC as zero %, this may be due to lack of measurements or a lot of leakages in networks.
2. There was improvement in RCWC regarding the RPWC in years (2003, 2004, 2005). This improvement may be due to more interesting for networks and measurements.

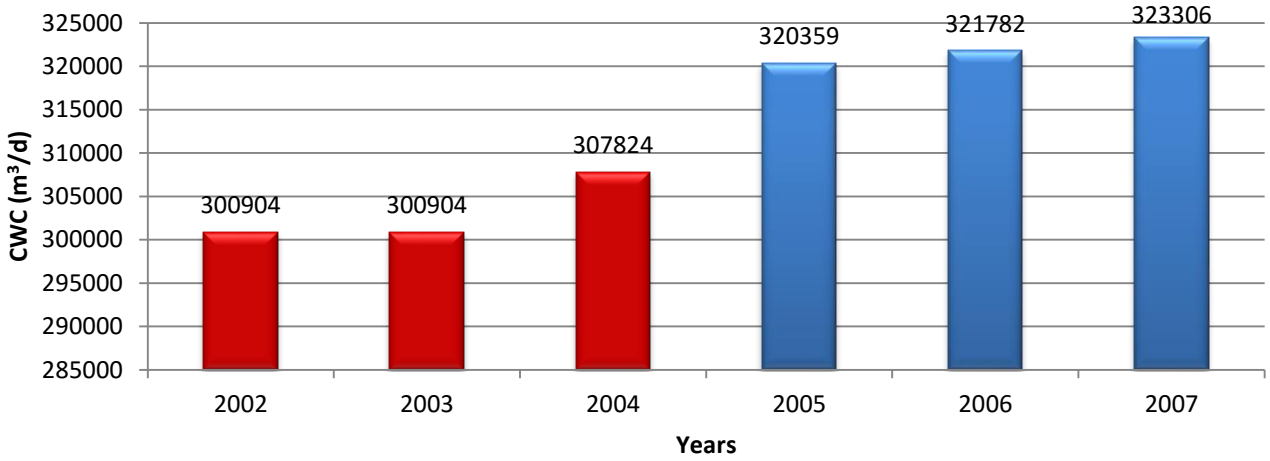

Fig. (4.31) (CWC) in El-Fayoum Governorate

Another thing can be found by comparing results obtained from figures mentioned before that, in period 2003 – 2004 RCWC and RPWC seems equal. This means that government starts the importance to be sure that quantity of produced water delivered to citizens. Also when comparing results obtained from Figure (4.31) with results obtained from Figure (4.7), it will be found that the difference between PWC and CWC in 2003 was 32.8% and this difference remains as it is in 2007. This means that

even the RCWC and RPWC were the same, but there was some shortage till now, that not all produced water delivered to citizens.

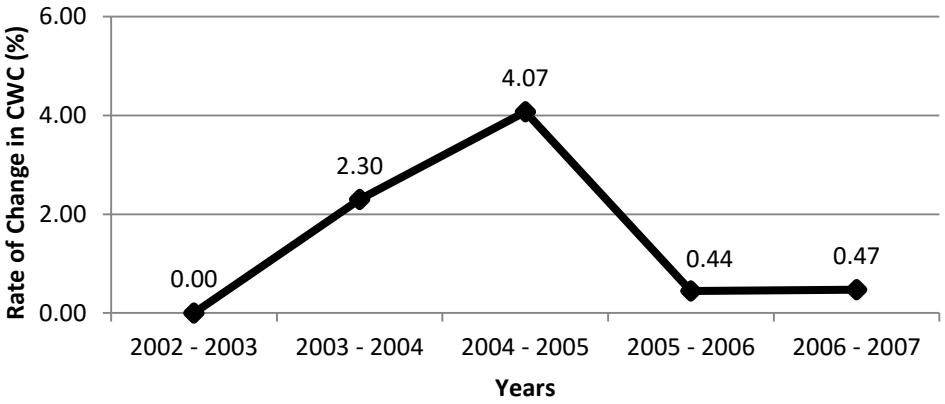

Fig. (4.32) (RCWC in El-Fayoum Governorate)

4.2.3.5 Beni-Swief Governorate

Figure (4.33) represent graphically the variation of the consumed water capacity for Beni-Swief Governorate. A closer inspection for this figure clearly indicates that there is some increase in this amount through the first year period started 2002 and ended 2003. Another thing shown that there is slightly variation through years started 2004 and ended 2006. Again there is a small increase in this quantity in the last year 2007.

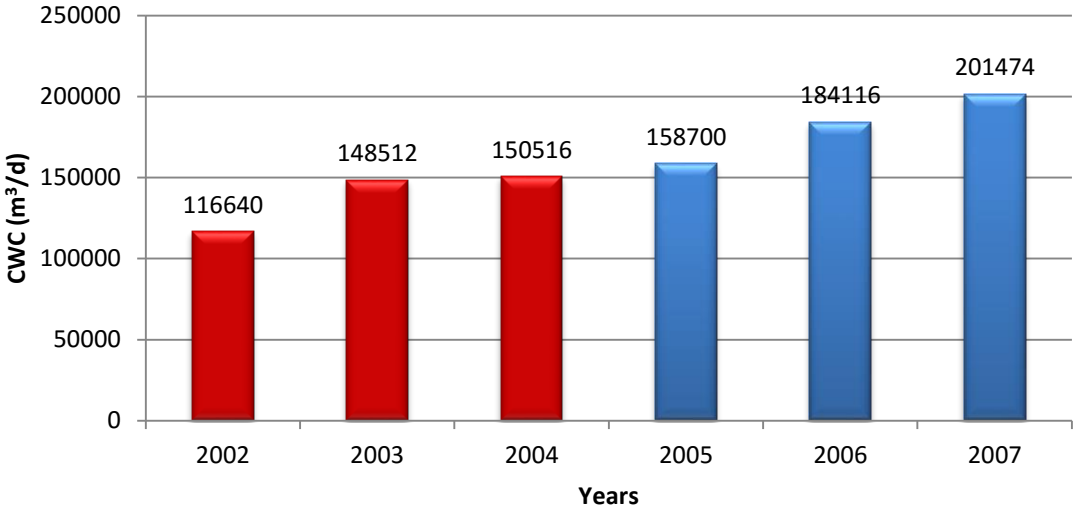

Fig. (4.33) (CWC) in Beni-Sweif Governorate

Figure (4.34) is another presentation for this data where the vertical axis represents the annual rate of development in the consumed water capacity. Some interesting findings can be observed through a careful inspection to this figure. For instance, the consumed water capacity increased by about 27.33% in year 2003 compared by the previous year. Moreover, this quantity has been increased by about 1.35% and 5.44 in years 2004 and 2005 respectively. Then there is high increase for this amount in year 2006 by about 16.02%. As shown before, a considerable increases was clearly observed in this quantity of water consumption in the last year by about 9.43%.

Comparing the results shown in Figure (4.34) by results shown in Figure (4.10), it shows that the increase in RCWC seems likely with the increase in RPWC except in year 2007 while RPWC increased but RCWC decreased.

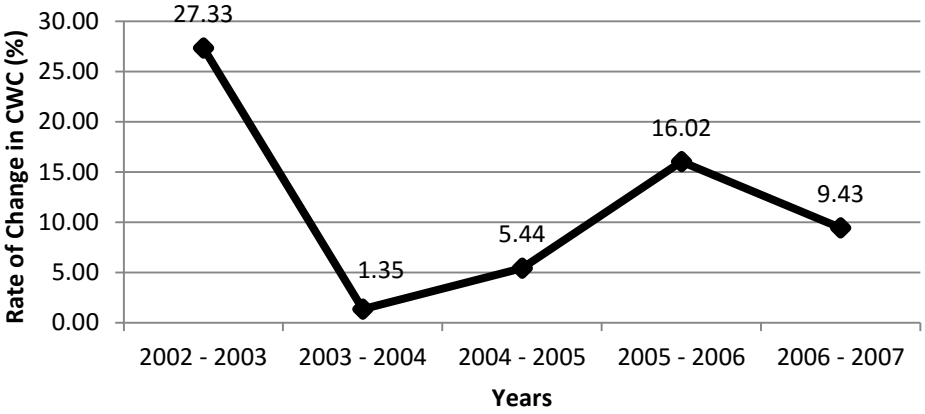

Fig. (4.34) (RCWC in Beni-Sweif Governorate)

4.2.3.6 Aswan Governorate

Variation of the consumed water capacity for Aswan Governorate represented graphically in Figure (4.35). A reflection consideration for this figure clearly indicates that there is considerable decrease in the quantity in years before reform started 2002 and ended 2004. Another thing shown more obviously that there is a great jump for this quantity in the first year of reforming from (101024 m^3/day) in 2004 to (160056 m^3/day) in 2005 and (186354 m^3/day) in 2006. Again, no considerable variation can be observed in this quantity at last year 2007.

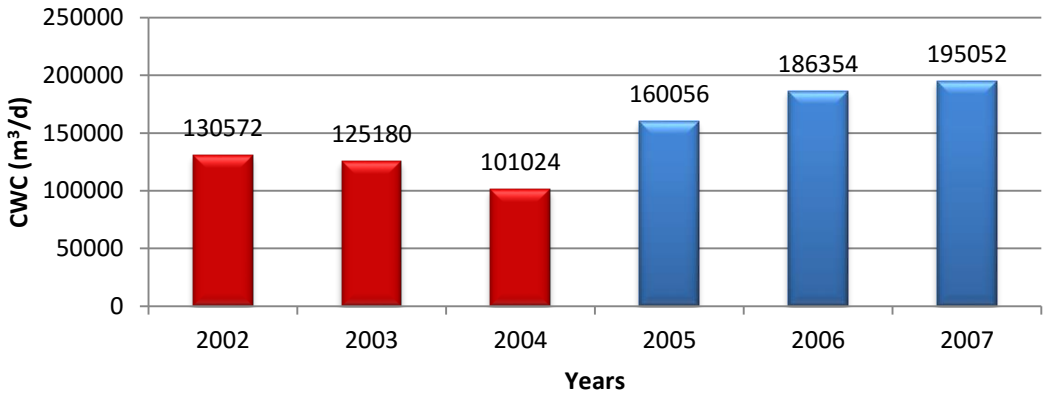

Fig. (4.35) (CWC) in Aswan Governorate

Another presentation for data mentioned before, Figure (4.36) shows "where the vertical axis represent the annual rate of development in the consumed water capacity" some motivating results which can be observed through a careful inspection to this figure. For illustration, the consumed water capacity decreased by about 4.13% and 19.3% in years 2003 and 2004 respectively compared by the previous year. As shown before, while it was great jump in this amount by about 58.43% in year of reform 2005. Furthermore, there is high increase in this quantity of daily water consumption in years 2006 and 2007 while this quantity increased to a corresponding percentage of 16.43% at year 2006 and 4.67% at year 2007.

A careful inspection to Figure (4.36) and Figure (4.12), it will be found that at year of reform (2004 – 2005) the RCWC had a very big increase regarding the increase in RPWC, this indicates that there was a very big interesting for water sector in this government.

