EFFECT OF DONOR SUPPORT BY WATER SERVICES TRUST FUND ON THE PERFORMANCE OF WATER SERVICE PROVIDERS IN KENYA

BY

JOSEPHAT O. ATUNGA

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTERS OF SCIENCE IN COMMERCE (FINANCE AND ACCOUNTING) IN THE SCHOOL OF BUSINESS AND PUBLIC MANAGEMENT AT KCA UNIVERSITY

November 2015

DECLARATION

I declare that this dissertation is my original work and has not been previously published or submitted elsewhere for award of a degree. I also declare that this contains no material written or published by other people except where due reference is made and author duly acknowledged.

Student Name**: Josephat Omenge Atunga** Reg, No**. 11/02216**

Sign: _____ Date: _____

I do hereby confirm that I have examined the master's dissertation of

Josephat Omenge Atunga

And have certified that all revisions that the dissertation panel and examiners recommended have been adequately addressed.

Sign: _____ Date: _____

Dr. Christine Nanjala

Dissertation Supervisor

ABSTRACT

EFFECT OF DONOR SUPPORT BY WATER SERVICES TRUST FUND ON THE PERFORMANCE OF WATER SERVICE PROVIDERS IN KENYA

WSTF has been a fundamental part of water sector in Kenya. Much of its work aims at extending water services to those who do not have clean and safe water (Pro-poor). This is done through provision of grants, strengthen Water Services Providers through training, and technical advice through Public-Private Partnerships. It is in this context that WSTF sources funds from government and other development partners to achieve its mission. The support usually has strengthened the WSPs but the extent of the effect to the organizations has not been investigated. The objective of the study is to analyze the effect of donor support by WSTF on performance of Water Services Providers in Kenya. Specifically the study investigated the effect of Grants, Capacity Building and Public-Private Partnership on performance. Data pertaining support to Water Services Providers was obtained from WSTF's Water and Sewerage Investment Department. Performance data was obtained from Impact Reports published by WASREB from the year 2009/2010 to 2012/2013. For the purpose of this study a cross-sectional descriptive study was adopted and panel data analysis was used. Grants had a positive effect on metering ratio and turnover while non on staff performance and cost recovery. Capacity Building sessions had a positive effect on staff productivity and a negative effect on metering ratio and turnover, it further had no effect on cost recovery. Public-Private Partnership had no effect on any performance variable.

Keywords: Grants, Capacity Building, Pubic Private Partnership, Cost Recovery, Metering Ratio, Turnover, Staff productivity, WSTF, WSP.

ACKNOWLEDGEMENT

I would like to first and foremost thank Dr. Christine Nanjala my supervisor for her guidance and very instructive support. Special thanks goes to Carden for her constant reminder that I need to remain focused though she also needed the same. I am grateful to Mr. Cosmas Kemboi for his insight in gathering information and access to a whole world of resource material.

TABLE OF CONTENT

DEDICATION

Special thanks go to my family and their constant support and encouragement – I don't know what I would do without them.

LIST OF TABLES

LIST OF FIGURES

ABBREVIATION AND ACRONYMS

CBS	Capacity Building Sessions
CPC	Community Project Cycle
DAC	Development Assistance Committee
MLS	Minimum Level of Service
MR	Metering Ratio
OECD	Organization for Economic Cooperation and Development
PPPs	Public Private Partnerships
SP1C	Cost Recovery
TR	Turnover
UFW	Unaccounted For Water
UNDP	United Nations Development Programs
UPC	Urban Project Concept
WAREB	Water Regulation Board
WARIS	Water Resource Information System
WASPA	Water Service Providers Association
WB	World Bank
WDC	Water Resources Users Associations Development Cycle
WSB	Water Service Board
WSP	Water Service Provider
WSS	Water Supply and Sanitation
WSTF	Water Service Trust Fund

CHAPTER ONE

Introduction

1.1 Back ground of the Study

Improved access to water supply and appropriate sanitation is a central pillar of the millennium development goals which will result in the reduction of poverty and improved living standards in the works. The provision of clean, accessible and affordable water is one of the millennium development goals targeted at the over 1.2 billion people living in the world who lack access to clean and safe drinking water (Estache & Kouassi, 2002). Despite the concerted efforts to improve access to clean, safe and affordable water to both the urban poor and rural poor, accessibility of clean and safe water continues to be a major challenge in developing countries (UNDP, 2007).

Sub-Saharan Africa remains a great concern in the realization of the millennium development goals of improving access to water with only 61% of the population having access to improved water supply sources. However, over the period 1990-2004 there was an increase of 23% in relation to improved access to water in Sub-Saharan Africa (Bayliss, 2005). Despite the increase in access to water in Sub-Saharan Africa water access has been faced with a number of challenges that are related to water utilities inefficiencies. Such outcome of inefficiency include insufficient revenue, high water loses, dilapidated and poor infrastructure, lack of investments, low billing and revenue collection efficiency, chronic water shortages and failure to meet the existing demand, low coverage, especially for the urban poor, and corruption, among others (World Bank 2010).

For a long time, government undertook diverse measures aimed at improving the accessibility of water services through structural adjustment programmes (SAPs) by attempting to make water provision utilities and agents efficient. However the measures taken focused on reducing government expenditure through reforms rather than addressing service coverage gaps thereby escalating the problem. Following the failure of structural adjustment programmes efforts were made by the donor community, particularly the World Bank in conjunction with the various government to address the existing water service gaps in developing worlds (World Bank, 2004). These efforts according to World Bank were focused on different geographical regions and differed greatly in terms of size, organizational culture and operating environments. The consequence of these efforts was the carrying out of water sector reforms in many countries leading to the establishment of private water service providers. Despite the championing of WSPs by international financial institutions a review of the performance of private WSPs in different regions of the word indicate a mixed performance. In Latin America, Clarke, Kosec, and Wallsten (2009) found poor performance of some WSPs and good performance of some other WSPs. On the other hand, Galiani, Gertler, and Schargrodsky (2005) found improved performance among WSPs in Argentina.

In the 1990s, many African governments, Kenya included, sought to implement reforms in the water sector with a focus on policy, regulatory and institutional reforms. This was carried out with support from international financial institutions such as the World Bank and International Monetary Fund (IMF).The reforms focused on addressing the deteriorated infrastructure, population growth, poorly run utilities, consumer protection and access to efficient, adequate, affordable and sustainable services, whilst ensuring the financial sustainability of service providers (Hukka & Katko, 2004). Though reform were carried out in

the water sector a number of African countries are faced with inefficiencies in their water service providers resulting to poor access to water services. These inefficiencies result to revenues losses thereby making the existing water service providers insufficient to cover operating costs let alone expand service coverage (Marin, 2009).

The existing water utilities in Africa have been bedeviled with a number of performance challenges that include: managerial, operational, leadership and financial challenges. As result of these challenges most water service providers are currently struggling to cover even their operating costs. In all regions of Africa less than half of the existing water service providers are not considered to performing well financially and thus less viable financially. Hence it has become apparent that the real potential lies in improving the performance of existing water service providers to cater for the increasing demand in both rural and urban areas (Kayanga, 2008).

The history of water reforms in Kenya stated in the early 1990's when the international financial institutions begun championing water sector reforms in Africa. However, the success of these reforms had minimal positive impact for they were majorly targeting existing water utilities and not focused on water system reforms. Water sector reform in Kenya again took place in 2002 with the reforms targeted at policies, regulation and service provision weaknesses experienced in the earliest reforms carried out in the 1990's (Owour & Foeken, 2009). These reforms were informed by the gaps in water service ineffectiveness and inefficiencies and thereby focused on separating policy function, regulation function and water and sewerage service functions (Daniel K. Sambua & Aondover Tarhule, 2013). Among the water sector reforms key priority was given to the water service provision which was known to experience

performance challenges associated with poor management of water which led to financial difficulties, the inability of water utilities to attract and retain skilled manpower, high levels of unaccounted-for-water and low revenue collection, including corruption, among others (Nyangena ,2008).

The Water Act 2002 separated water resources management from water and sewerage services and established autonomous regulatory bodies in the sector. The Water Services Regulatory Board, (WASREB) whose mandate entails regulation of water service provision and to implement policies in regards water service policies. As a result of the water act 2002 the water service trust fund (WSTF) whose mandate is to finance the supply of water and sanitation services to areas inadequately served. The water sector reforms led to the establishment of water Services Boards (WSBs) whose mandate covered the development and ownership of water infrastructure in their respective areas of jurisdiction. Water sector providers were also established under the water service boards with a mandate to provide water services. The water service providers sign an agreement with the Water service boards through Service Provision Agreements (SPAs) which indicate the performance targets to be achieved within a given period. The performance targets expected of the water service providers lend the question what impact has water sector reforms and donor support has on the performance of the WSOs (DANIDA, 2010).

1.2 Concept of performance of Water Utilities

Performance is a measure of the results achieved. Performance efficiency is the ratio between effort expended and results achieved with this efficiency calculated by the difference between current performance and the theoretical performance limit. Performance efficiency is manifested

in two ways namely: performance improvement through performance platform and performance improvement modification of the performance platform (Curtis, 1999).

1.2.1 Performance Efficiency

One of the major goals of the water reforms is to improve both operational and performance efficiency. There are many factors that determine the level of performance efficiencies of water service providers. However, the practice to determine the performance efficiency of water service providers is modeled along three main indicators: water losses, bill collection, and labor productivity (Philippe Marin, 2009).

Water losses are a key cost element in most water utilities in developing countries and this has made the control of water losses among water service providers a key strategy. Apart from water loses the bill collection has been a major issue in developing country with leaks in bill collection still been experiences. This has been caused by poor revenue collection systems and corruption among other factors. Poor bill collection by many poor water service providers has affected their cash streams resulting to most of the water service utilities not been able to fulfill their mandates effectively. Labor productivity is also a criterion that is utilized in performance analysis of water utilities with labor treated as a fixed costs.

1.3 Performance Measurement of Water Utilities

According to Dixon *et al* (1990), appropriate performance measures are those which enable organizations to direct their actions towards achieving their strategic objectives. He also contends that performance measures can either be subjective or objective to any organization. Andrea and Campedelli, (2011) found out that, objective performance measures include

indicators such as profit growth, revenue growth, return on capital employed. They further argue that various public sector utilities have different performance measures for which performance measures of water utilities includes the following:

The quality of pipe networks, measured by unaccounted-for water and amount of waste to the pipe network; The quality of administrative processes, measured by commercial losses and customers credit solvency; The coverage of the network; Staff productivity, measured by staff per 1000 connections; and Economic sustainability, measured through known financial analysis. Mwanza (2006) on the same note also states that performance measurement of WSP is guided by the following Performance indicators: water resources indicators, personnel indicators, physical indicators, and operational indicators, quality of service and financial indicators.

1.4 Problem Statement

In view of Water Act 2002 the water service trust fund was also established as a state corporation to assist in financing water and sanitation services to the poor and marginalized in the country. Water service trust fund whose mandate entails financing water services and providing capacity building support has been able to provide support to at least 109 water service providers in county, and this lends the question what has been the effect of WSTF support to water service providers in Kenya? (WSTF, 2008). WSTF has for the last five years extended support to WSPs through grants, capacity building and partnered with the private sector. However, despite the support given to the water service providers by the WSTF and other donor the performance of water service providers has not been good with urban and rural WSPs performing at 52% and 45% of their capacity respectively (Githinji, 2012). This is against the background of the

minimum level of service(MLS) that WSPs sign with WSB, with these agreement covering water coverage, revenue collection efficiency, UFW and hours of water supply (onsomu *et al* ,2013).

Various studies have been conducted on the performance of water service providers in Kenya and these include (K'akumu and Appida, 2006; Sambu, 2011, Onsumu *et al*, 2013 and Githinji, 2012, Gathairu 2012) with their areas of focus being on performance, financial viability and revenue efficiency. However, from these studies, it is evident that no study has been conducted to determine the effect of these efforts by the donors particularly WSTF on performance. Focus would be made on linking donor support to performance of WSPs. It is also important to note WASREB as a government regulatory agent, extensively monitor performance of the WSPs and information made available to the public.

1.5 Research Objectives

Research objectives are examined in general and specific.

1.5.1 General objective

The general objective of the study will be to analyze the effects of donor support by WSTF on performance of water service providers in Kenya.

1.5.2 Specific objectives

1. To investigate the effect of grants provided by WSTF on performance of WSPs in Kenya.
2. To establish the effect of capacity building by WSTF on performance of WSPs in Kenya.
3. To examine the effect of Public-Private Partnerships as contrived by WSTF on the performance of WSPs in Kenya.

Research Questions

(a) What is the effect of grants to WSPs by WSTF on their performance?

(b) Does capacity building provided by WSTF to Water Services Providers have any significant effect on their performance?

(c) Do WSTF partnerships with private entities have any significant effect on performance of Water Service Providers in Kenya?

1.6 Significance of the Study

1.6.1 Contribution to knowledge base

Whilst acknowledging that donor aid and official development assistance has contributed to the improvement to increased access water and sanitation services, over the past years focus has been shifted on donor aid impact. This study will contribute to the knowledge base on performance studies by provide knowledge on the potential impact of donor community support on the performances of WSPs.