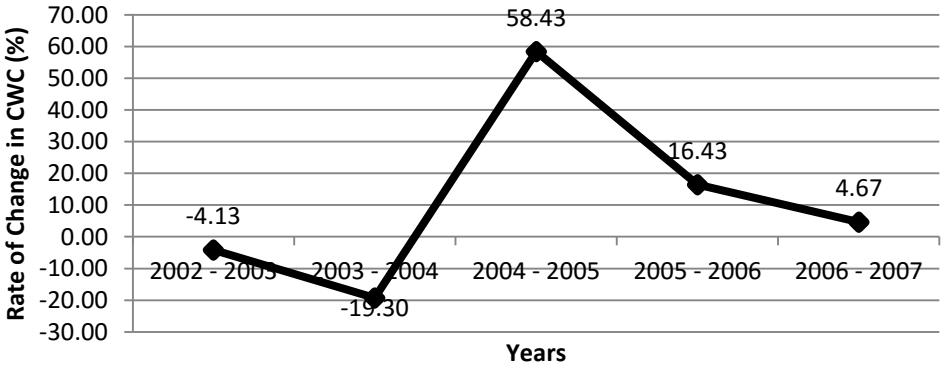

Figure (4.36) (RCWC in Aswan Governorate)

At the end of analysis of this factor, it can be saying that there were significant differences between the PWC and the CWC at all governorates, but there were good efforts to resolve this problem. It is clear that these efforts did not succeed as full and so, this problem requires unconventional solutions to overcome them and we can discuss some of these solutions in the next chapter. Regarding this difference between produced and consumed water, it is a very dangerous alarm that there were some difficulties facing potable water system around all Egypt. Also, some investigations should be made on existing networks to reduce leakage and to reduce all these quantities of potable water that leaked from old and dirty pipes. Another thing can be concluded from these analyses, that there was an importance with Lower Egypt Governorate more than Upper Egypt Governorate, as mentioned before.

4. 2.4 Non Revenue Water (NRW)

Non revenue water (NRW) is water that has been produced and is “lost” before it reaches the customer. Losses can be real losses (through leaks, sometimes also referred to as physical losses) or apparent losses (for example through theft or metering inaccuracies). High levels of (NRW) are detrimental to the financial viability of water utilities, as well to the quality of water itself. (NRW) is typically measured as the volume of water "lost" as a share of net water produced. However, it is sometimes also expressed as the volume of water “lost” per km of water distribution network per day. Figures (4.37 to 4.42) show that the (NRW) had increased after the year of reform; this may be due to the increase in the water production without paying much attention to the networks. The percentage of the (NRW) started to decrease as the companies started to implement an (NRW) decreasing plan.

4.2.4.1 El-Gharbia Governorate

Figure (4.37) shows the amount of waste in water for El-Gharbia Governorate. By studying this form it is clear that (NRW) decreasing in the early years where decreased from (28.92%) in 2002 to (20.17%) in 2004, then there was a large increase in this ratio in 2005 up to (35.33%) and then decreased again up to (23.11%) in 2007. Comparing the numbers of forms (4.1), (4.25) with Figure (4.37) is clear the

government's attention to produce large quantities of water without attention to deliver the service to beneficiaries.

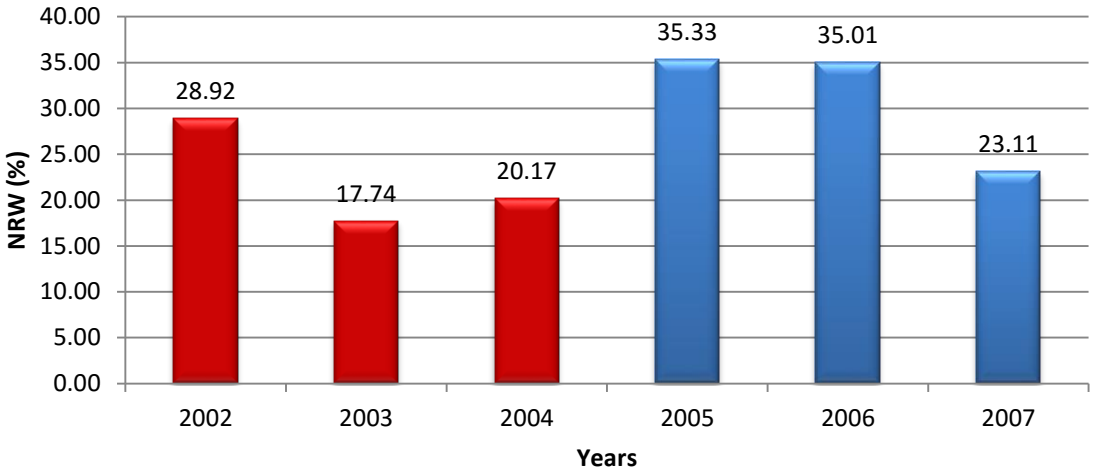

Fig. (4.37) (NRW) in El-Gharbia Governorate

4.2.4.2 El-Sharkia Governorate

By studying the amount of (NRW) in El-Sharkia governorate, through Figure (4.38) it is clear that this ratio are decreasing remarkably from (47.61%) in 2002 until it reached to (18.02%) in 2007. Comparing the figures numbers (4.3), (4.27) with Figure (4.38) it is clear that this remarkable decrease in the (NRW) as a result of the government in this governorate has paid attention to connect the service to those who deserve more from their interest in the production of larger quantities of water.

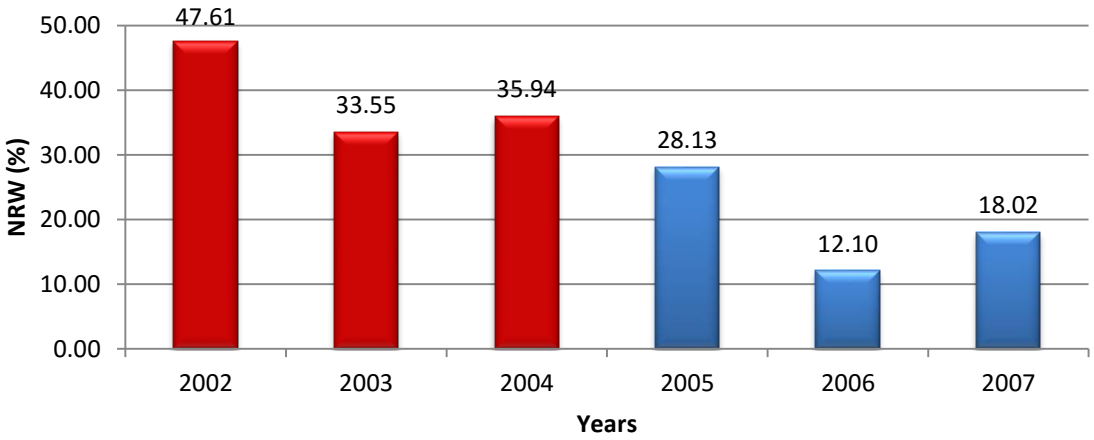

Fig. (4.38) (NRW) in El-Sharkiah Governorate

4.2.4.3 El-Dakahlia Governorate

Variation of the non revenue water for El-Dakahlia Governorate represented graphically in Figure (4.39). A careful inspection to this figure clearly indicates that a slight increase in (NRW) of the water capacity through years before reform started 2002 and ended 2004. Another thing shown more obviously is there is an obviouse decrease for this quantity in the first year of reforming from (34.07%) in 2004 to (26.25%) in 2005. Again, no considerable variation can be observed in this quantity in the last two years 2006 and 2007.

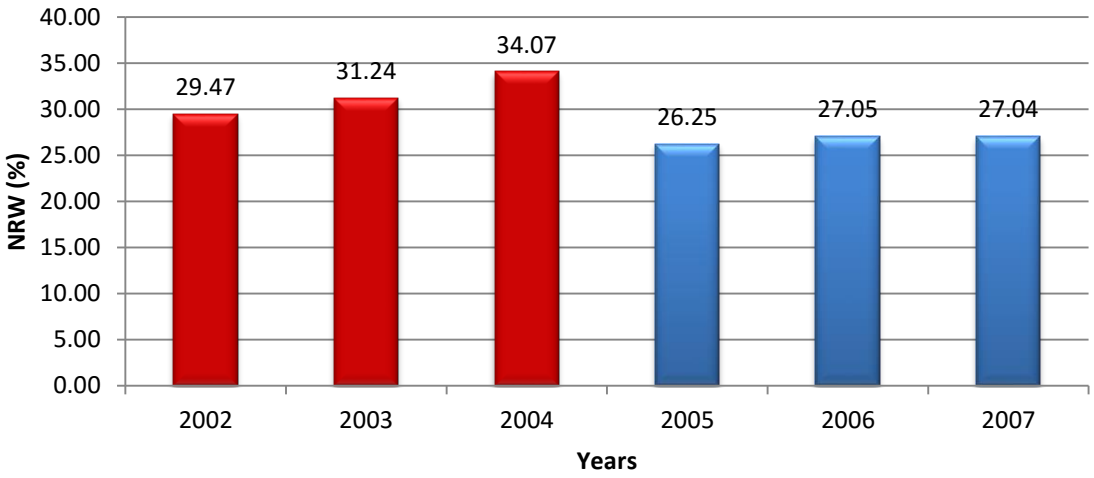

Fig. (4.39) (NRW) in El-Dakahlia Governorate

4.2.4.4 El-Fayoum Governorate

Figure (4.40) shows the change in (NRW) in El-Fayoum Governorate. By studying this figure it is clear that (NRW) has increased very noticeable between 2002 and 2003, (6.01%) in 2002 to (32.82%) in 2003. This percentage is fairly constant until 2007. Comparing Figure (4.40) with figures number (4.7), (4.31) it is clear that there is a surge in the amount of water produced between 2002 and 2003, but the amount of water consumed remain constant, which indicates a lack of benefit of citizens of the increase in the amount of water produced. This may attributed to the high percentage of the NRW.

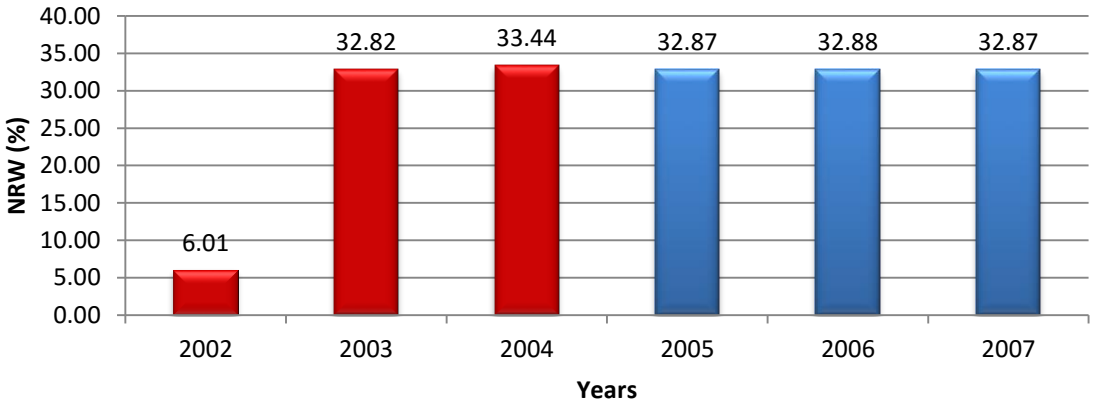

Fig. (4.40) (NRW) in El-Fayoum Governorate

4.2.4.5 Beni-Swief Governorate

Figure (4.41) represent graphically the variation of the non revenue water for Beni-Swief Governorate. A closer inspection for this figure clearly indicates that there is some decrease in (NRW) through the first year period started 2002 and ended 2003. Another thing shown that there is slightly variation through years started 2004 and ended 2006. Again there is a small increase in this quantity in the last year 2007.