1.6.2 Contribution to Water Sector Stakeholders

In evaluating the benefits and costs of water sector projects, one key policy question is whether donor aid has led to improvement in delivery of water services. This study will help to document the impact of donor aid on the following key areas of utility employment, managerial expenses and sales revenue and through providing empirical data. The recommendations and lessons learned from the study will be useful to WASREB and WSTF thus helping in development of guidelines and policies that will guide the use of donor aid or development assistance, and thereby improving the effectiveness of such assistance among water service

providers in Kenya. The study through the findings will provide data that will be useful to WSB and WSP for strategic, operational, administrative and commercial purposes. This will be crucial to improving the performance of water service providers in Kenya.

The study will also be of benefit to the WSB and donor community on understanding the high impact areas where any future donor support can be channeled to improve financial performance.

1.6.3 Contribution to Theory and Practice

In order to improve the efficiency and quality of water services, service providers, regulators and decision makers should introduce appropriate management tools for measurement and monitoring of the performance of their water utilities. The managers of water utility should understand the importance of data collection, verification, storage, and processing to the success of the utility. This necessitates the need for more empirical studies to be carried out particularly in developing countries. This study will provide such data thus enhancing water service delivery in developing countries, Kenya included.

1.7 Scope of the Study

The geographical scope of the study will be Nationwide with all the WSPs in Kenya targeted. *(See table 1)* (WASREB, 2015).The study will consider the relationship between donor support and the performance of public sector organizations, and the impact of loans, grants, capacity building support and partnership with WSTF have on the performance of the WSPs. The study will also focus on the formal service provider and not informal service provider. There are eight performance indicators however for the purpose of the study the study will be limited to the following indicators: staff to 1000 customers' ratio, metering, revenue collection and, operation and maintenance costs. The structure of management is largely the same across the WSPs and

therefore secondary data would be sourced from impact reports by WASREB and WSTF internal reports. The study is estimated to take a period of one month and would mainly consider information related to four years that is (2010- 2013). The period of four years has chosen because it is long enough for the researcher to establish the effect of donor support on the performance of WSPs.

1.8 Assumptions of the Study

It is assumed that the data extracted from the published impact reports of WASREB for purposes of this study is accurate and reliable.

CHAPTER TWO

Introduction

This chapter seeks to establish various empirical and literature reviews of what has been researched earlier on the effects of donor support on the performance of water service providers in Kenya. This chapter evaluates theories that mainly revolve around the research questions posed earlier on in chapter one. This chapter further seeks to discuss related studies to this study in order to strengthen the assumptions and identify research/knowledge gap made earlier on

2.1 Theoretical Review

This involved a collection of interrelated theories existing with a view to explain performance of water services providers. This theoretical framework was given by different scholars aiming at determining how donor funding can be utilized to affect performance.

2.1.1 Stakeholder theory of firm performance

According to Ed Freeman (1984), 'stakeholder' refers to those groups without whose support an organization would not exist, and the management need to be responsive to for without these "stakeholders" companies would not operate. The survival of a business depends upon the level to which an organization pays attention to the "stakeholders". The theory posits that all stakeholders are "customers" and they play a part in determining if the organization is giving them great utilities than they would have got somewhere. In the context of this study stakeholders would represent customers, donors, investors, county government and national governments (Etzioni, 1998). Stakeholder theory also focuses on the understanding of a firm's performance, with more understanding on provision of financial returns. The theory postulates that the management of a company should aim to provide maximum returns to investors and

shareholders and for this to be a reality the company should aim at provide the best value to all the stakeholders. This according to the theory is the only reason guaranteeing a company's survival. Stakeholders theory also state that one of the indicators that a company is providing highest value to all stakeholders lies in financial measures as indicated through financial statements (Freeman, 2008).

According to Van Puyvelde, e. al., (2012) stakeholders theory complements agency theory in performance management and according to them unlike agency theory stakeholder's theory focus on the understanding the role of key stakeholder such as WSTF in improving the performance of water service providers. Furthermore the theory will also help to explore the different forms of support that WSTF, a key stakeholder in water sector and their impacts on water service providers. This is because the theory acknowledges that donors can provide different forms of support, with each holding varying impacts on water utilities. WSPs shall be managed in the interest of stakeholders defined as employees, financers, customers, employees and communities. Financers (donors) and communities are interested in the utilization of donated funds in accordance with the stakeholders enabling principle.

2.1.2 Agency theory

Agency theory describes the relationship between a principal that delegates work to an agent. It explains their differences in behaviour or decisions by recognizing that the two parties often have different goals and, independent of their respective goals, may have different attitudes toward risk. The concept pioneered from by Adolf Augustus Berle and Gardiner Coit Means, who were examining the issues of the agent and principle as early as 1932. Berle and Means inquired into the concepts of agency and their suitability toward the development of large

corporations. They saw how the interests of the directors and managers of a given firm differ from those of the owner of the firm, and used the concepts of agency and principal to explain the origins of those conflicts (Murtishaw & Sathaye, 2006).

Jensen and Meckling developed further the work of Berle and Means in the context of the risk-sharing research popular in the 1960s and '70s to develop agency theory as a formal concept. Jensen and Meckling formed a school of thought arguing that firms are structured to minimize the costs of getting agents to subscribe to the interests of the principals. The theory essentially recognizes that different parties involved in a given situation with the same given goal will have different motivations, and that these different motivations can be attested in divergent ways. It states that there will always be partial goal conflict among parties, efficiency is part and parcel effectiveness, and information will always be somewhat asymmetric between principal and agent. The theory has been successfully applied to the myriad disciplines including accounting, economics, politics, finance, marketing, and sociology (Nikkinen & Sahlström, 2004).

The principal and the agent can be termed as utility maximizers therefore there "is a good reason to believe that the agent will not always act in the best interest of the principal" (Jensen and Meckling, 1976, P. 308). The assumption is that all individuals are considered to be propelled mainly by self-interest: this is agreeable in all agency models (Baiman, 1990). So the action taken by the agency may be divergent from the cooperative action. Instead of an agent taking the action that will maximize the group's welfare, a different path is chosen by the agent whereby agency problem arise. It is imperative to note however, that even if an agent tries his/her best to follow the principal's interest, his/her action will always have a trace of his/her

interpretation of these. The agent interpretation of the situation still, inadvertently, lead to an incongruent action thereby resulting in agency problems (Bauman, 1990)

These agency problems must be addressed through contracting agreements and other control mechanisms. Different agency models focus on, and advocates different solutions for these problems. What is common to all solutions however, is that they will endeavor to limit that agency divergences from the principal's interests. They will try to produce goal-congruent behaviour based on set (but perhaps not completely shared) goals (Arwinge, 2013)

Agency theory is applied in this study because it will model the relationship of donor and agents with donors as principles determining the conditionality's, terms and regulation that governs any relationship with water service providers. Donors has the principals expect that the decision arrived by the WSPs would maximize the use of aid extended to them as exposed by terms and conditions of the terms of reference. Agency theory provides framework for the implementation of contractual agreement that govern private-public partnership which has been on an upward uptake in the water and sanitation sector. PPPs contrived by WSTF must be looked at in terms of synergistic effect on WSPs performance as the agents in applying aid endowed to them.

Dicke and Ott (2002) in examined the utility of human services accountability methods which were grounded in Agency Theory argued that agency theory plays a significant role in explaining the role of principal (donors) on an agency through provision of capacity building, training programmes and grant for capacity building. Due to the establishment of the role that agency theory play in human management accountability in performance management the theory will thus be adapted to the study. Whilst the agent (WSP) is capable of perpetuating its own

position other than those envisaged by the owner of the funds, it is possible to align the interest of WSP with those interest of the donors and reduce any slack. Donors may offer WSPs incentive (capacity building etc.) to encourage them to move in the correct direction (Barl and Means, 1968).

2.2 Empirical Review

Various empirical researches have been done by various academicians and institutions in the area of donor aid in the water sector, institutions in the water sector and partnership in the same sector, they tend to give different inferences for which are examined in this section.

2.2.1 Water service provision donors

NGOs are one of the donors who have supported water provision through water service providers in Kenya. NGOs support to water service providers has taken the form of supply of storage tanks, installation of supply tanks, provision of grants and loans. Most of the NGOs prefer to use water service boards as guarantors when giving out loan facilities to water service providers. These are the second category of donors who support WSPs. These refers to international financial institutions that offer loans or grants to county , water service boards, water service providers and water service trust fund. Grants and loans given by development partners are majorly used to facilitate expansion of water infrastructure and sewerage system, rehabilitation of sewerage system and water pipeline network (Okeyo, 2013).

2.2.2 Water Service Trust Fund

The Water Services Trust Fund (WSTF) is a State Corporation established under the Water Act, 2002 with a mandate to finance the provision of water to the marginalized areas.

WSTF operates under the ministry of water and irrigation and their operation is guided by strategic plan 2014-2019. WSTF has three funding systems and these are namely: Community Project Cycle (CPC) for rural water and sanitation projects, the Urban Project Cycle (UPC) for urban water and sanitation projects and the Water Resources Users Associations Development Cycle (WDC) for water resource projects. WSTF funds are channeled through water service boards, water service providers, community based organizations and water resource users association. WSTF is also working on the development of a micro financing system, known as Output Based Aid (OBA), which is aimed at augmenting the existing financial provision to WSPs. Ever since its inception WSTF has been able to fund more than 192 water project in rural areas. (WASREB, 2014)

2.2.3 Donor aid in water and sanitation sector

An assessment of aid given to water and sanitation sector is not as straight forward as it might seem. However, aid to the water supply and sanitation (WSS) sector increased from US$3.7 billion in 1995 to US$7.4 billion in 2011. Bilateral aid increased from US$2.6 billion in 1995 to US$4.5 billion 2011 whereas multilateral aid to this sector has increased from US$1.1 billion in 1995 to nearly US$2.8 billion in 2011(OECD, 2012). According to OECD (2012), in 2009-10, out of all sector-allocable aid, commitment to water and sanitation sector amounted to US$8.3 billion or around 7 per cent. In relative terms share of water and sanitation in total sector allocable aid steadily increased from around 4 per cent in the 1970s to nearly 7.5 per cent in 1994 but subsequently this share decreased to 6 per cent in 1999 before rising again after 2001 to reach the 7 per cent level now.

According to OECD (2012) Japan is the largest provider of assistance for water and sanitation, accounting for 23% of total aid in the sector for the period 2010-11. It is followed by

the World Bank's IDA (17%), Germany (11%), the EU institutions (7%) and the United States (6%). Other countries that have significantly increased their aid to the sector in recent years include Switzerland, Australia and Finland. Among those providing aid for water and sanitation, the UN Economic Commission for Europe (UNECE) and the OPEC Fund for International Development (OFID), respectively with 20% and 18%, extended the highest proportion of their aid to the sector.

OECD (2012) reports that of bilateral aid from OECD DAC donors in 2010-11 to water and sanitation, 76 per cent of aid was through investment projects while only 9 per cent was allocated through sector wide budget support. The six biggest donors to water and sanitation sector (WSS) use project and programme investment as the main vehicle for their aid to the WSS sector. Sector budget support formed nearly 8 per cent in 2010 but dropped to around 2 per cent in 2011. This was attributed to the fact that in many countries water supply and sanitation sectors cut across a range of ministries and sector as well as spatial administrative boundaries. According to OECD(2013) bilateral aid to water service sector is in the following forms: 80% of aid flows in the water sector were extended in the form of projects (mainly investment projects); 6% were allocated through sector budget support mainly by the EU institutions; 6% through technical assistance; 5% through pooled contributions to specific purpose programmes managed by international organizations e.g. Inter-American Development Bank Water and Sanitation Fund, UN Habitat Trust Fund for Water and Sanitation, World Bank Water and Sanitation Programme; 2% through pooled contributions to basket funds; WSTF falls in this category.

2.2.4 Effect of donor aid on water and sanitation sector

There are many different ways to measuring effectiveness of aid for water and sanitation. One suggested way is look at the millennium development goals and the contribution of donor aid towards the realization the MDGs. According to UNICEF/WHO (2012), the proportion of population in the developing world with access to improved sources of water increased from 70 per cent in 1990 to 86 per cent in 2010. In 1990, 32 per cent of people in the developing world had access to piped water supply while 38 per cent depended on other improved sources. By 2010, those with piped supply increased quite significantly to 46 per cent while those with access to other improved sources increased to 40 per cent. These significant increase of water access across the globe over the past decade(s) is attributed to the increased donor aid that has been targeted at water and sanitation programmes.

A previous study based on data from 1990 to 2004 (Anand, 2006) suggested that there was no correlation between the volume of aid received and performance in terms of whether the proportion of population with access to water and sanitation improved and if so by a commensurate extent. On the other hand according to WHO-UNICEF (2004) estimates, the proportion of people having access to water increased from 77 per cent in 1990 to 83 per cent in 2002 and the proportion of those with access to sanitation increased from 49 per cent in 1990 to 58 per cent in 2002. During the period of 1990-2000, the total amount of aid to the sector for these countries was estimated to be US$11.14 billion. This gives a figure of 0.17 persons per dollar of aid or approximately US$5.88 to provide access to water or sanitation per person.

Even as the magnitude of aid going to WSS activities has increased significantly, there has also been considerable change in the nature of activities being financed by aid. Donor Aid on water supply has focused on the following areas, water has taken the major chunk of donor

funding while sanitation has relatively taken small percentage of donor aid support. This is surprising given that the debate about what constitutes access to improved water sources with regard to MDG targets seemed to suggest that the aim should not be to achieve universal connection to piped water supply (and sanitation) but instead to consider a range of options many involving communal stand posts and other such communal sources. Through there has been a bias in donor funding towards water and sanitation project, donor aid has contributed to improved access to water in developing countries (UNICEF/WHO 2012). Besides improved access to water and sanitation, donor aid has also been associated with improved professionalization and benchmarking of water utilities through enhancement of both operational and financial performance through generating more revenue. Donor Aid has also played a major role in improvement of water quality in developing countries through improvement of infrastructure and monitoring activity for water systems. (WHO/UNICEF, 2012)

Donor support contribution on the performance of water projects in developing countries has not only been felt in improved access of water services but has also been felt on the management of water services in developing countries. Through donor support a number of water service providers and stakeholders have been able to learn through shared experiences with successful The most important benefit derived from building partnerships among water utilities and other sector institutions is the opportunity for sharing experiences and for capacity building. In particular these donor funded project have focused on improving the water research capacity of institutions in developing countries, improving human development capacity, supporting reform initiatives and supporting institutional development. (WHO/UNICEF, 2012)

2.2.5 Public- Private partnerships in water projects

Analysis on impact of PPP on water and sanitation project has been studies along the following four dimensions of performance: access (coverage expansion), quality of service, operational efficiency, and tariff levels. The analysis of the impact of PPPs on access to piped water focuses on concessions (where most of the investment is funded by the private partner) and leases-affermages (where it is mostly funded by the public partner). Overall, it is estimated that water PPP projects have provided access to piped water for more than 24 million people in developing countries since 1990. The overall performance of PPPs in regards to increasing access to water coverage has been mixed with some PPPs failing to have meaningful impact of water access while some PPPs have has meaningful impact of water access in developing countries. The overall performance of concessions for expanding access to service has been relatively successfully. The performance of leases-affermages has not been successful like the private financing. However, public financing in PPPs has proved to be successful in Senegal and Côte d'Ivoire.

PPPs have substantially improved service quality, especially by reducing water rationing. Rationing is possibly the number one quality challenge for many water utilities in the developing world. Without service continuity, meeting drinking water standards cannot be guaranteed because of the risk of infiltration in pipes. The poor, who often live at the low-pressure ends of distribution networks and cannot afford coping equipment (such as private wells, roof tanks, and filters), are disproportionately affected. Once water rationing becomes the standard practice in a utility, it is very hard to reverse. Frequent surges in pressure speed up the deterioration of the network, and any attempt to increase the average service pressure causes more burst pipes and lost water. In this context, it is remarkable that many of the PPPs that started from a situation of

water rationing succeeded in improving service continuity and that some even managed to reestablish continuous service. (Marin, 2009)

Another impact of PPPs on water and sanitation sector is on improving operating efficiency. Although utility operation has multiple facets, in practice, the impact on PPS on water utilities has been felt on the following three areas: water losses, bill collection, and labor productivity. Studies by Andrés *et al* (2008); Gassner *et al* (2008) found that PPPs were effective in reducing water losses. Bill collection is an area in which it has been established that PPPs are efficient, because of direct financial incentives, with studies showing that PPPs in most cases, introduces improved collection rates. Strong evidence has also be established that the introduction of PPPs result in improvements in labor productivity (measured as the number of staff per thousand customers), achieved through both staffing reductions and increases in the customer base. (Andrés *et al*, 2008)

2.2.6 The unique PPPs as contrived by WSTF

WSTF's core objective is to assist in financing investment costs of providing water services to communities without adequate water services in the country priority given to poor and disadvantaged groups (Urban poor and rural communities). To effectively discharge their mandate WSTF chose to work with WSPs countrywide among other stakeholders. In the initial needs-assessment conducted WSTF, it was determined that WSPs required assistance to improve their capacity in the technical, social and financial capabilities (WSTF, 2009). It is important to note that WSPs are public institutions structured to mirror the private sector governance composition. Hence, leases-affermages would not work in case of the Kenyan scenario.

The biggest challenge the WSPs face is capacity in terms of technical, social and financial capabilities. It is against this backdrop that WSTF and their development cooperators

contrived to partner with independent private consultants to improve capacity of the WSPs (WSTF, 2009). When a WSP successfully applied for a grant, a team of technical, social and financial consultants are attached to that particular WSP. The technical consultant will guide the WSP on quality of works, construction contract management, regularize water connections and other technical inadequacies the WSP might be facing. The social consultant would support the WSP to establish the WSP's presence in otherwise neglected areas and areas previously abandoned for whatever reasons. The social consultant would mobilize, sensitize and train community members to ensure acceptance of the WSP and its services in the targeted community. The financial consultant would support the WSP on governance, organization structures and systems, strengthen the WSP with regard to sustainable and customer oriented services and scheme management. (WSTF, 2009).The study will examine the effect of these partnership in relation to the performance of the WSP.

2.2.7 Water Service Providers

These are commercial entities formed under the jurisdiction of water service boards and mandated to provide water services. In accordance with the water act of 2002 the WSPs mandate include the provision of water and sanitation services, ensuring good customer relation and sensitization, adequate maintenance of assets and reaching a performance level set by regulation .The Companies took over the provision of water and sewerage services from their respective municipal councils. By 2009, 118 such WSPs had been licensed and in operation in the country (WASPA, 2014). The WSP are expected to meet stipulated Minimum Level Service (MLS) benchmarks that they sign in agreement with WSB each WSP was expected to meet. The MLS are interim yearly benchmarks indicators in water coverage, revenue collection efficiency, UFW and hours of water supply. They represent incremental steps considered critical to achieving the

MDG by 2015. There also exist informal water service providers who are not under the water service boards. These include persons selling water on carts or through unlicensed boreholes and water kiosks (GOK, 2007). WSPs are categorized into large, medium and small as well as publicly owned or privately owned.

2.3 Performance of Water Service Providers

We are going to examine performance in terms of water utilities, nonrevenue water, hours of supply, staff productivity, operation and maintenance cost, utility revenue and also efficiencies in different jurisdictions and scenarios.

2.3.1 Defining the performance of water utilities

According to Estache and Kouasi (2002) to measure the performance of water service providers is not an easy task. This according to them is complicated by the nature of water production process, the need to balance between allocative efficiency and equity issues involved. Schwartz (2006) on the other hand argues that performance of water service providers is solely dependent on utility conditions. World Bank (2009) posits that financial performance of water utilities is hinged on revenue generation and operating costs efficiency. According to world bank revenue generation is affected by the following nonrevenue water, appropriate tariff design, effective billing and collection and new connections while operating costs is influenced by nonrevenue water, maintenance costs, energy efficiencies, staff cost and chemicals efficiency. The indicators are discussed below.

2.3.2 Nonrevenue water

Nonrevenue water (NRW) is defined as 'the difference between the volume of water put into a water distribution system and the volume that is billed to customers' (Kingdom, Liemberger & Marin, 2006). These losses can be caused by the following leakages mainly due to poor operations and maintenance, losses due low meter registration, poor billing, inefficiency in data handling and water theft. Non-revenue water results to lost revenue and increase in operation costs by and thereby affecting water service coverage which is one of the indicators of millennium development goals. Non-revenue water is a common occurrence in African and Asian countries with approximately 40% of water lost (Janssens, 2013). According to a study conducted in Ghana by Yeboah (2008) non-revenue water was at 57% leading to decrease in water service providers in Accra by at least 40%. Similarly a study conducted by Olwa (2012) in Kenya also established similar non-revenue water which affects the performance of water service providers in Kenya.

2.3.3 Hours of supply

According to WASREB (2014), hours of supply measure the 'average number of hours per day that a utility is able to provide water to consumers'. McBain (1985) stated that the reliability of water service providers is related to the level to which continuous supply of quality and quantity can be maintained to the consumers. This affects the performance of water companies in the in terms of meeting its social as well as financial goals (Tisdell & Ward, 2003).

2.3.4 Staff productivity

Organization for Economic Co-operation and Development (2008) defines staff productivity as the output per worker in a given time. The concept is used in utility management

to show the contribution of management and organization employees towards the performance of a water utility company. Staff productivity is measured by a ratio analysis which slightly differs in different region with this difference affected by taxes, margins, costs, among others (Hausser, 1949).

2.3.5 Operation and maintenance cost

According to WASREB (2010), operations and maintenance (O&M) costs are the costs incurred to operate a system and maintain its infrastructure. They include personnel costs, energy costs, chemical costs and maintenance of plant and equipment. This indictor is important in the measurement of the short term performance of the water service providers by reflecting if the investment costs have been covered. A better performing water service provider arises if the water utility company through its revenue is able to cover for both operating, maintenance and investments costs.

2.3.6 Water utility revenue

For a long time, the performance of water utilities was majorly related to its engineering and operational performance. However over the past decades there has been an evolution in the performance measurement of water service providers to even include issues of financial performance, delicate environmental concerns, community interests and varying levels of regulatory oversight. Financial performance is thus ensured when water service providers are able to meet both their current and operating needs. Financial management consists of effectively generating sufficient revenue while appropriately managing costs (American Water Works Association (AWWA), 2010). Revenue is majorly generated by water service providers through sales of water. As such, rates and fees attached to the sale of water becomes a primary

component in determining how a water utility company performs financially. Without utility revenues water service providers are not able to meet their mission of providing safe, reliable, and high-quality water. Water rates are usually charged in different ways with the common way of rates billing being monthly, bimonthly and quarterly billing. Besides the water rates water utility companies have other forms of revenue generation such as sewerage charges, selling of bottled water, plumbing charges among other innovative service charges.

2.3.7 Technical efficiency in African utilities

Labor productivity, water pipe bursts and operating cost are the three indicators used to evaluate the technical operations of the utilities. Labor productivity rates can be hard to compare because of differing reliance on contractors. Nevertheless, a frequently used international benchmark for labor productivity is 2 employees per 1,000 connections, which has been modified to 5 employees per 1,000 connections for developing countries (Tynan & Kingdom 2002).Overall, African utilities covered by Africa Infrastructure Country Diagnostic (AICD), (2010) study, report an average of about 5.6 employees per 1,000 connections, which is right around the developing country benchmark cited above. The rate of bursts per kilometer of water main provides some indication of the condition of the underlying infrastructure, and hence the extent to which it is being adequately operated and maintained (Mehta & M.Cardone, 2009).

2.3.8 Financial efficiency in African utilities

According to AICD (2010), five indicators are used in performance analysis of utilities: revenue collection efficiency, operating cost ratio, debt-service ratio, value of gross fixed assets per connection, and average operating revenue. According to Tynan and Kingdom (2002) most water service providers in Africa have enough revenues to barely cover for their operating costs.

2.3.9 Non-revenue water and utility revenues

Non-revenue water (NRW) is the difference between the volume of water put into a water distribution system and the volume that is billed to customers. NRW encompass commercial losses, physical losses, and unbilled authorized consumption. Physical losses refer to the losses that arise due to leakages in the water infrastructure system and majorly they are attributed to poor maintenance and operation of water systems. Commercial losses on the other hand are attributed to under registration of meters, poor customer data handling and theft of water.

According to World Bank (2006), revenue earning of water service providers is determined by the difference between the amount of water put into the distribution system and the amount of water billed to consumers. High levels of NRW show that most of the water is lost through physical losses and this can seriously affect the performance of water utilities since such water is unaccounted. In addition high NRW usually reflect the governance and management system that exists in water utilities companies, with companies having poor governance and management system having relatively high NRW. The waste of resources A recent World Bank study estimated the full cost of water losses from urban water utilities in developing countries to be as much as US$5 billion per year (Kingdom, Liemberger & Marin, 2006).As found out by World Bank (2010), the average level of NRW in an entire sample of 134 utilities is 36 percent. This is well above the good practice levels for developing countries considered to be below 23 percent according to (Tynan & Kingdom, 2002).

Although it is not feasible to eliminate all NRW in a water utility, reducing by half the current level of losses in developing countries appears a realistic target. This reduction could generate an estimated additional US$2.5 billion in cash every year for the water sector (from

both increased revenues and reduced costs) and potentially service an additional 90 million people without any new investments in neither production facilities nor drawing further on scarce water resources. Figures of such magnitude, even though they are based on a rough estimate, should obviously capture the attention of donors and developing-country governments alike (World Bank, 2010).

2.4 Performance of Water Service Providers in Kenya

The overall performance of WSPs in Kenya is measured through the following indicators (WASREB, 2014).

2.4.1 Water coverage

Water Coverage refers to the number of people served with drinking water by a WSP expressed as a percentage of the total population within the service area of the WSP. It assesses performance in executing the core mandate of the utility of supplying potable water to consumers. Water coverage by WSP's in urban area shown an improvement from 53% in 2012 to 54% in 2013. On the other hand water Coverage in rural areas improved from 50% in 2011/12 to 51% in 2012/13 though this is still below the benchmark acceptable.