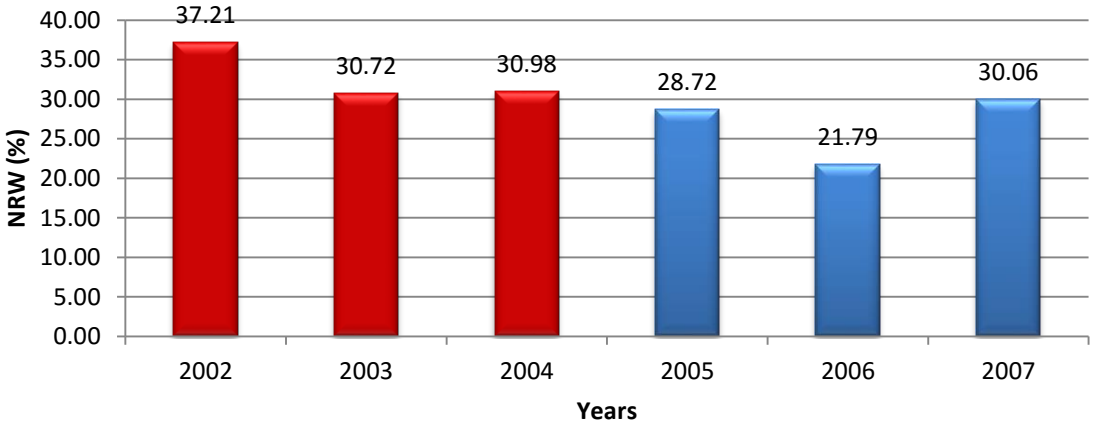

Fig. (4.41) (NRW) in Beni-Sweif Governorate

4.2.4.6 Aswan Governorate

The (NRW) in Aswan Governorate were increasing from (37.03%) in 2002, reaching a maximum value (56.82%) in 2004 and then decreased this ratio significantly in 2005, amounting to (35.54%) This is clearly evident through the study of Figure (4.42). By studying figures number (4.11) and (4.35) with the Figure (4.42) it is clear that despite the absence of a marked increase in the amount of water

produced between 2004 and 2005, it notes just that the amount of water consumed increased significantly in 2005 for the year 2004, which indicates that there has been considerable interest to deliver the service to beneficiaries.

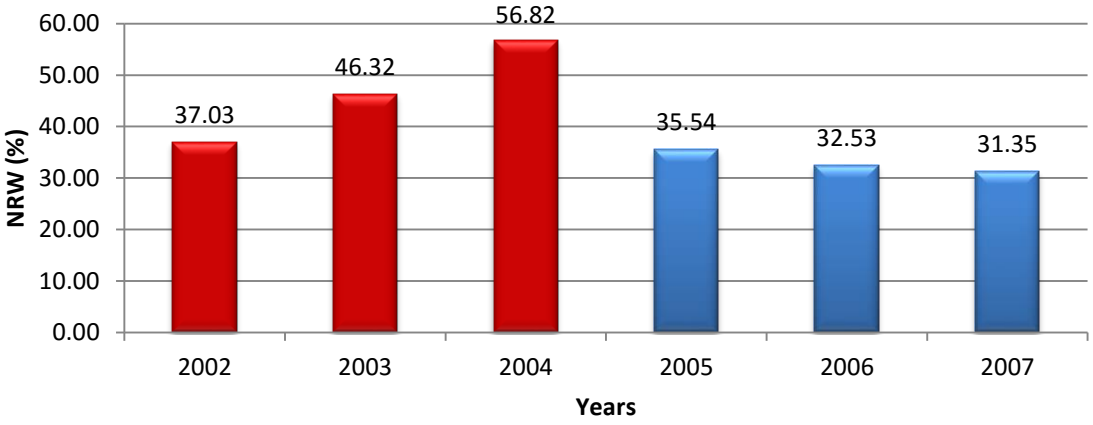

Fig. (4.42) (NRW) in Aswan Governorate

At the end of analysis of this factor, we can say that the government paid more attention for water producing water without sure that these produced quantity reached to beneficiaries and there had small importance with reasons of losses in potable water. At the next chapter, there will be some suggestions to improve service and decrease the amount of NRW.

4. 2.5 Percentage of Household With Access to Water (%HAW)

Access to safe drinking water is indicated by the number of people using proper sanitary sources. These improved drinking water sources include household connection, public standpipe, borehole condition, protected dug well, protected spring, and rain water collection. This definition is the worldwide definition but percentage of households with access to water means the actual population connected to the networks. As shown in Table (4.3) the indicator had slightly increased after the reform in all governorates.

By studying Table (4.3), it found that the percentage of household with access to water increased after reform. This increasing clearly indicate for El-Gharbia Governorate, El-Sharkia Governorate and Beni-Sweif Governorate. That this percentage in El-Gharbia Governorate increased from 83.7% in 1996 to 98.3% in

2006. And in El-Sharkia Governorate increased from 76.1% in 1996 to 93.5% in 2006. But in Beni-Sweif Governorate, this percentage increased from 75.1% in 1996 to 93.9% in 2006, (Description by information 2009 – 8th edition). This means that there was a good work done to deliver quantities of water produced to users. In general, it can be saying that after reform, the government tried to deliver quantities of potable water produced to users and this try gone to be actual after sector reform.

Table (4.3) (% of house hold) (Description by information 2009 – 8th edition)

Governorate	Percentage of Household with Access to Water (%)		
	1986	1996	2006
El-Gharbia	75	83.7	98.3
El-Sharkia	64.4	76.1	93.5
El-Dakahlia	78.1	90.2	97.5
El-Fayoum	84.4	98.4	98.9
Beni-Swief	65.3	75.1	93.9
Aswan	82.1	95.5	99.4

4. 2.6Treated Wastewater Capacity (TWwC)

4.2.6.1 El-Gharbia Governorate

Figure (4.43) is graphical presentation for the variation of treated wastewater capacity for El-Gharbia Governorate. A closer inspection for this figure clearly indicates that there is considerable increase in (TWwC) at years before reform started 2002 and ended 2003. Another thing shown rather clearly is no considerable change in this amount at rest studied years.

According to the Egyptian code for water and wastewater, the amount of wastewater acts 80% of quantity of potable water. When calculating this percentage for El-Gharbia Governorate, it will be found that in 2002 the amount of treated wastewater was about 75.5% of consumed water. In 2004 and 2005 this percentage becomes 85% and 74.6% respectively and in 2007 it becomes 62.4%. This means that before reform there was an adequate system for wastewater treatment. This may be because water quantities is not sufficient to the total number of habitants. Also it indicate that after reform there was a clear shortage in wastewater treatment system. Through these results, it can be concluded that it is very important to give more interest for increasing treated wastewater capacities, because increasing of untreated wastewater quantities have a very bad effects on public health and environment.

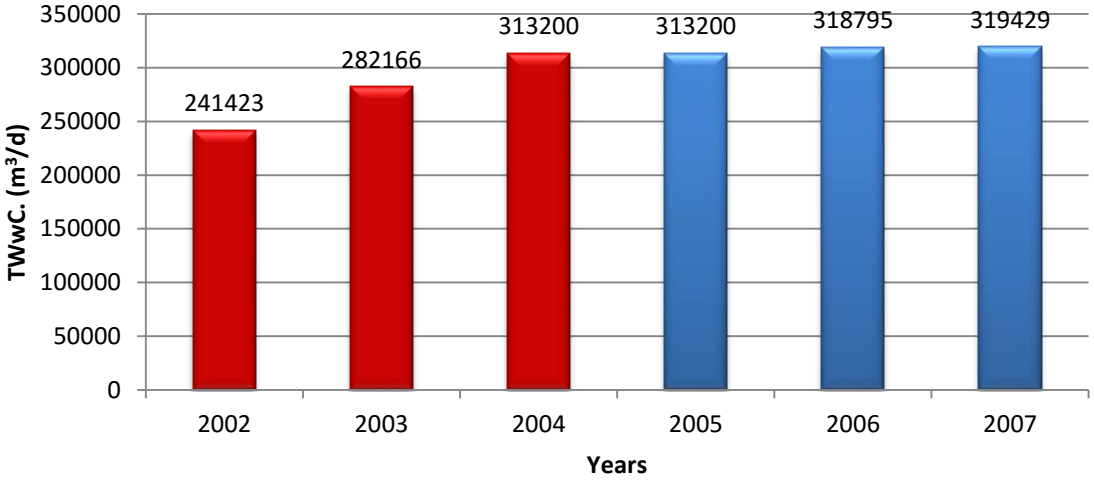

Fig. (4.43) (TWwC) in El-Gharbia Governorate

4.2.6.2 El-Sharkia Governorate

Figure (4.44) represent graphically the variation of treated wastewater capacity for El-Sharkia Governorate. A closer inspection for this figure clearly indicates that no considerable variation in (TWwC) at years before reform started 2002 and ended 2004. Another thing shown more obviously is high increase in this amount at the first two years after reform (174080 m^3/day) in 2004 to (267264 m^3/day) in 2005 and (344005 m^3/day) in 2006, (Description by information 2009 – 8^{th} edition). Then, there is no considerable change in this amount at the last year 2007.

Also when calculating the percentage of treated wastewater to the consumed water in El-Sharkia Governorate, it will be found that before reform this percentage ranged about 46% to 53%. After reform there was an improvement in this percentage that in 2005 it jumped to 71%, but it decreased again that it reached to 66.4% in 2007. This means that after reform, the government began to improve wastewater system in parallel with improving of potable water. But while this improvement clearly occurred, it was still there some quantities of wastewater untreated. From these results we can conclude that the system of treated wastewater in El- Sharkia Governorate needs a big improvement to reach that no untreated quantities of wastewater.