2.4.2 Sanitation coverage

Sanitation Coverage refers to percentage of the population with improved access to sanitation services within the service area of WSPs, as expressed as a percentage of the total population. It measures performance with regard to the provision of sewerage and on-site sanitation services. Improved facilities include flush or pour-flush to piped sewer systems, septic tanks, ventilated improved pit latrines (including Urine Diversion Dehydration Toilets) and

traditional pit latrines (with a squatting slab). This is one of the target areas where WSTF through grants have supported a programme called up scaling Basic Sanitation for the Urban Poor (UBSUP), with the aim of the programme been to improve access to sanitation among the poor and marginalized in urban areas. According to WASREB (2014) Sanitation Coverage for rural areas increase slightly from 69& in 2012 to 70% in 2013, while overally the sanitation coverage increase from 69% to 73% over the same period.

2.4.3 Sewerage coverage

Sewerage Coverage refers to the number of people served with flush or pour-flush to piped sewer systems as a percentage of the total population within the service area of a WSP. This measure is solely used to measure the performance of urban WSPs, with the sanitation coverage of 2013 stagnating at 17%.

2.4.4 Drinking water quality

Drinking Water Quality (DWQ) measures the portability of the water supplied by a WSP. This is a critical indicator that is used in measurement of the social performance of the WSPs since it has a direct bearing on the health of the citizens. This indicator is measure through measuring residual chlorine and bacteria levels in water.

2.4.5 Hours of supply

This refers to the average number of hours per day that a utility provides water to its customers. It is an important indicator in measuring the continuity of water supply to consumers, and by extension the reliability of water supply to consumers. It is an important indicator in measuring the level to which WSP's are progressing towards the achievement of millennium

development goals. Besides it is an important indicator that has a bearing on the financial sustainability of WSPs, for the higher the hours of supply the higher the revenue generated by WSPs. According to WASREB (2014) Hours of Supply improved from an average of 16 hours in 2011/12 to an average of 17 hours per day in 2012/13 in rural areas while hours of supply increased from 15 hours to 16 in the same period in urban areas

2.4.6 Non-revenue water

Non-Revenue Water (NRW) refers to the difference between the amount of water produced for distribution and the amount of water billed to customers. It measures the efficiency of the WSP in delivering the water it produces to the customer take-off point. It captures both technical losses (leakages) and commercial losses (illegal connections/water theft, metering errors and unbilled authorized consumption). According to WASREB (2014) the performance in terms of non-revenue for urban WSPs improved from 44% in 2011/12 to 42% in 2012/13. On the other performance on Non-Revenue Water in rural WSPs improved from 57% in 2011/12 to 55% in 2012/13. However, it was established that on average rural WSPs continue to lose more water than they sell.

2.4.7 Dormant connections

This refers to the number of access points that have remained disconnected or have not received water for more than three months expressed as a percentage of total water connections. This is an indicator that indicates the management capacity to provide quality water services to consumers with high dormant connections indicating poor water quality services and by extension an ineffective management system of WSPs. According to WASREB (2014) performance of this indicator in rural areas improved from 39% in 2011/12 to 34% in 2012/13

while the performance of the same indicators in urban areas remained constant at 17% for the same period.

2.4.8 Metering ratio

This refers to the number of connections with operational meters expressed as a percentage of the total number of active water connections. It measures the extent to which WSPs have been able to install meter to their consumers. This is important for WSPs since it is only through the meters that the WSPs are able to charge consumers and thereby raise revenue. Metering ration in most cases correspond to non-revenue water indicator with a high metering ratio corresponding to a NRW level. According to WASREB (2014) Metering in urban areas improved considerably, from 79% to 89% for the period 2011/2012 to 2012/2013 while metering ratio for rural areas improved from 68% to 75% in the same period.

2.4.9 Staff productivity (staff per 1000 connections)

Staff Productivity refers to the number of staff in employment for every 1000 connections (total registered water and, where applicable, sewer connections). It measures the efficiency of WSP in utilizing its staff with low figure indicating high staff productivity. However, it is worth mentioning that staff productivity can all be affected by a number of factors such as geographical location, skill mix, employee motivation, managerial factors etc. According to WASREB (2014) staff productivity in rural areas remained the same at 9 staff per 1000 connection for the year 2012/2013 while staff productivity in urban areas stagnated at 7 staff per 1000 connection for the same period.

2.4.10 Revenue collection efficiency

Revenue Collection Efficiency refers to the total amount collected by a WSP expressed as a percentage of the total amount billed in a given period. It measures the effectiveness of the revenue management system of a WSP. Revenue collected and not amount billed determined the level to which WSPs are able to finance their operations. Collection efficiency is but a combined process on the WSPs ability to collect revenue as required on the right time and the consumer's ability to pay for the water service when expected. According to WASREB (2014) the revenue collection efficiency for WSPs in urban areas improved from 85% in 2011/12 to 89% in 2012/13 while the revenue collection efficiency in rural areas improved from 84% to 91% for the same period.

2.4.11 Operation and maintenance cost coverage

Operation and Maintenance (O+M) Cost Coverage is the extent to which internally generated funds cover the cost of running a WSP. This is a critical indicator for the short term performance of WSPs and important in the long run determination of financial sustainability. A WSP is estimated to have reached full cost coverage when it reaches at least 150% O+M Cost Coverage. Improved performance in this indicator is a result of revenues having increased at a higher proportion than O+M costs. According to WASREB (2014) the overall performance of WSPs in rural areas declined slightly, from 109% in 2011/12 to 104% in 2012/13 while the performance of WSPs in urban areas improved from 105% to 113% for the same period.

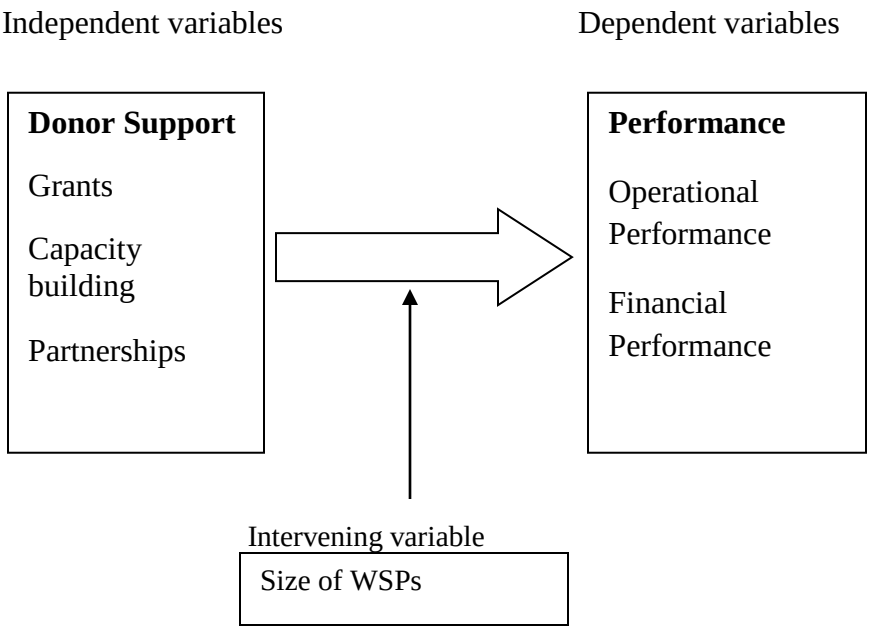
TABLE 1

KNOWLEDGE GAP

Author	Study	Findings	Study Gap
OECD (2012)	Analysis of Aid flow to water sector in developing countries	The study presented the impact of Aid on improving access to water	The study did not focus on the impact of Aid on performance of water utilities
Muthee (2012	An investigation on financial performance of water service providers licensed by Rift Valley Water Services Board	Financial performance of rift valley service board providers is poor	The study was a case study on rift valley water service providers thus necessitating the need for a national survey The study also did not focus on understanding the impact of donor aid on performance of water service providers. It also focused only on financial performance
Smitt (2013)	The Impact of Support to Community - Based Rural Water Service Providers: Evidence from Colombia	The study established that there was no clear effect found between support and the level of service that users received or the asset status.	The study did not focus on donor support but government and local authority support. The study was also adopted a case study approach thus necessitating the need for national survey
Anand (2013)	The aim of this study was to capture some of the complexity in assessing impact and effectiveness of aid in water and sanitation sector	The study established that governance and historical factors present challenges in analyzing the impact of donor aid on water utilities	The study fell short of understanding the impact of donor aid on performance of water service providers
Bellaubi & Visscher (2014)	This paper aim was to explore through case studies the quality of water service delivery in four different water utilities in Kenya and Ghana.	The study showed that low-income populations receive a poor quality of water service delivery	The study only focused on water service delivery an aspect of WSP performance. The study never focused on the impact of donor aid on the performance of WSPs

FIGURE 1

Conceptual framework



Source: Author (2015)

2.10 Explanation of conceptual framework

Support by donor community has recorded success in impacting immediate objective of the assistance. According to Riddell, (2008) the success rate of aid has been 75% which indicates that most donor intervention has some impact. Further more recent data indicate that the impact on immediate objective continue to improve over time.

In recent years these "end of the project" reports have been complemented by more in-depth evaluations of discrete development interventions. The evidence of effect of most of these studies is predominately positive (Parker, 2011).

A major component of aid is provided as "Technical Assistance (TA). This is aid in the form of trained personnel deploying their skills by training recipient institutions personnel to

replace them as well as activities aimed at helping to strengthen institutions and enhance local capacities (Riddell, 2008). Assessment of the impact of this form of assistance suggests two form of main outcome. Firstly and positively, most TA has succeeded in filling knowledge gaps and training local personnel and imparting knowledge, though usually the cost has been high. Secondly, subsequent evaluations indicate that although there have been exceptions aid has generally not been at all successful in efforts to build capacities, encourage the retention of high skills and strengthen public institutions in a sustainable manner (Adams, 2013).

There are other factors that influence outcomes. For instance the size of the institution and its location. (Oakley 1999). The impact will tend to be significant to a smaller institution than a larger one: what happens in an urban setting is not a good guide to what happens in a rural institution. The urban setting tends to be more significant than the rural setting.

TABLE 2

Operationalization Of Variables

Variable	**Indicator(s)**	**Measurement**	**Impact report Statements/ questions**
Grants	Grants issued	Continuous Variable and Nominal Variable	
Capacity building	No of training activities, refresher courses for employees, existence of manuals, guidelines	Nominal Variable	
Partnerships	contract agreement, Number of partners and forms of partnerships	Nominal variable	
Size of WSPs	Membership WASPA, Number of connections	Nominal variables	
Location of WSPs	Urban or Rural	Nominal Variables	
Performance of WSPs	Metering, Staff productivity, Revenue collection efficiency, operation and maintenance cost coverage	Continuous Variable and nominal variables	Water related income, maintenance and production costs in financial statement

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter will present research design, target population, sampling techniques that will be used in the study, sources of data collection procedures and data analysis methods.

3.2 Research Design

For the purpose of this study, cross-sectional descriptive study design will be adopted. This is because cross-sectional descriptive design will allow the researcher to gain views of management of WSPs on the impact of donor support on WSPs performance.

3.3 Target Population

Population is the aggregate of all that conforms to a given specification In other words; population refers to an entire group of individual's, events or objects having a common observable characteristic. For the purpose of this study the researcher will focus on all the 99 operational WSPs in Kenya. *(See table 1)*(WASREB 2015)

3.4 Sample Size and Sampling Technique

Sampling is the process of selecting a sufficient number of the right elements from the population (Groves, 2010). The study will use purposive sampling to select participating WSPs that meet the inclusion criteria of the study. These inclusion criteria will include the following:

a) WSPs must be a member of water service providers association (WASPA)

b) WSPs must have been in operation for at least five years

c) WSPs must have been funded by WSTF

The study will select a sample size of 54 WSPs from all the existing water service boards in the country.

3.5 Data Collection

Secondary data collection will be gathered from the reports of water service trust fund, water services regulatory board impact reports and *MajiData* website. These data will be collected for the period 2010-2014. Since there are 54 WSPs and 4 years, this consist a panel data with total of 216 observations

3.6 Data Analysis

Panel data analysis is used due to the following advantages that it offers (Hsiao, 2003).

a) Panel data analysis allows for control of heterogeneity unlike time series and cross-sectional analysis which does not take care of heterogeneity and this may have an effect of biased results.

b) Panel data provides more informative data, more variability, less collinearity among the variables, more degrees of freedom and efficiency. This is contrary to time series which is plagued with multi-collinearity issues.

c) Panel data analysis will offer the ability to study the effects of changes and this is difficult to detect in pure cross-sectional or time-series data. Use is made of panel data analysis because it is more suited for this study.

3.7 Model specifications

Panel data regressions is used to test the relationship between donor support and firm performance. Panel data include repeated measures of one or more variables on one or more firms (repeated cross-sectional time series). It is more informative (more variability, less collinearity, more degrees of freedom), and the estimates are more efficient. Panel data also allow for control of individual unobserved heterogeneity (Wooldridge, 2003).

The econometric model for random effect preposition is as follows:

i $$\mathbf{Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \mu_{it} + \varepsilon_{it}}$$

Where $i = 1 \ldots 54$, $t = 2010 - 2013$

Where Y is the dependent variable (Performance of WSPs, financial and operational), β_0 is the regression coefficient, β_1, β_2, and β_3 are the slopes of the regression equation, X_1 is grants, X_2 is capacity building and X_3 is public private partnership, μ_{it} is the random effect for wsp $_i$ over time t while ε_i is an error term.

The econometric model for fixed effect preposition is as follows:

ii $$\mathbf{Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \mu_{i} + \varepsilon_{it}}$$

Where $i = 1 \ldots 54$, $t = 2010 - 2013$

Where Y is the dependent variable (Performance of WSPs, financial and operational), β_0 is the regression coefficient, β_1, β_2, and β_3 are the slopes of the regression equation, X_1 is grants, X_2 is capacity building and X_3 is partnership, μ_i is the fixed effect while ε_i is an error term.

3.8 Diagnostic tests

To decide between fixed or random affects run a Hausman test where the null hypothesis is that the preferred model is fixed effects vs. the alternative the random effects. It basically tests whether the unique errors (μ_i) are correlated with the regressors, the null hypothesis is that they are not. Run a fixed effects model and save the estimates, then run a random model and save the estimates, then perform the test. If the p-value is significant (for example <0.05) then use fixed effects, if the inference indicates that there is no random effects.

For panel data to be valid and reliable it must be tested for Heteroskedasticity and serial correlation. To test for heteroskedasticity, homoskedasticity is assumed with a null hypothesis that all error variances are equal with the alternative that the error variances are multiplicative function of one or more variable. P-value is set at 5%. To test for homoskedasticity, the Modified Wald test for group-wise heteroskedasticity was applied.

Solution for heteroskedasticity would be:

a) Robust Huber-White Sandwich estimators (GLS)

b) White heteroskedasticity consistent VC estimate: manipulates the variance covariance matrix of the error term.

d) Dummies for groups of WSPs that are assumed to behave more similar than others.

To test for serial correlation a Wooldrige-Drucker test is run with the p-value set at 5%. If the P- value are above 5% then the variables are serially correlated.

Solution for serial correlations:

a) Praise-Winsten transformation

b) Ignore if the period is less than 10

3.9 Data Exploration

According to Walker (2008) it is important to explore data because you need to know that your data are parametric, to detect any outliers that might distort your analysis and have a predisposition of results from your subsequent analyses. Many important features of the data can be summarized numerically or graphically without referring to the model.

3.9.1 Visual exploration

Visual data mining techniques are important for exploring large databases where little is known about the data and exploration goals are vague. Specifically, visual data mining will have the following advantages; tackles more easily a highly inhomogeneous and noisy data; is intuitive; requires no understanding of complex mathematical or statistical algorithms and parameters.

3.9.2 Over lay graphs

The study adopted over lay graphs for better comparison of water services companies. Overlays consider similarities a control to experiential set, assess the accuracy of gates and find high or low expressers. Over lay graphs are compelling visual tool for cytometric analysts. Unique characteristics between populations within a single experiment or among groups of experiments are easily seen. It also identifies peculiar populations, subsets, define cytokine expressing cells and compare controls to experiments.

3.9.3 Trend line graphs

The study adopted trend line graphs for clarity in patterns and trends of parameters over time of water services providers. Trend line graphs have the advantage of summering a large data in visual form, it is easily understood and require minimal verbal or written explanation.

3.9.4 Tables

The study adopted tables as a way of easily understanding results and visualize the relationship between the input values and output values.

CHAPTER FOUR

ANALYSIS AND FINDINGS

4.1 Introduction

Presented in this chapter are the study results based on the objectives and research questions presented. Data was available for 54 WSPs for a period of four years. In the first section, explanatory analysis of the data is provided. This includes descriptive summary statistics such as mean, median, maximum, minimum and standard deviation, trend analysis, overlain plots and. Moreover, a Hausman test is conducted to establish which of the models (fixed effects or random effects is suitable for the data). Further presented in the chapter are the diagnostic statistics to test assumptions of regression including a test of multicollinearity, serial correlation and homoskedasticity? Lastly panel model regression analysis is performed which provides the estimated effect of the independent variables on the dependent variable.

4.2 Descriptive Analysis

In this section, descriptive analysis is performed on each variable over the four years. The variables considered in this study were grants to WSPs (GR), capacity building by WSTF (CBS) and Public-Private Partnerships contrived by WSTF (PPP) which were the independent variables. Measures of performance which was the dependent variable were staff per 1000 customers (SP1C), cost recovery ratio (CR), metering ratio (MR) and total turnover (TR). The mediating factor was the size of the WSP (Very large, Large, Medium and Small. Table 4.1 presents the descriptive statistics.

TABLE 3

Descriptive Statistics

Variable		Mean	Std. Deviation	Min	Max
GR	Overall	1.03e+07	5591176	1925511	3.03e+07
	Between		3694324	3354225	2.04e+07
	Within		4219438	-6325963	2.32e+07
CBS	Overall	1.67907	.8396033	1	6
	Between		.4387741	1	3.75
	Within		.3750969	-.0709302	3.92907
PPP	Overall	2.930556	.4417636	1	5
	Between		.2350064	2.25	3.75
	Within		.3750969	1.430556	4.680556
SP1K	Overall	12.74537	8.323404	3	49
	Between		7.421522	4	39.25
	Within		3.868928	-3.75463	35.99537
CR	Overall	92.34259	36.49955	21	252
	Between		31.44137	36	180.25
	Within		18.90638	13.34259	164.0926
MR	Overall	77.56944	23.12363	10	100
	Between		18.37492	28	100
	Within		14.20477	13.56944	128.3194
TR	Overall	219.4954	803.3538	2	7227
	Between		797.2289	4.25	5860.5
	Within		136.645	-1129.005	1585.995

Findings presented in Table 4.1 indicate that the average grant provided by WSTF to WSPs was Ksh. 1.03 million with the minimum being Ksh 1.9 million and maximum being Ksh 30 million. Capacity building sessions ranged from 1 to 6 with the average being 1.68. Further findings indicate that the average number of PPPs organized by WSTF for the WSPs was 2.93 with the least being 1 and the highest being 5. Average of staff per 1000 customers was 12.75 with the

highest being 49 and the lowest being 3 employees per 100 customers. Additionally, results indicate that cost recovery ratio was on average 92.34%. The highest over the four years was 252% with the lowest being 21%. Moreover, metering ratio averaged 77.57% with the highest over the four years being 100% whereas the lowest was 10%. Lastly turnover averaged Ksh 219.49 million with the maximum being Ksh 7.227 billion with the lowest being Ksh 2 million.

4.3 Correlations Analysis

The study measured the degree of association between grants, capacity building and PPPs by WSTF to WSPs and the performance measures. Table 4.2 shows correlation of the variables. The study findings indicate that grants by WSTF has positive relationships with cost recovery (0.273), metering ratio (0.222) and turnover (0.214). This indicates that the grants were weakly associated with improvements in cost recovery, metering ratio and turnover. However, grants had a significant negative association with the ratio of staff to 1000 customers (-0.165) indicating that grants were associated with the WSP reducing the number of staff for every 1000 customers. Capacity building sessions were not statistically significant with any of the performance measures; ratio of staff to 100 customers (0.098), cost recovery ratio (0.089), metering ratio (-0.092) and turnover (0.087). PPPs arranged by WSTF for WSPs had a statistically significant weak positive relationship with turnover (0.154) but was not significantly related to the other three measures of performance.

4.4 Data Transformation

In view of the above results, data rages are wide and the degree of association is insignificant, data transformation is necessary in order to normalize ranges over several orders of magnitude. It is also important to note that if the variable integers are positive then the log transformation is

immediately applicable. The affected variable included: Grant, Staff per 1000 customers, metering ratio and turnover.

TABLE 4

Correlation Matrix of the Variables

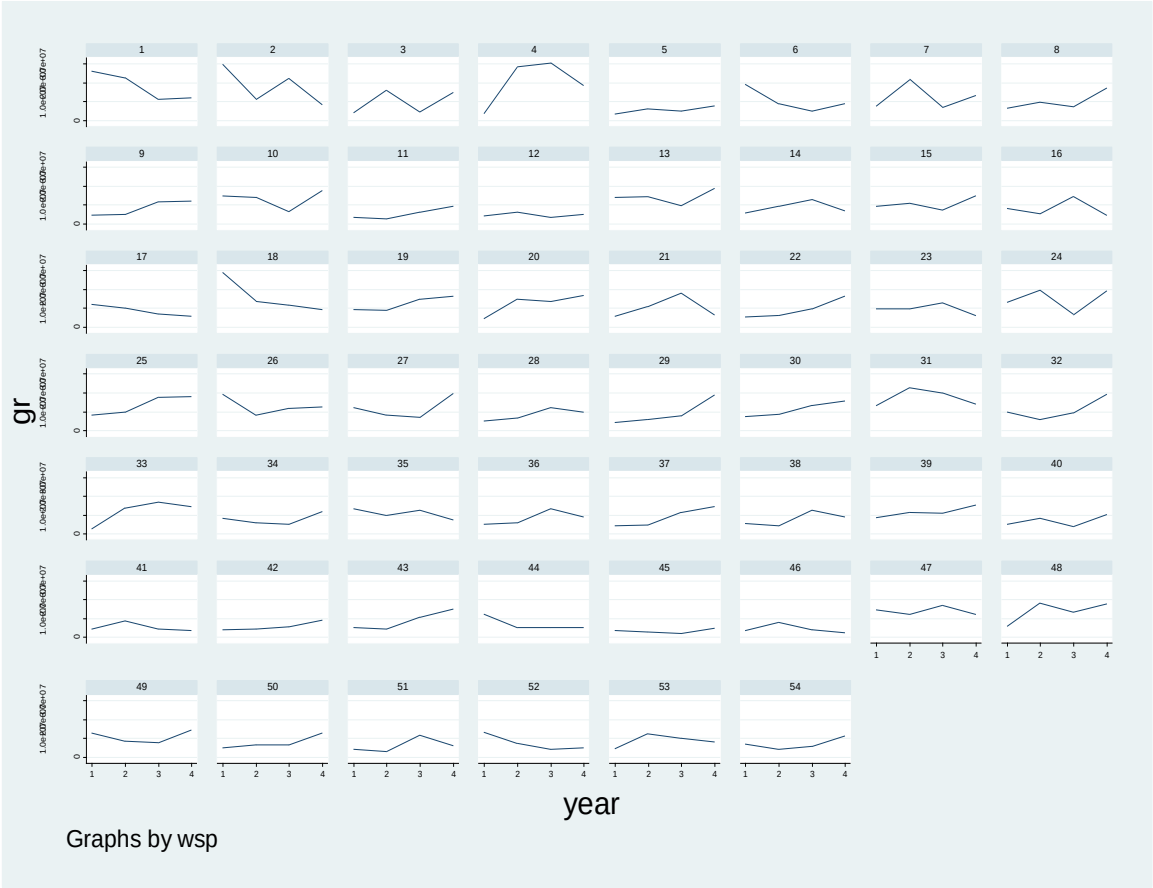
		CT	GR	CBS	PPP	SP1K	CR	MR	TR
	Pearson Correlation	1							
CT	Sig. (2-tailed)								
	N	216							
	Pearson Correlation	-.291**	1						
GR	Sig. (2-tailed)	.000							
	N	216	216						
	Pearson Correlation	-.097	.166*	1					
CBS	Sig. (2-tailed)	.156	.015						
	N	216	216	216					
	Pearson Correlation	-.054	.201**	.191**	1				
PPP	Sig. (2-tailed)	.428	.003	.005					
	N	216	216	216	216				
	Pearson Correlation	.507**	-.165*	.098	.013	1			
SP1K	Sig. (2-tailed)	.000	.015	.154	.851				
	N	216	216	216	216	216			
	Pearson Correlation	-.528**	.273**	.089	-.001	-.457**	1		
CR	Sig. (2-tailed)	.000	.000	.194	.990	.000			
	N	216	216	216	216	216	216		
	Pearson Correlation	-.220**	.222**	-.092	.011	-.338**	.299**	1	
MR	Sig. (2-tailed)	.001	.001	.180	.870	.000	.000		
	N	216	216	216	216	216	216	216	
	Pearson Correlation	-.364**	.214**	.087	.154*	-.194**	.211**	.116	1
TR	Sig. (2-tailed)	.000	.002	.203	.024	.004	.002	.089	
	N	216	216	216	216	216	216	216	216