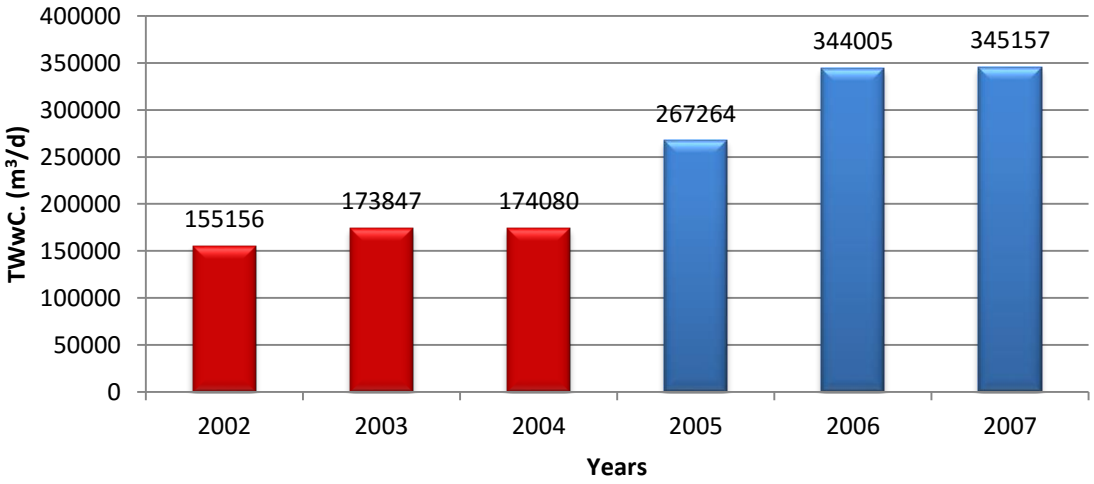

Fig. (4.44) (TWwC) in El-Sharkia Governorate

4.2.6.3 El-Dakahlia Governorate

Variation of the treated wastewater capacity for El-Dakahlia Governorate represented graphically in Figure (4.45). A closer inspection for this figure clearly indicates that there is a small increase in amount of treated wastewater between every two years along whole studied years.

When calculating the percentage of treated wastewater to the consumed water in El-Dakahlia Governorate, it will be found that at all years of study this percentage seems good, that it ranged from 80% to 85%. This means that before and after reform there was a good interest and improvement in wastewater system in parallel with improving potable water. From these results we can conclude that the system of treated wastewater in El- Dakahlia Governorate is a good system and it should be shared with other governorates that it suffers from shortage in the treated wastewater services.

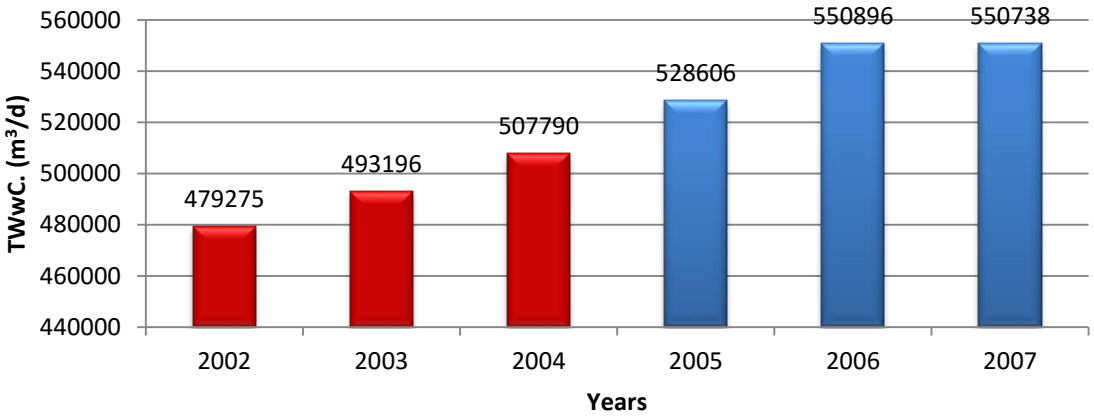

Fig. (4.45) (TWwC) in El-Dakahlia Governorate

4.2.6.4 El-Fayoum Governorate

Figure (4.46) is graphical presentation for the variation of the treated wastewater capacity for El-Fayoum Governorate. A closer inspection for this figure clearly indicates that there is no considerable change in (TWwC) through years before reform started 2002 and ended 2004. Another thing shown more obviously that there is high increase in amount of treated wastewater at year of reform (123178 m^3/day) in 2004 to (149682 m^3/day) in 2005. Again no considerable change in (TWwC) at last two years.

By calculating the percentage of treated wastewater to the consumed water in El-Fayoum Governorate, it will be found that before reform this percentage ranged about 35% in 2002 to 40% in 2004. After reform there was a small improvement in this percentage that it reached to about 47% in 2005, but it remains constant till 2007. This means that after reform, the government began to improve wastewater system in parallel with improving of potable water. But while this improvement clearly occurred, there were still large quantities of wastewater untreated. From these results we can conclude that the system of treated wastewater in El- Fayoum Governorate needs a big improvement to reach that no untreated quantities of wastewater.

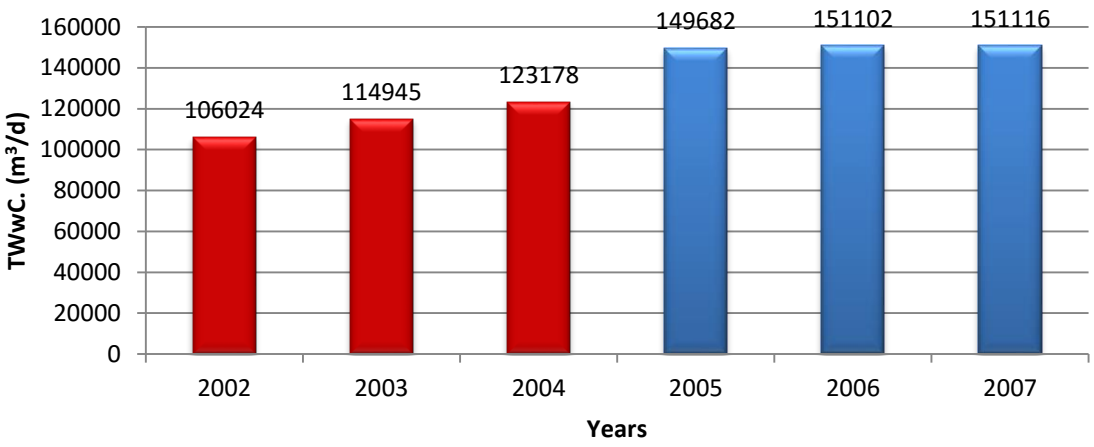

Fig. (4.46) (TWwC) in El-Fayoum Governorate

4.2.6.5 Beni-Sweif Governorate

Figure (4.47) represent graphically the variation of the treated wastewater capacity for Beni-Swief Governorate. A closer inspection for this figure clearly indicates that there is no considerable change in (TWwC) through years before reform started 2002 and ended 2004. Another thing shown more obviously that there is high increase in amount of treated wastewater at year of reform (34126 m^3/day) in 2004 to (47840 m^3/day) in 2005. Again no considerable change in (TWwC) at last two years.

Also by calculating the percentage of treated wastewater to the consumed water in Beni-Sweif Governorate, it will be found that before reform this percentage ranged about 29% in 2002 to 22.7% in 2004. After reform there was a very small improvement in this percentage that it reached to about 30% in 2005 and it decreased again to 24.8% in 2007. This means that after reform, the government began to improve wastewater system, but this improvement did not reach to the required benefits. That there were huge quantities of wastewater untreated. From these results we can conclude that the system of treated wastewater in Beni-Sweif Governorate needs a big improvement to reach that no untreated quantities of wastewater.

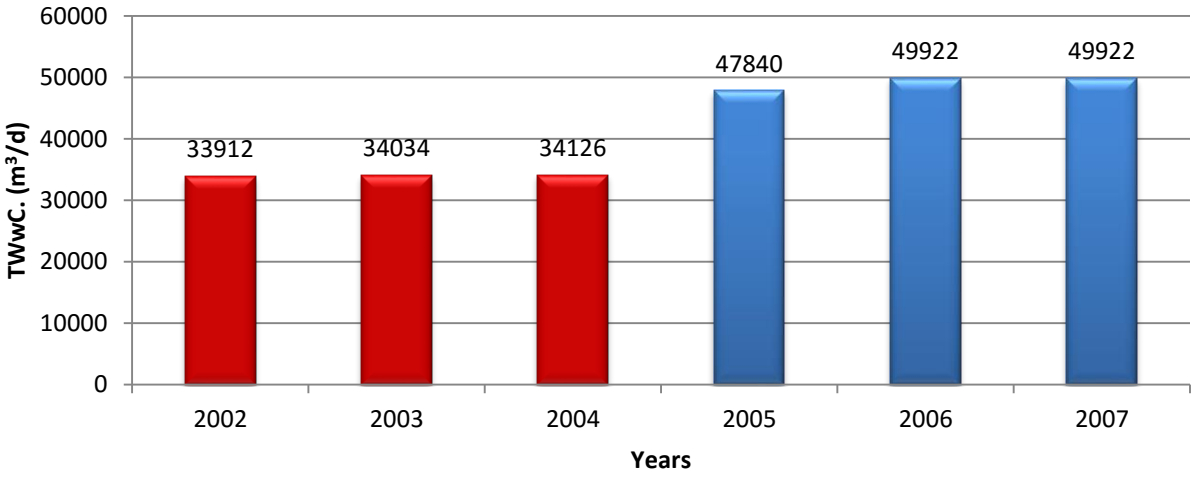

Figure (4.47) (TWwC) in Beni-Sweif Governorate

4.2.6.6 Aswan Governorate

Variation of treated wastewater capacity for Aswan Governorate represented graphically in Figure (4.48). A reflection consideration for this figure clearly indicates that there is no considerable increase in the quantity in years before reform started 2002 and ended 2004. Another thing shown more obviously that there is a high increase for this quantity in the first year of reforming from (76384 m^3/day) in 2004 to (93480 m^3/day) in 2005. Again, no considerable variation can be observed in (TWwC) at last two years 2006 and 2007.

Also when calculating the percentage of treated wastewater to the consumed water in Aswan Governorate, it will be found that before reform this percentage ranged about 57% in 2002 to 75.6% in 2004. After reform there was a decreasing in this percentage that in 2005 it decreased to 58.4%, and decreased again that it reached to 50.4% in 2007. This means that after reform, the government neglect wastewater system while it concentrates its effort in potable water system. From these results it can be concluded that the system of treated wastewater in Aswan Governorate needs a big improvement to reach that no untreated quantities of wastewater.