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

FIGURE 2

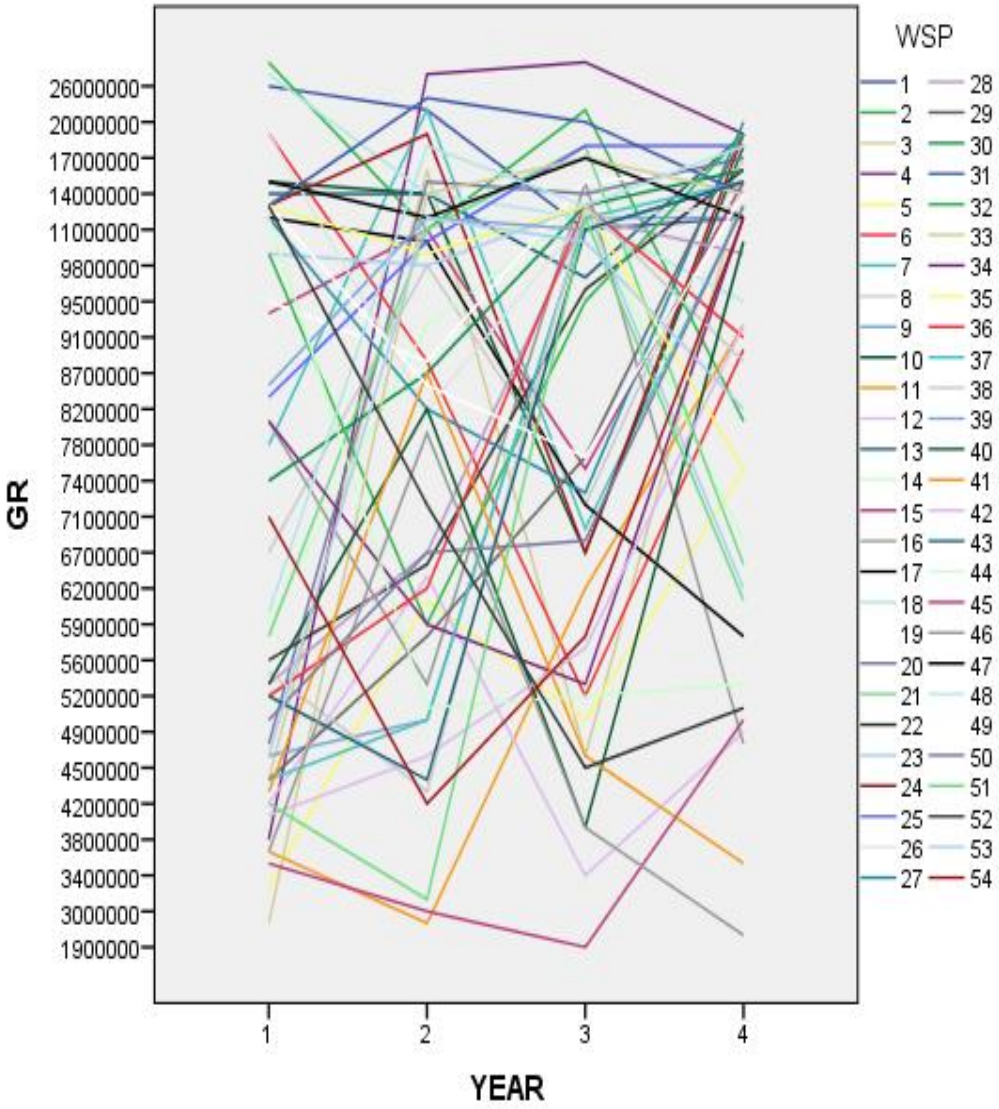
Trend lines of Grants to WSPs



In figure 2 Grants are given to WSPs on the basis of a good proposal that meets the set of criteria outlined by WSTF. The trend above to all WSPs do not follow a particular pattern because the amount depends on the nature of the project, location and the number. However, WSP 1 and 4 have a peculiar trend. WSP 1 grants has a declining trend this could be because either the coverage that meets WSTF criteria were exhausted or they were unable to present a good proposal. While that of WSP 4 has an increasing trend meaning they managed to write good proposal and had locations that meets WSTF criteria.

FIGURE 3

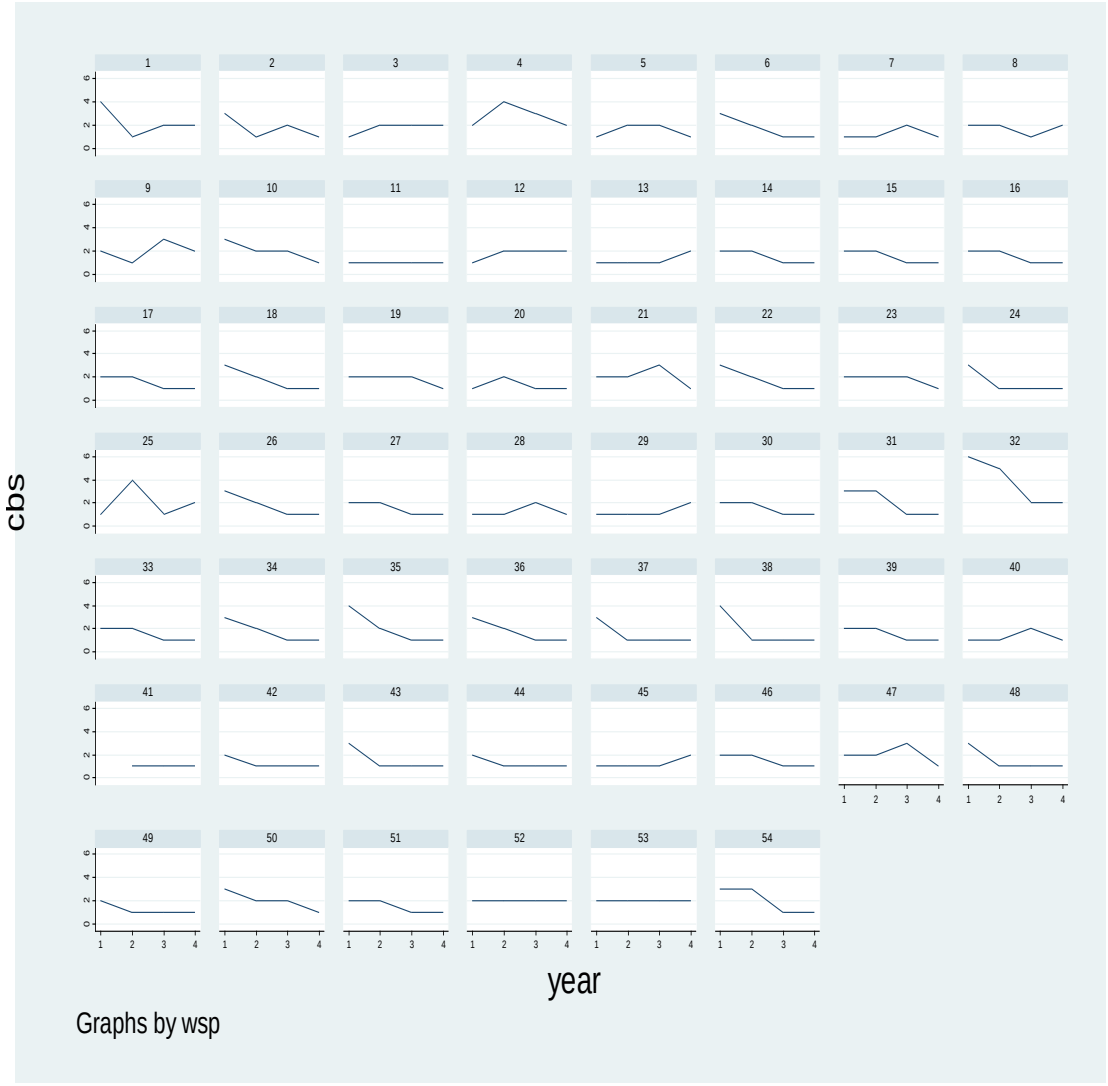
Overlain plots of Grants to WSPs



In figure 3 the overlain plots confirms the random nature of grants given to WSPs. WSPs 1,24, 36 and 2,18 share the same intercept but their slope differ confirming that fixed time effect is not significant between them.

FIGURE 4

Trend lines of Capacity Building Sessions by WSTF to WSPs



In figure 4 the trend lines shows a general slight decline then constant sessions in capacity building. Usually these are tied to the project that already been awarded. The decline is explained to mean that the team that implemented the previous project are the ones who continue to implement the subsequent one hence no need of more sessions. WSP 32 has the highest number of capacity building session because the pilot project was carried in the WSP.

FIGURE 5

Overlain plots of Capacity Building Sessions by WSTF to

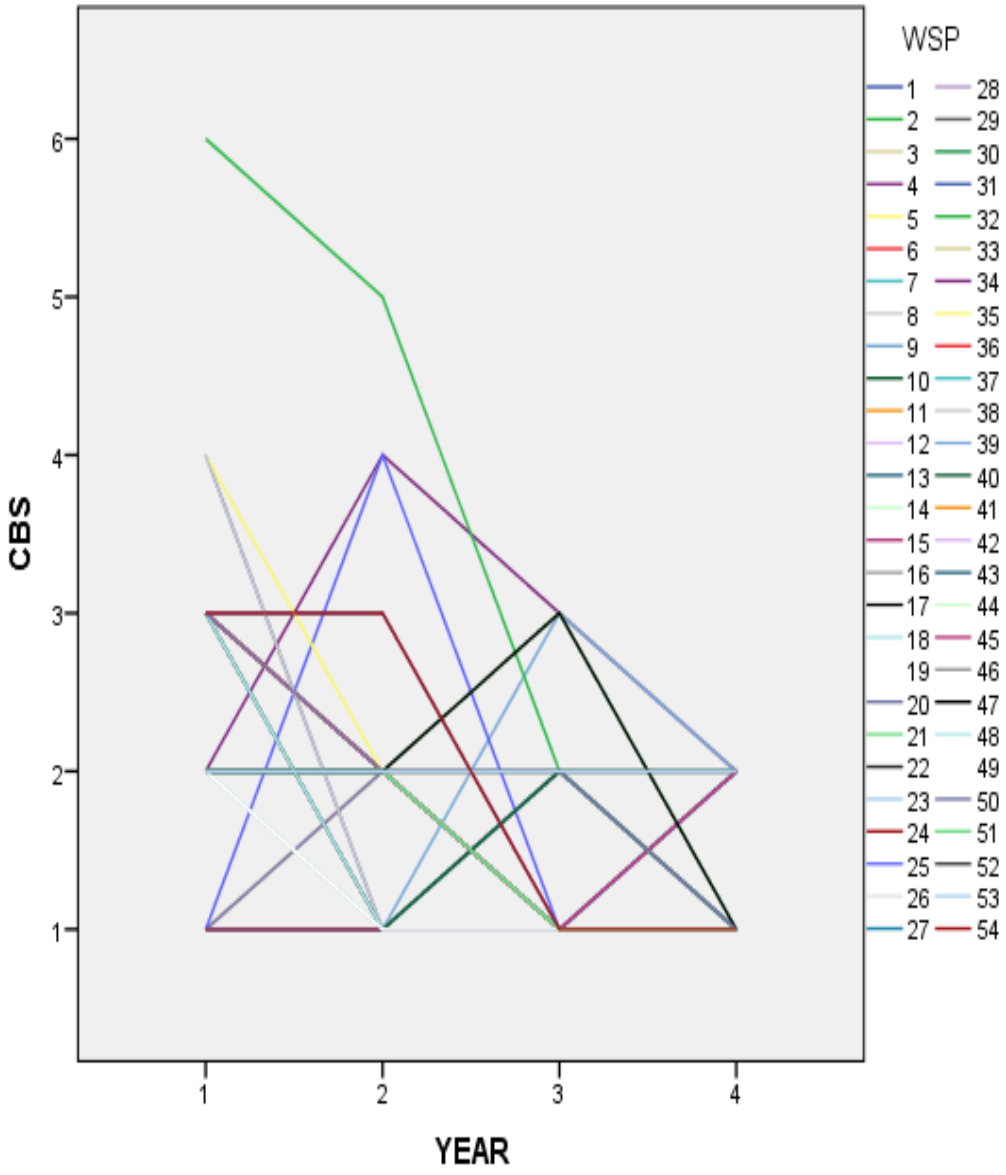


Figure 5 the overlain plots confirms the decline pattern as depicted in the trend line figure 4.3. WSPs 45,46,31 19,15 1,2,3,4,6,8 and 5, 9 share the same intercept but their slops differ meaning fixed time effect is not significant between them.

FIGURE 6

Trend lines of PPPs arranged by WSTF for WSPs

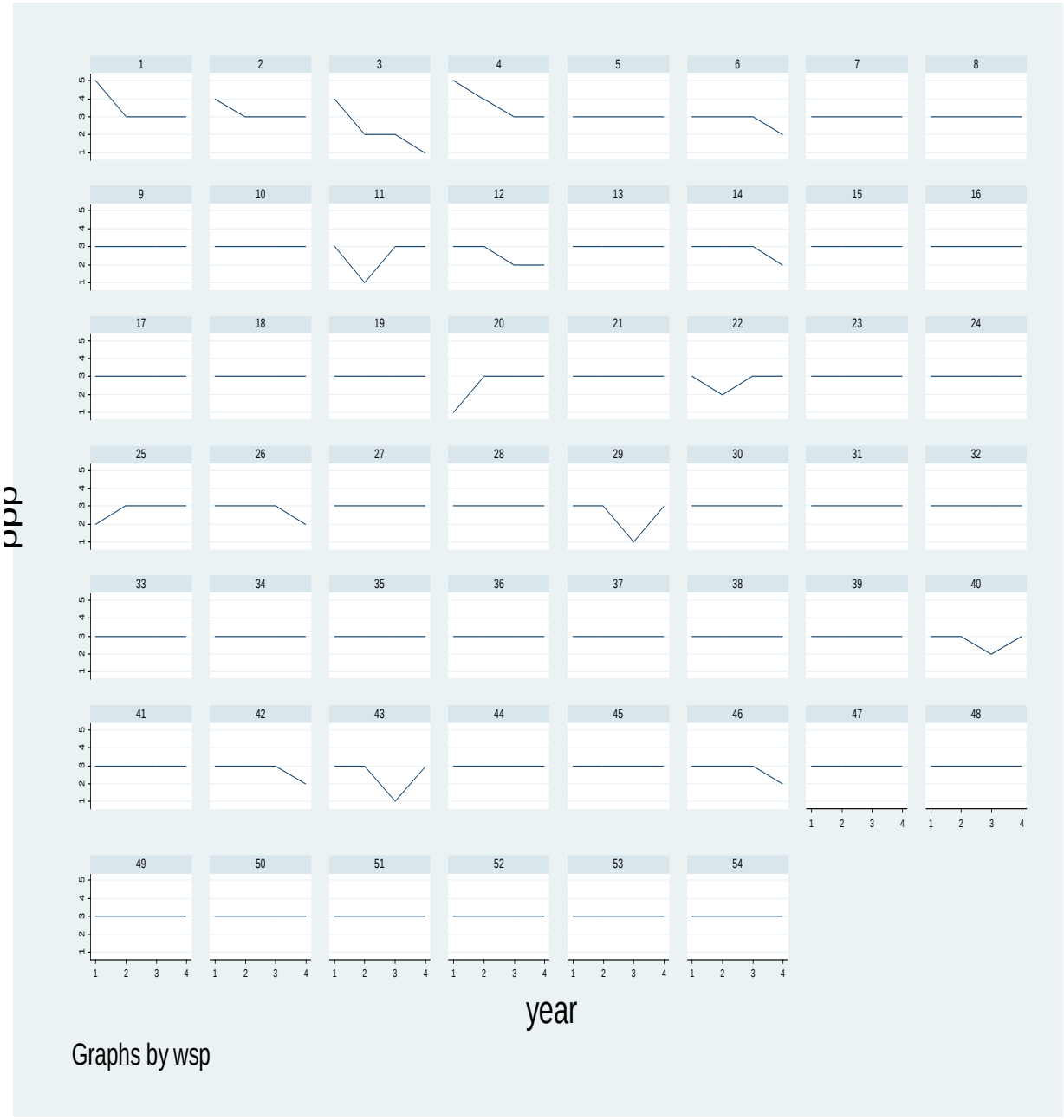


Figure 6 trend lines for PPP depicts largely a constant partnership with the private sector, the nature of support are three consultants for technical, finance and social. There are some

instances when more will be deployed and sometimes less depending on the nature of weakness and request of the WSP.

FIGURE 7

Overlain plots of PPPs arranged by WSTF for WSPs

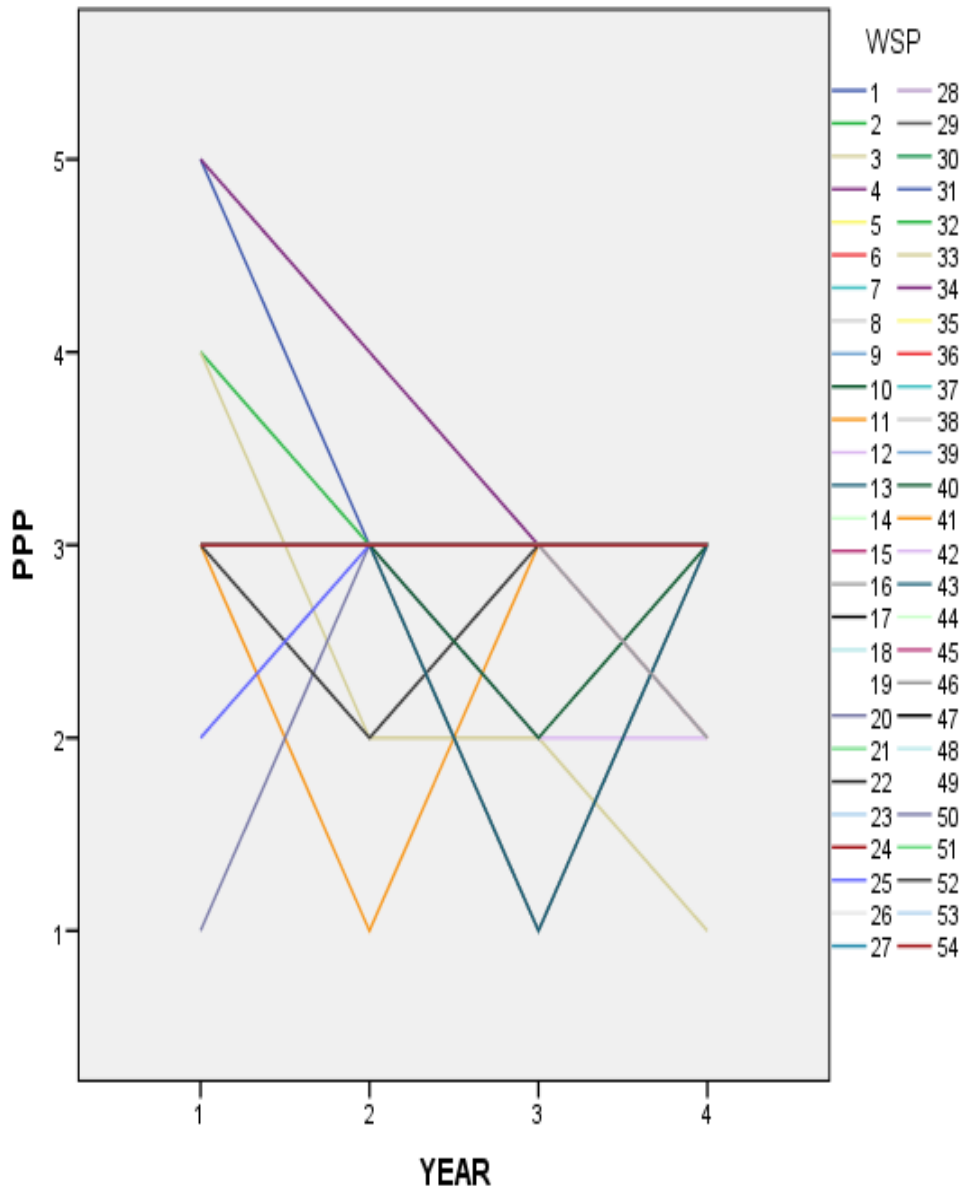
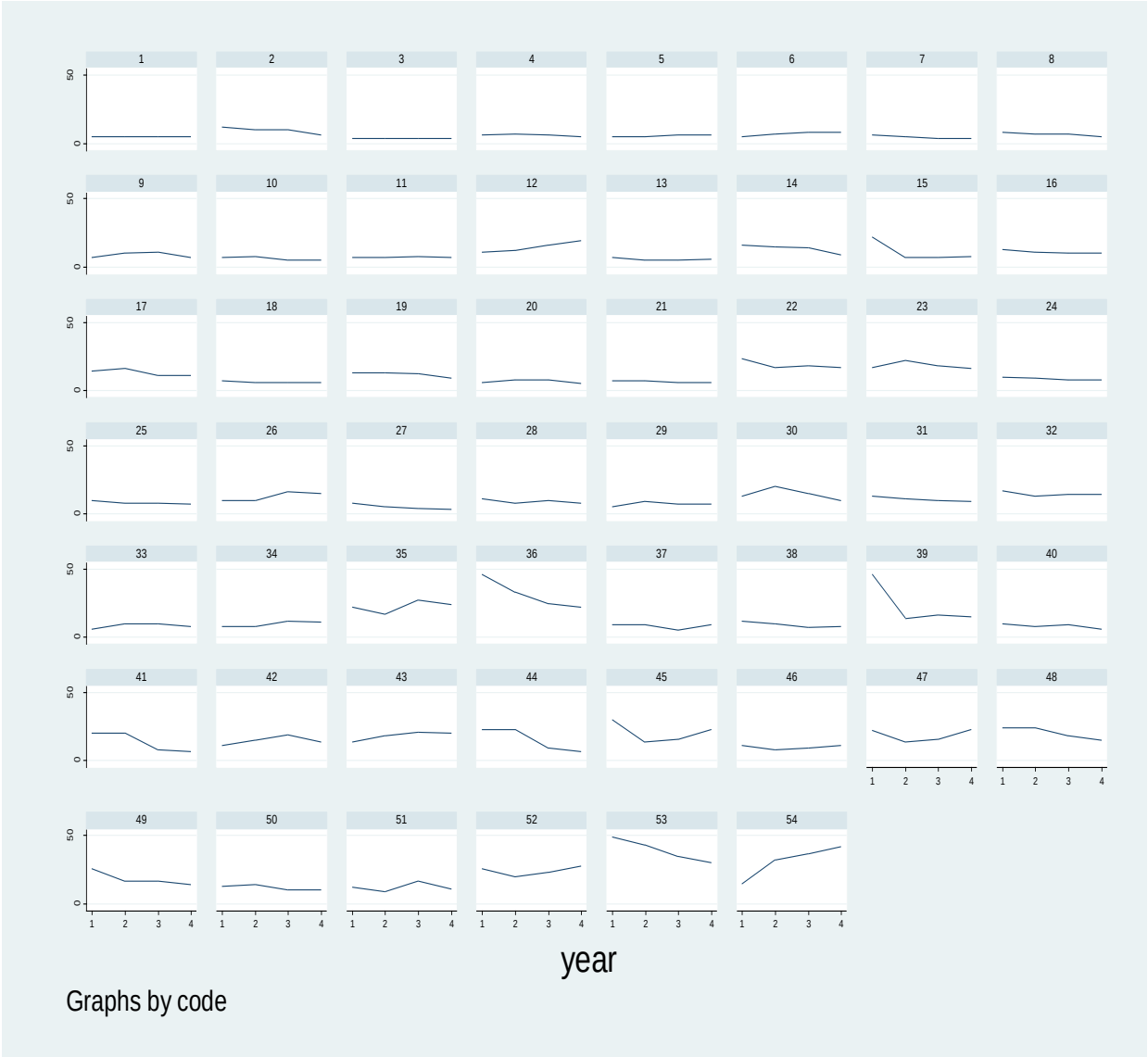


Figure 7 of the overlain plots shows that most of the WSPs partner with three private sector consultants except a few would either request for more or decline for whatever reasons. WSPs 4,

1 and 12, 32 and 11, 24 Share the same intercept but their slopes differ confirming that fixed time effect is not significant between them.

FIGURE 8

Trend lines of ratio of staff to 1000 Customers in WSPs

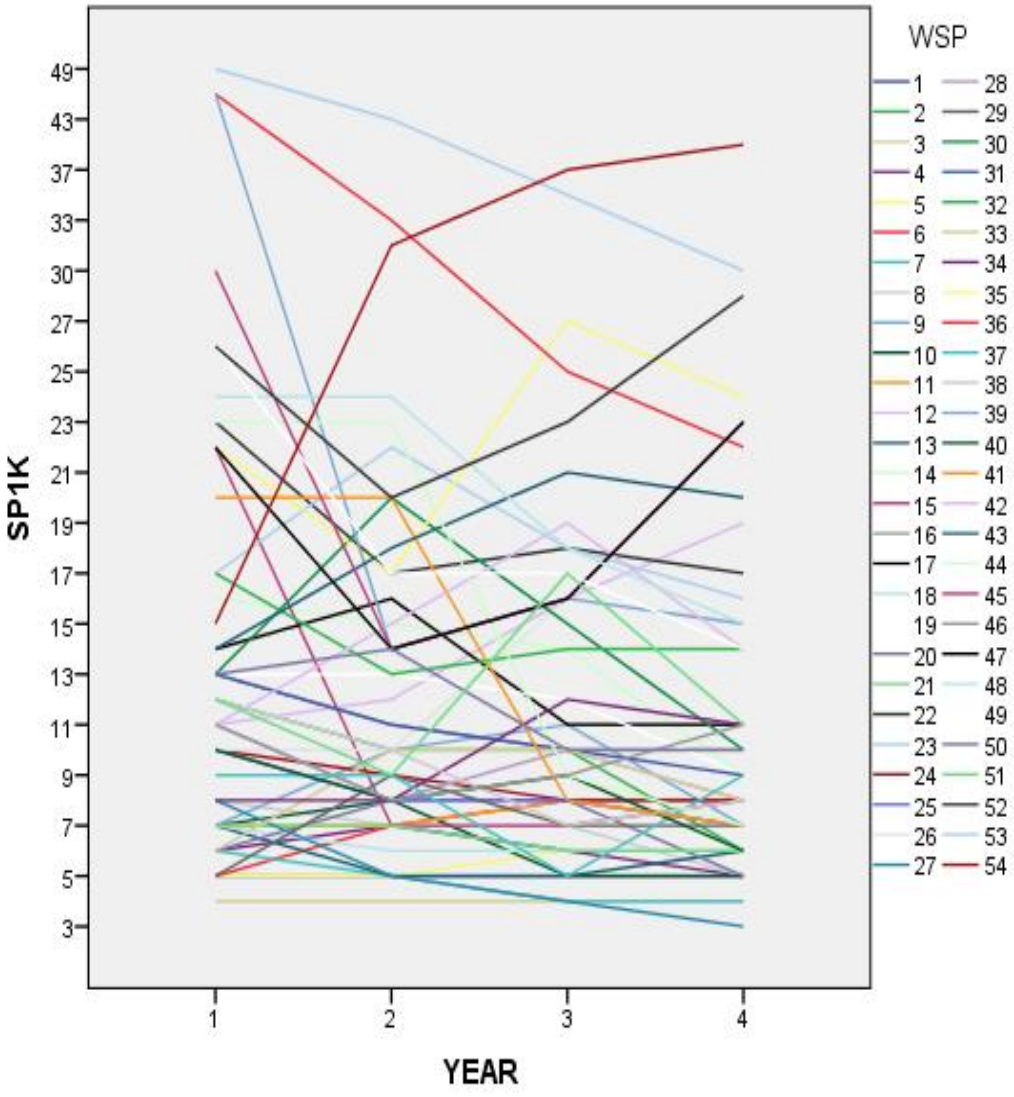


Staff productivity refers to the number of staff in employment for every 1000. It measures the efficiency of WSPs in utilizing its staff with low figure indicating high staff productivity.