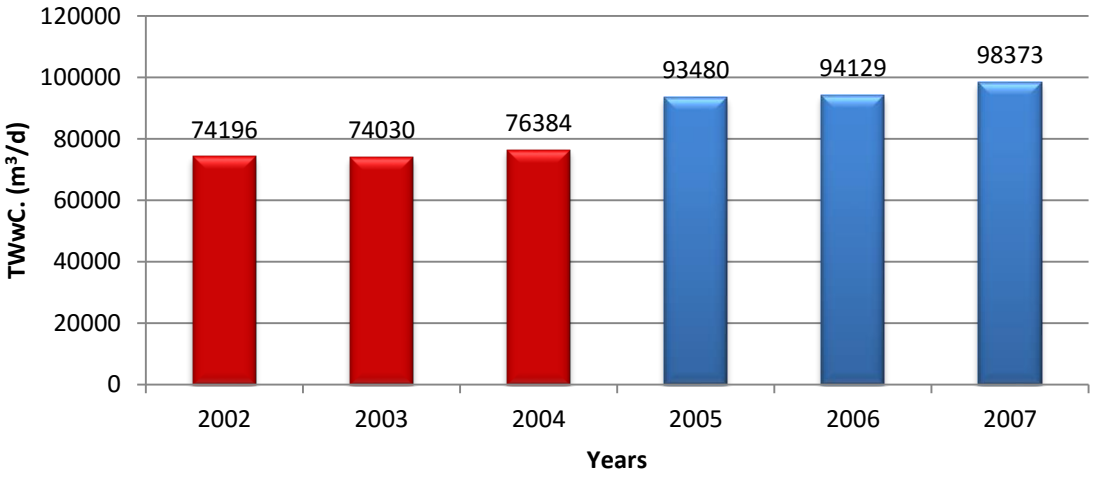

Figure (4.48) (TWwC) in Aswan Governorate

At the end of analysis of this factor, it can be said that there was a very big shortage in wastewater system. That there was a big amount of wastewater untreated, which it had bad effects on habitants, environment and public health. Also, it can be concluded that the attention of producing potable water larger than the attention of improving system of wastewater treatment. Also it clearly showed from results obtained from figures (4.43) to (4.48) that the government gives more attention to Lower Egypt governorates larger than Upper egypt governorates. This finding clearly showed from results of El- Dakahliah Governorate and Beni-Sweif Governorate. That in El-Dakahliah Governorate the percentage of treated wastewater of consumed water in 2007 was about 79% which is means that all quantities of collected wastewater were treated. While this percentage in Beni-Sweif at the same year was about 24.8% which means that a small quantity of wastewater collected were treated. This difference makes citizens unsatisfied and causes kind of immigration from governorates that had no attention to governorates that had more attention. Also this may have a very bad environmental impact.

4. 3 ANALYSIS OF FINANCIAL PERFORMANCE

4.3.1 Methods of Financial Analysis

There are some methods to analyze the financial statement of a company:

1. Comparative financial statement:
2. Index Number Trend Series.
3. Common Size Financial Statement.
4. Ratio Analysis.
5. Performance Model.

This study, concerns with Comparative financial statement and Ratio Analysis:

4.3.2 Comparative Financial Statement

Comparative Financial Statement analysis provides information to assess the direction of change in the business. Financial statements are presented as on a particular date for a particular period. The financial statement Balance Sheet indicates the financial position as at the end of an accounting period and the financial statement Income Statement shows the operating and non-operating results for a period. But financial managers and top management are also interested in knowing whether the business is moving in a favorable or an unfavorable direction. For this purpose, figures of current year have to be compared with those of the previous years. In analyzing this way, comparative financial statements are prepared.

Comparative Financial Statement Analysis is also called as Horizontal analysis. The Comparative Financial Statement provides information about two or more years' figures as well as any increase or decrease from the previous year's figure and it's percentage of increase or decrease. This kind of analysis helps in identifying the major improvements and weaknesses. For example, if net income of a particular year has decreased from its previous year, despite an increase in sales during the year, is a matter of serious concern. Comparative financial statement analysis in such situations helps to find out where costs have increased which has resulted in lower net income than the previous year. (Tutorsonnet.com 2012).

4.3.2.1 El-Gharbia Governorate

Figure (4.49) is graphical presentation for the comparative financial statement for El-Gharbia Governorate. A closer inspection for this figure clearly indicates that there was shortage in assets and owner equity and there was increasing in liabilities at the first years period started 2002 and ended 2004. Another thing shown rather clearly is the great jump in current assets, fixed assets, owner equity and short term liabilities in 2005. Then, there was a whole decrease in short term liabilities at year 2007. This indicates that the financial year (2004 – 2005) was reforming point in the financial statement of this company. Also this figure shows that owner equity was increased clearly in 2007. Results mentioned before reflect that there was an improvement in financial statement in El-Gharbia A.C. after reform. That fixed assets increased after reform and they got ability to reduce their liabilities. Also after stabilization of financial statement of this A.C., owner equity increased again. This means that there was a good chance to increase improvement.

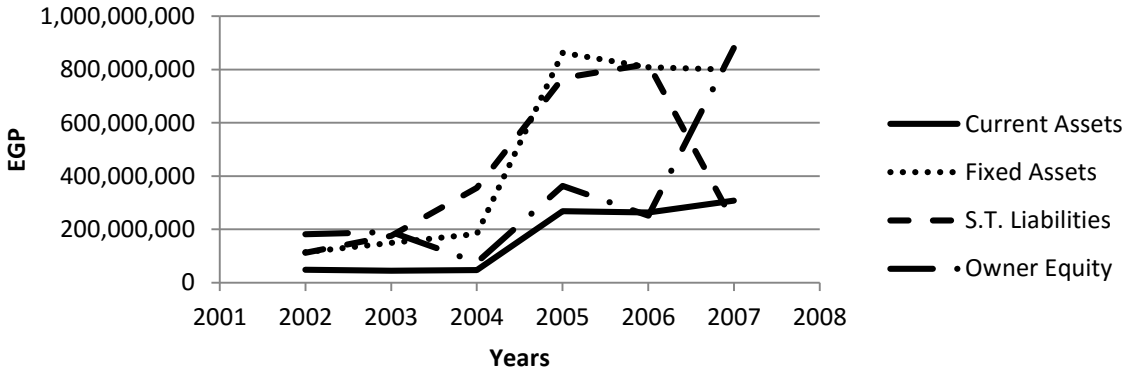

Figure (4.49) Comparative Financial Statement for El-Gharbia Governorate

4.3.2.2 El-Sharkiah Governorate

Figure (4.50) is graphical presentation for the comparative financial statement for El-Sharkia Governorate. A closer inspection for this figure clearly indicates that there was shortage in current assets, owner equity and liabilities at the first years period started 2002 and ended 2004 and there was a great increase in fixed assets at year

2004. Another thing shown rather clearly is there were some increase in current assets and fixed assets and a whole decrease in a short term liabilities at years 2005 – 2007. This indicates that this company suffered from some financial shortage after reform. Also this figure shows that owner equity was decreased clearly in 2006 and 2007. Results mentioned before reflect that there was an improvement in financial statement in El-Sharkia A.C. after reform. That fixed assets increased after reform and they got ability to reduce their liabilities. But the decreasing in owner equity in this A.C. would affect badly on financial statement in this A.C. This means that they need to improve their situation to improve their performance technically and financially.

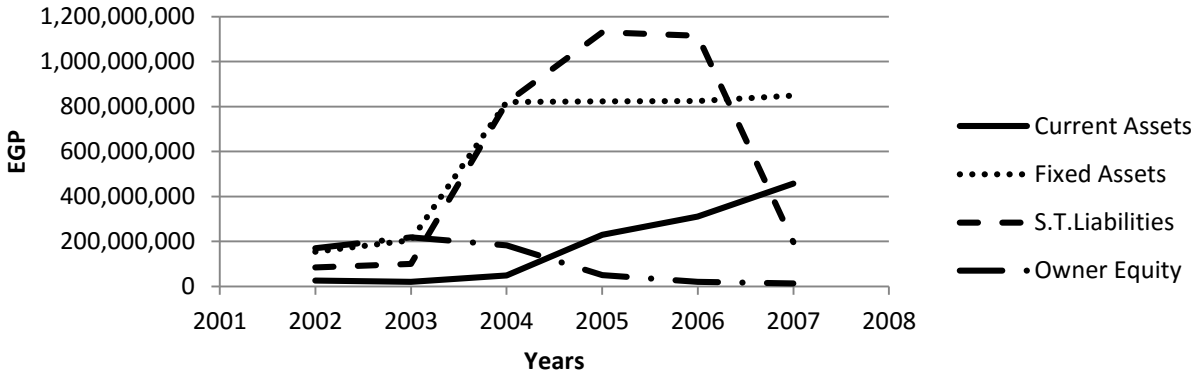

Figure (4.50) Comparative Financial Statement for El-Sharkia Governorate

4.3.2.3 El-Dakahlia Governorate

Figure (4.51) is graphical presentation for the comparative financial statement for El-Dakahlia Governorate. A closer inspection for this figure clearly indicates that there was shortage in current assets and owner equity and there was increasing in liabilities at the first years period started 2002 and ended 2004 while a great jump in fixed assets and short term liabilities occurred in year 2004. Another thing shown rather clearly is the great jump in owner equity in 2005. Then, a sharp decrease in short term liabilities at year 2005 and current assets slightly increase in years (2005 – 2007). This indicates that the financial year (2004 – 2005) was reforming point in the financial statement of this company. Also this figure shows that owner equity was increased clearly in 2007. Results mentioned before reflect that there was an

improvement in financial statement in El-Dakhlia A.C. after reform. That fixed assets increased after reform and they got ability to reduce their liabilities. Also owner equity increased again before reform and still increased after reform. This means that there was a good chance for improvement of financial performance.

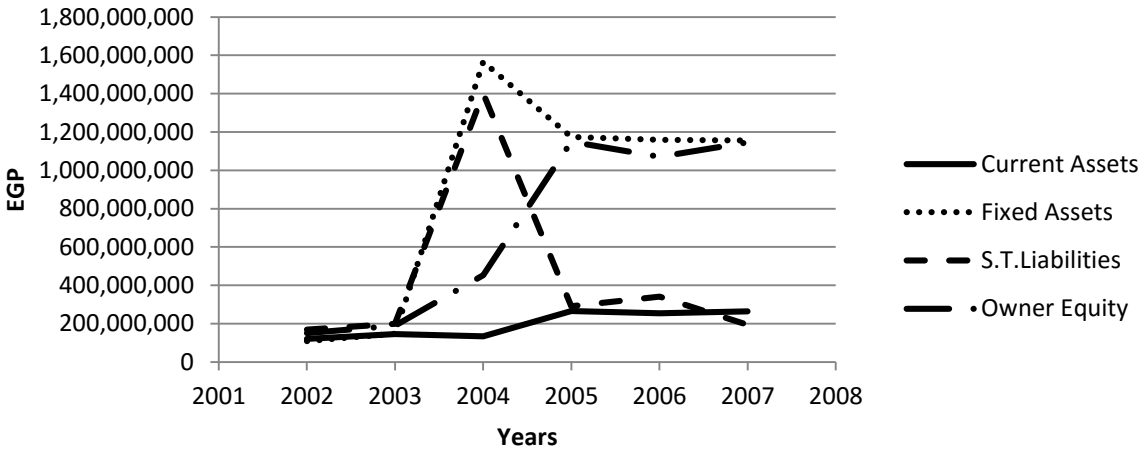

Figure (4.51) Comparative Financial Statement for El-Dakahlia Governorate

4.3.2.4 El-Fayoum Governorate

Figure (4.52) is graphical presentation for the comparative financial statement for El-Fayoum Governorate. A closer inspection for this figure clearly indicates that there was a large shortage in current assets compared with the short term liabilities at the first years period started 2002 and ended 2004. This may be considered a bad indicator regarding the available liquidity. A sharp decrease in owner equity occurs in year 2004. Another thing shown rather clearly is the great jump in owner equity in 2006. Then a large decrease in short term liabilities in years started 2005 and ended 2007 and some increase in current and fixed assets in years (2005 – 2007). This indicates that the available liquidity of this company was improved along the studied years. Also by studying these results it can be concluded that there was instability in financial situation in this A.C.

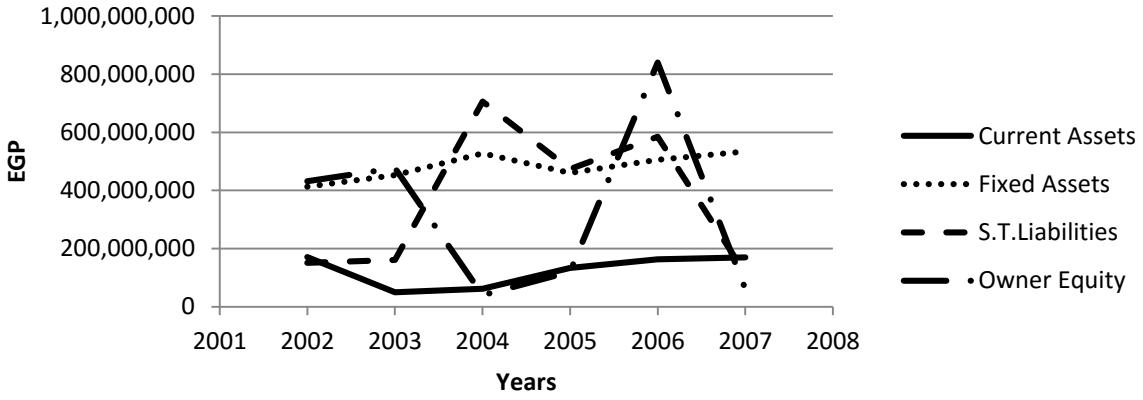

Figure (4.52) Comparative Financial Statement for El-Fayoum Governorate

4.3.2.5 Beni-Sweif Governorate

Figure (4.53) is graphical presentation for the comparative financial statement for Beni-Sweif Governorate. A closer inspection for this figure clearly indicates that there was shortage in current assets and owner equity and there was increasing in liabilities and fixed assets at the first years period started 2002 and ended 2004. Another thing shown rather clearly is the whole decrease in liabilities in 2006. Then, there was some increase in fixed assets at years (2005 – 2007). This indicates that the financial year (2004 – 2005) was reforming point in the financial statement of this company. Also this figure shows that owner equity was decreased clearly in 2005 and 2007. Results mentioned before reflects that there was an improvement in financial statement in Beni-Sweif A.C. after reform. That fixed assets increased after reform and they got ability to reduce their liabilities. But the decreasing in owner equity in this A.C. would affect badly on financial statement in this A.C. This means that they need to improve their situation to improve their performance technically and financially.

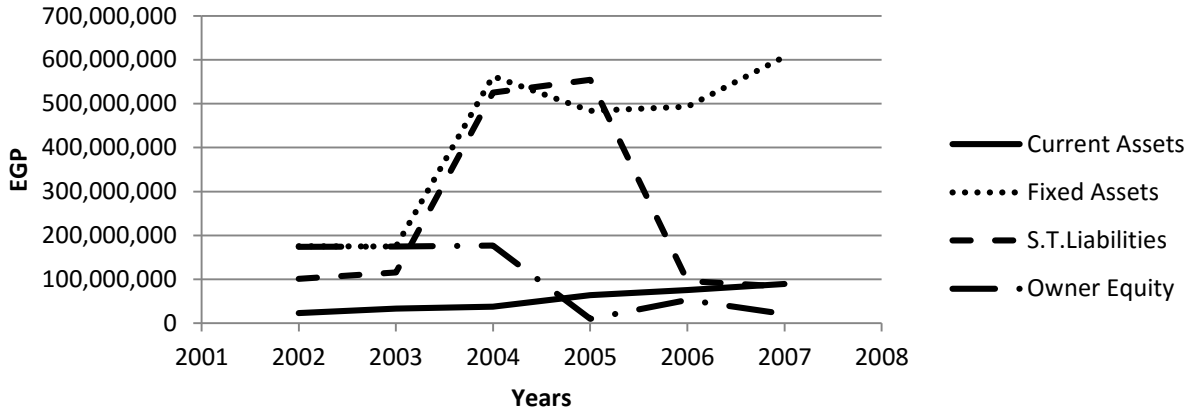

Figure (4.53) Comparative Financial Statement for Beni-Sweif Governorate

4.3.2.6 Aswan Governorate

Figure (4.54) is graphical presentation for the comparative financial statement for Aswan Governorate. A closer inspection for this figure clearly indicates that there was shortage in assets and owner equity and there was increasing in liabilities at the first years period started 2002 and ended 2003 while there was a great jump in fixed assets and short term liabilities at year 2004. Another thing shown rather clearly is the great jump in owner equity in 2006. Then, there was a whole decrease in short term liabilities at year 2006 and there was some increase in current assets at years (2005 – 2007). This indicates that the financial year (2004 – 2005) was reforming point in the financial statement of this company. Also this figure shows that owner equity was increased clearly in 2006. Results mentioned before reflect that there was an improvement in financial statement in Aswan A.C. after reform. That fixed assets had slight decrease in 2005 and remains constant till 2007. Also Aswan A.C. got ability to reduce their liabilities. Also owner equity increased again before reform and still increased after reform. This means that there was a good chance to increase improvement.

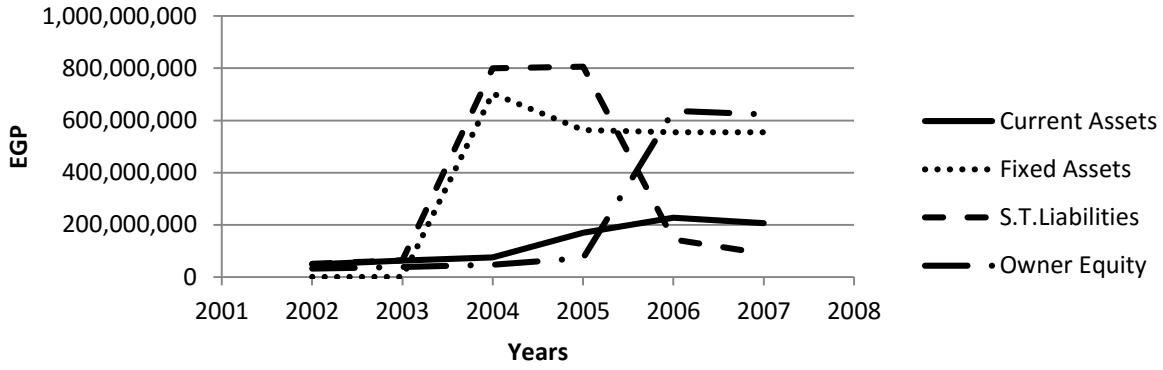

Figure (4.54) Comparative Financial Statement for Aswan Governorate

There is another finding by studying table (4.4) which represents the available data about the operating costs for water supply services in 2007 (IWSP study report – 2007). This table shows that the current situation clearly reveals that personnel costs represent the major cost item whereas the available budget / expenditures for regular repair and maintenance works is rather limited in A.C.'s. This leads to the logical conclusion that adequate preventive and corrective repair and maintenance measures are not performed in compliance with standards and apparent needs. However, increasing energy tariffs constitute an ever greater burden on the financial flexibility and viability of the companies. In general it can be stated that additional future revenues are needed to allow appropriate repair and maintenance measures and to compensate the steadily increasing expenditures for energy. On the other hand, the current staff ratios do not yet match the envisaged targets in all Governorates and so there may be possibilities for future overall savings on personnel budgets. However, strengthening the technical and operational capabilities of the companies will in future require a more specialized and qualified work force which will be reflected in higher salaries for better trained administrative and technical staff.

Table (4.4) (Available operating costs for water supply services in 2007) (IWSP study report 2007)

No.	Description	Unit/year	Sharkia A.C.	Gharbia A.C.
1	Personnel Costs	L.E.	5.011	6.773
2	Energy Costs	L.E.	2.311	1.693
3	Chemical Costs	L.E.	0.216	
4	Repair and Maintenance Costs	L.E.	0.685	
5	Depreciation	L.E.	3.195	4.520
6	Other Costs	L.E.		0.653
	Total Operating Costs	L.E.	11.418	13.639

4.3.3 Ratio Analysis

Ratio analysis is the relation between two balance sheets items.

4.3.3.1 Importance of Ratio Analysis:

- Comparing the ratios of the same company through a number of days.
- Comparing this ratio with the same standard value.

4.3.3.2 Analysis on companies

4.3.3.2.1 El-Gharbia Gohevernorate

Figure (4.55) is graphical presentation for ratio analysis for El-Gharbia Governorate. A closer inspection for this figure clearly indicates that the liquidity ratio was about 0.43 in 2002 and it was changed ups and downs until it reached to 1.36 in 2007 which is below the average study (2.00). This means that in 2002 there was an amount of 0.43 L.E. of liquid assets for each 1.00 L.E. of liability and in 2007 there was an amount of 1.36 L.E. of liquid assets for each 1.00 L.E. Also these results indicate that there was an obvious improvement in liquidity after reform.

Also by studying Figure (4.55), it will be found that the leverage ratio in 2002 was 0.70 and also changed ups and downs until it reached to 0.81 in 2007, which is higher than the maximum limit (0.5 – 0.6). Also it will be found that in 2004 it was the highest value of this ratio which is 1.56. All these results indicate that Al-Gharbiah A.C. depends on liabilities to build their assets, and it is very clear in 2004. But after reform they try to find another solution to build assets.

After analyzing results of liquidity and leverage ratios showed from figure mentioned before, there were some findings. The first one is, that before reform there was a big shortage in financial system in El-Gharbiah A.C. and it was clear through values of liquidity and leverage ratios from years of study (2002 to 2004). The second one is, there was an obvious improvement in the financial stability after reform, and also it is clear showed by increasing liquidity ratio and decreasing leverage ratio. But while there was an improvement, El-Gharbiah A.C. still needs more improvement to reach the acceptable limit of liquidity ratio.

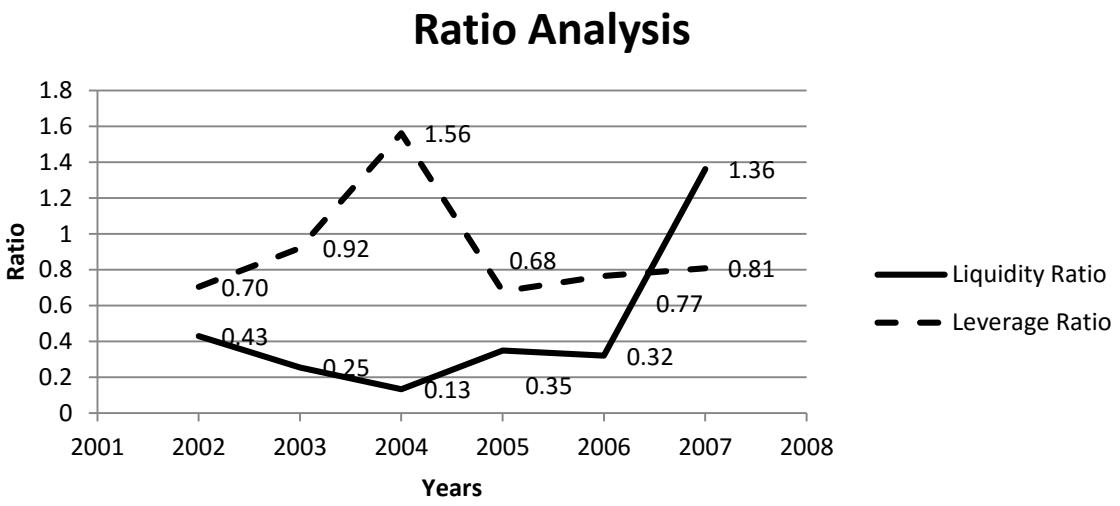

Figure (4.55) Ratio Analysis for El-Gharbia governorate

4.3.3.2.2 El-Sharkia Governorate

Figure (4.56) is graphical presentation for ratio analysis for El-Sharkia Governorate. A closer inspection for this figure clearly indicates that the liquidity ratio was about 0.32 in 2002 and it was changed ups and downs until it reached to 2.32 in 2007 which is below the average study (2.00), but with a very small variance. This means that in 2002 there was an amount of 0.32 L.E. of liquid assets for each 1.00 L.E. of liability and in 2007 there was an amount of 2.32 L.E. of liquid assets for each 1.00 L.E. Also it can be clearly showed that in 2004 this ratio had the lowest value comparing by years of study. Also these results indicate that there was a clear improvement in current assets after reform.

Also by studying Figure (4.56), it will be found that the leverage ratio in 2002 was 0.43 and also changed ups and downs until it reached to 0.91 in 2007, which is higher than the maximum limit (0.5 – 0.6). Also it will be found that in 2005 it was the highest value of this ratio which is 1.07. All these results indicate that El-Sharkia A.C. support building their assets by liabilities, and it is very clear in 2005. But after reform they try to find another solution to build assets.

After analyzing results of liquidity and leverage ratios showed from figure mentioned before, there were some findings. The first one is, that before reform there was a big shortage in financial system in El-Sharkia A.C. and it was clear through values of liquidity and leverage ratios from years of study (2002 to 2004). The second

one is, there was an obvious improvement in the financial system after reform, and also it is clear showed by increasing liquidity ratio and decreasing leverage ratio. But while there was an improvement, El-Sharkia A.C. needs more improvement to reach the study average.

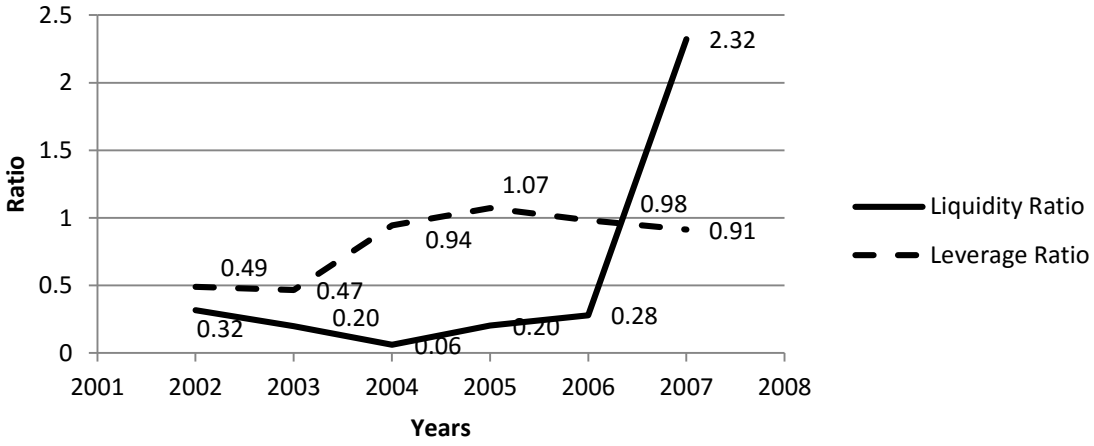

Figure (4.56) Ratio Analysis for El-Sharkia governorate

4.3.3.2.3 El-Dakahlia Governorate

Figure (4.57) is graphical presentation for ratio analysis for El-Dakahlia Governorate. A closer inspection for this figure clearly indicates that the liquidity ratio was about 0.72 in 2002 and it was changed ups and downs until it reached to 1.35 in 2007 which is below the study average (2.00). This means that in 2002 there was an amount of 0.72 L.E. of liquid assets for each 1.00 L.E. of liability and in 2007 there was an amount of 1.35 L.E. of liquid assets for each 1.00 L.E. Also it can be clearly showed that in 2004 this ratio had the lowest value comparing by years of study. Also these results indicate that a clear improvement occurred in the available liquidity after reform.

Also by studying Figure (4.57), it will be found that the leverage ratio in 2002 was 0.76 and also changed ups and downs until it reached to 0.14 in 2007, which is much smaller than the maximum value of the safety limit (0.5 – 0.6). Also it will be found that in 2004 it was the highest value of this ratio which is 0.83. The gradual decreasing

in leverage ratio after reform provides a good indicator regarding the improvement in the financial stability of this firm after reform.

After analyzing results of liquidity and leverage ratios showed from figure mentioned before, there were some findings. The first one is, that before reform there was a very big shortage in the financial stability in El-Dakahlia A.C. and it was clear through values of liquidity and leverage ratios from years of study (2002 to 2004). The second one is, there was an obvious improvement in the liquidity and financial stability after reform. This is also clear by the obvious increasing liquidity ratio and decreasing leverage ratio. But while there was an improvement, El-Dakahlia A.C. still needs more improvement to reach the average standard of liquidity ratio.

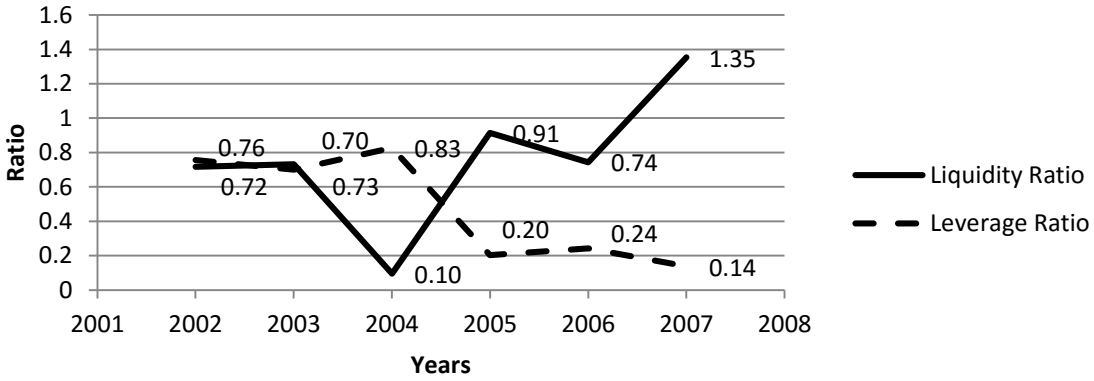

Figure (4.57) Ratio Analysis for El-Dakahlia governorate

4.3.3.2.4 El-Fayoum Governorate

Figure (4.58) is graphical presentation for ratio analysis for El-Fayoum Governorate. A closer inspection for this figure clearly indicates that the liquidity ratio was about 1.13 in 2002 and it started decrease until it reached 0.09 in 2004. After that it started increase until it reached 1.49 in 2007 which is below the average study (2.00). This means that in 2002 there was an amount of 1.13 L.E. of liquid assets for each 1.00 L.E. of liability and in 2007 there was an amount of 1.49 L.E. of liquid assets for each 1.00 L.E. Also these results indicate that there was an obvious improvement in liquidity after reform.

Again a careful inspection to Figure (4.58), it will be found that the leverage ratio in 2002 was 0.26 and also changed ups and downs until it reached to 0.16 in 2007, which is lower than the allowable maximum limit (0.5 – 0.6). Also it will be found

that in 2004 it was the highest value of this ratio which is 1.20. The gradual decreasing in leverage ratio after reform provides a good indicator regarding the improvement in the financial stability of this firm after reform.

After analyzing the results of liquidity and leverage ratios showed from figure mentioned before, there were some important findings. The first one is, that before reform there was a big shortage in financial resources in El-Fayoum A.C. and it was clear through values of liquidity and leverage ratios from years of study (2002 to 2004). The second one is that, there was an obvious improvement in liquidity and the financial stability after reform. This is also clear by obvious increasing liquidity ratio and decreasing leverage ratio. But while there was an improvement, El-Fayoum A.C. still needs more improvement to reach the acceptable limit of the liquidity ratio.

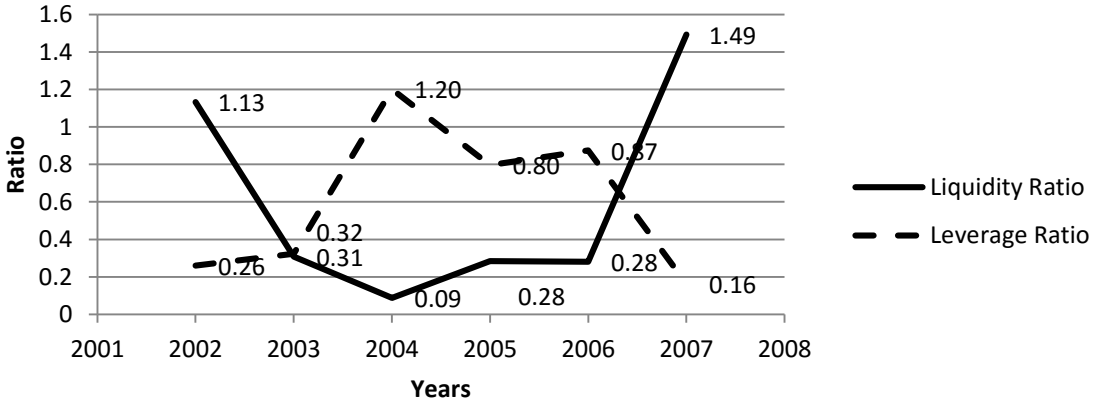

Figure (4.58) Ratio Analysis for El-Fayoum governorate

4.3.3.2.5 Beni-Swief Governorate

Figure (4.59) is graphical presentation for ratio analysis for Beni-Sweif Governorate. A closer inspection for this figure clearly indicates that the liquidity ratio was about 0.22 in 2002 and it started decrease that it reached 0.07 in 2004. After that it started increase until it reached 1.07 in 2007 which is below the average study (2.00). This means that in 2002 there was an amount of 0.22 L.E. of liquid assets for each 1.00 L.E. of liability and in 2007 there was an amount of 1.07 L.E. of liquid assets for each 1.00 L.E. Also these results indicate that there was an obvious improvement in current assets after reform.

Also by studying Figure (4.59), it will be found that the leverage ratio in 2002 was 0.52 and it was started to increase until it reached to 1.09 in 2006, after that it began to decrease in 2007 that it was 1.07 which is higher than the maximum limit (0.5 – 0.6). All these results indicate that Beni-Sweif A.C. depends on liabilities to build their assets.

After analyzing results of liquidity and leverage ratios showed from figure mentioned before, there were some findings. The first one is, that before reform there was a big shortage in financial system in Beni-Sweif A.C. and it was clear through values of liquidity and leverage ratios from years of study (2002 to 2004). The second one is, there was an obvious improvement in the financial system after reform, and also it is clear showed by increasing liquidity ratio. But while there was an improvement, Beni-Sweif A.C. needs more improvement to reach the study average.

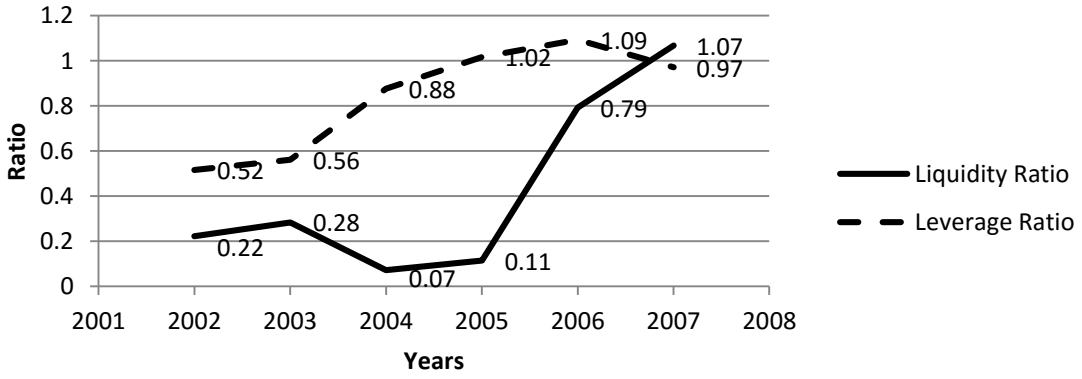

Figure (4.59) Ratio Analysis for Beni-Swief governorate

4.3.3.2.6 Aswan Governorate

Figure (4.60) is graphical presentation for ratio analysis for Aswan Governorate. A closer inspection for this figure clearly indicates that the liquidity ratio was about 0.95 in 2002 and it started decrease that it reached 0.09 in 2004. After that it started increase until it reached 2.27 in 2007 which is below the average study (2.00) but it almost near. This means that in 2002 there was an amount of 0.09 L.E. of liquid assets for each 1.00 L.E. of liability and in 2007 there was an amount of 2.27 L.E. of liquid assets for each 1.00 L.E. Also these results indicate that there was an obvious improvement in current assets after reform.

Also by studying Figure (4.60), it will be found that the leverage ratio in 2002 was 1.05 and also changed ups and downs until it reached to 0.12 in 2007, which is lower than the maximum limit (0.5 – 0.6). Also it will be found that in 2005 it was the highest value of this ratio which is 1.10. All these results indicate that Aswan A.C. depends on liabilities to build their assets, and it is very clear in 2005. But after reform they try to find another solution to build assets.

After analyzing results of liquidity and leverage ratios showed from figure mentioned before, there were some findings. The first one is, that before reform there was a big shortage in financial system in Aswan A.C. and it was clear through values of liquidity and leverage ratios from years of study (2002 to 2004). The second one is, there was an obvious improvement in the financial system after reform, and also it is clear showed by increasing liquidity ratio and decreasing leverage ratio. But while there was an improvement, Aswan A.C. needs more improvement to reach the study average.

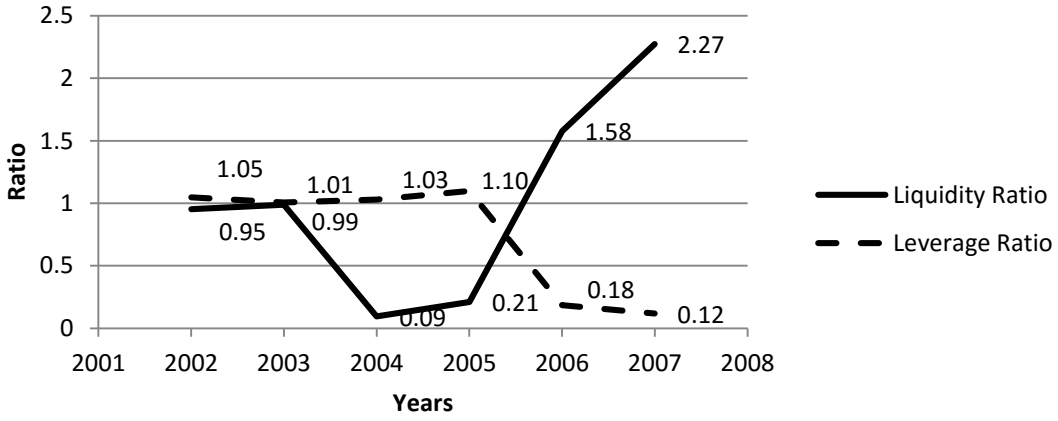

Figure (4.60) Ratio Analysis for Aswan governorate

At the end of analysis of financial indicator, it can be said that:

- All companies apply the Egyptian public sector unified accounting system, which is highly different from the accounting practices for private sector companies in Egypt as well as from International Accounting Standards (IAS). Therefore, the financial statements under the public standards were converted into International Accounting Standard (IAS) formats and spread sheets.
- All balance sheet items, including fixed assets, are estimated at the book value, i.e. value of assets at time of purchase or occurrence. A breakdown of total fixed assets into water and wastewater related assets, respectively, was not always possible due to the lack of adequate cost accounting systems at the companies' level. Sometimes, break down of assets in net values was also not possible as only gross values could be obtained.
- There was a very big shortage in financial resources in all governorates. This is clearly showed in the first years of study started from 2002 and ended in 2004. That there was a significant decrease in liquidity ratio and also significant increase leverage ratio. This means that the current assets were very low and total liabilities were very high at the first years of study.
- Water and wastewater revenues reported in income statements represent the value of invoices, irrespective of the amount of cash collected.
- Operating cost refer to all activities of the companies as a break down (core activities / other activities) is not possible due to insufficient cost accounting practices.
- Water and wastewater tariffs are highly subsidized, the water tariffs will be increased and companies will be able to cover higher portions of their operating expenses if they operate efficiently.
- There was an obvious improvement occurred in all governorates after reform. This improvement clearly showed that current assets started to

increase from 2005 and short term liabilities started to decrease from 2006. This means that there was an improvement in liquidity and leverage ratios and financial stability of the firms.

While there was a significant improvement, as mentioned before, but this improvement differ from governorate to another. That the financial situation of Lower Egypt governorates better than of Upper Egypt governorates. This clearly showed that there was instability of the financial system in Upper Egypt governorate. Also from 2006 it was clearly indicate that the financial system in Lower Egypt governorates started stabilization.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5. 1 Summary

An investigation was carried out to study the effect of re-organization of the Egyptian economical organizations for water and wastewater on the performance, in order to show the improvement or the deterioration of the sector. The research consisted of two phases, phase one was to collect the required data to perform a comparison on the technical and financial performance indicators of the affiliated companies. Phase two was to analyze the collected data and show the improvement or the deterioration of the AC's. The literature of this study showed the different factors used to measure the performance and also some case studies on sector reform. The factors studied in this research were: a) Produced water capacity (PWC) b) Produced water consumption (PWCons.) c) Consumed water capacity (CWC) d) Non revenue water (NRW) e) Percentage of household with access to water (%HAW) f) Treated wastewater capacity (TWWC) g) Comparative financial statement h) Liquidity ratio i) Leverage ratio. All factors were analyzed for each governorate showing the difference between before and after the re-organization.

5. 2 Conclusion

Financial and technical data have been collected to have an in-depth view on the performance of the ACs before and after the reform. The A.C.'s that has been studied were (Sharkia, Gharbia, Dakahlia, Aswan, Fayom, and Beni Swief). Based on the results of the analysis, the following conclusions can be made:

- A slight increase in water production after reform. This is due to the increase in the concern for the sector. This concern is supported by increasing the fund
- The increase in the water production was occupied with an increase in the water consumption. The increase in water consumption was due to the continues increase in population. Having those two factors increased at the same time result in the stabilization of the production/consumption curve.

- One of the most important factors in the ACs performance is the non-revenue water NRW. This indicator was not improved after the reform. This could be due to the inaccurate figures before the reform which might gave false overview.
- The number of house connections increased as it's directly proportional to the increase in the water production.
- On the wastewater treatment side also an increase is witnessed due to the increase in the water production.
- It can be saying that government gave more attention to Lower Egypt Governorates rather than Upper Egypt Governorates. This attention refer that implementation bodies put public impression as an important factor in investment direction. For this reason, governorates that have high population density took investments larger than those that have low population density.
- This interest clearly showed when comparing results of Al-Dakahliah Governorate with Aswan Governorate as follows:

Governorate	Population in 2006	Technical Results in 2007	
		NRW	% of treated wastewater to consumed water
Al-Dakahliah	4,990,000	27.04%	80%
Aswan	1,190,000	31.35%	50.4%

- One of misdeeds of this management system that it does not show the effect of investment on performance improvement. While if investments directed to governorates that have low population density, the effect of this investment will appear faster and with lowest investment volume.
- The ACs financial situation was deteriorated before the reform. This situation was slightly improved after the reform but more time is needed in order to witness a significant improvement.
- The technical and financial performance indicators showed an obvious improvement after the re-organization. Despite this improvement the AC's didn't reach the required level of improvement which insures the user's satisfaction and the AC's financial and technical sustainability.

5. 3 Recommendation

Based on the results obtained from analysis, the following recommendations have to be raised:

- Decreasing NRW is a very important factor that will impact the performance rapidly. Therefore, a NRW plan should be adopted by A.C.'s.
- Increase public awareness toward water saving.
- Further studies should be made to study the sector complexity.
- Increase A.C.'s staff productivity through building capacity programs to take into consideration low population areas.
- Regular monitoring for the A.C.'s on the basis of technical and financial indicators.
- Restructure tariff rate in order to cover cost of operation and maintenance.
- Decrease dependence on liabilities.
- Involve public in group discussions in order to know public impressions before taking political decisions.
- Involve universities' research centers to represent their plans for sector developing and putting their solutions for the current problems.