Figure 8 the trend lines depicts a constant ratio of staff to customers. However, some medium and small have a mixed trend either declining or increasing depending on the measures put in place. WSPs 36, 39, 41 has shown a remarkable decline in the ratio meaning significant improvement.

FIGURE 9

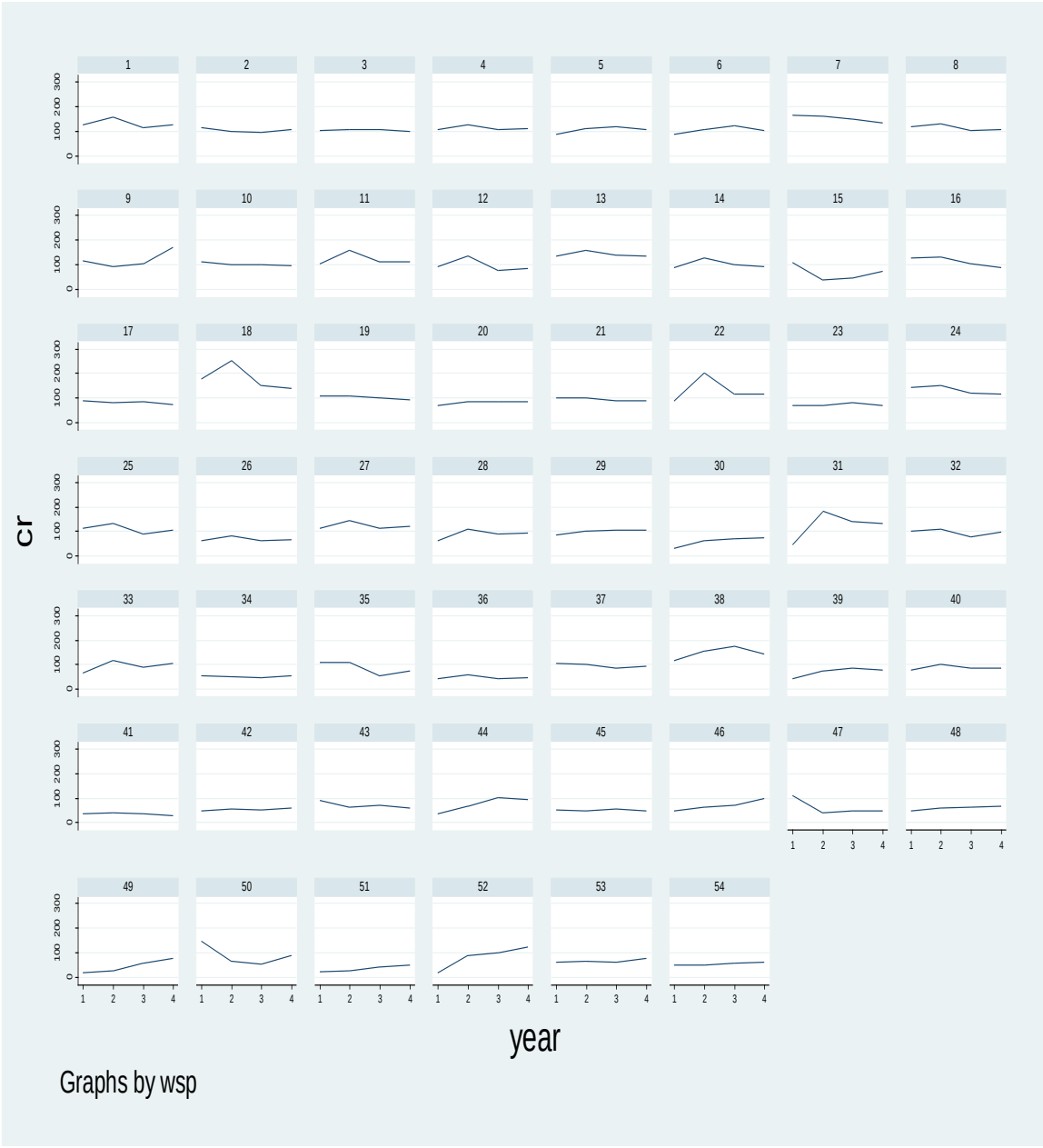
Overlain Plots of ratio of staff to 1000 customers in WSPs



In figure 9 shows WSPs 2, 43 and 27, 36 and 6, 28 and 47, 15 and 17, 39 share the same intercept but their slopes differ meaning the fixed time effect is not significant between them.

FIGURE 10

Trend lines of Cost Recovery in WSPs



Cost coverage is the extent to which internally generated funds cover the cost of running a WSP.

Figure 10 trend line for cost recovery generally shows decline in cost recovery with WSPs 18, 47, 50 performing poorly while WSPs 46, 49 have done fairly well.

FIGURE 11

Overlain plot of Cost Recovery in WSPs

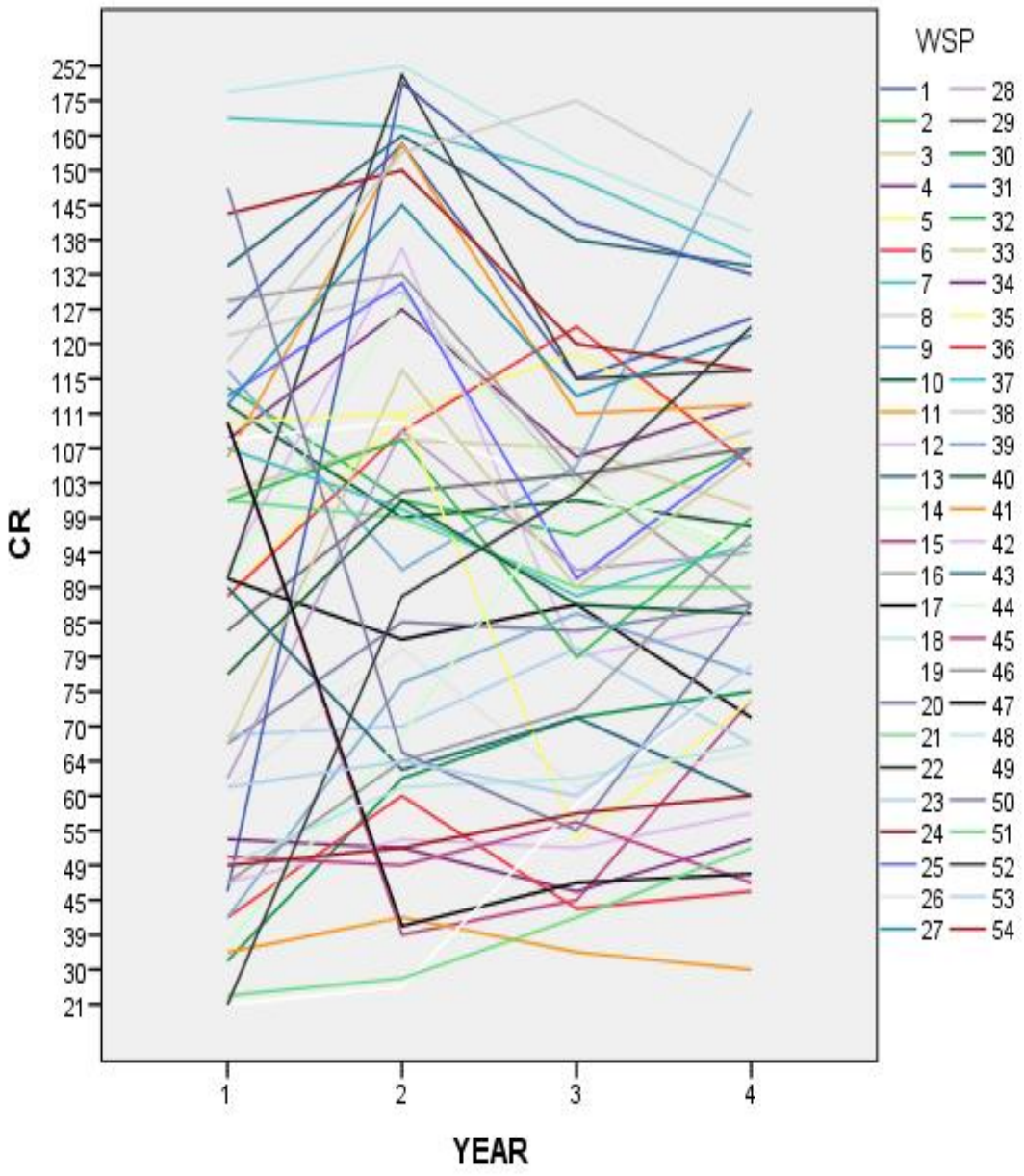
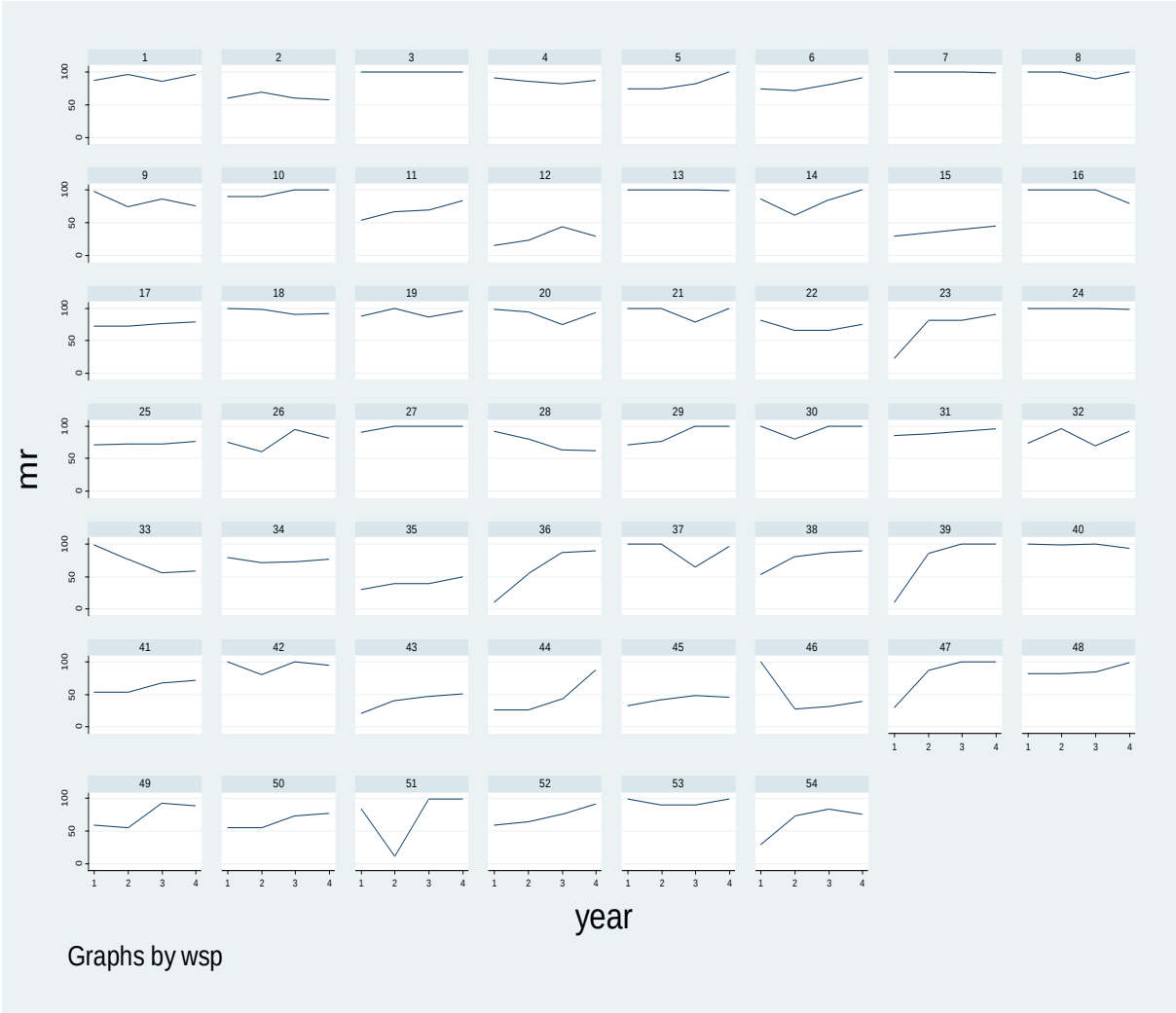


Figure 11 of the overlain plot of cost recovery confirms that WSPs 30,32 and 47,17 share the same intercept but there slopes differ meaning that fixed time effect between them is not significant.

FIGURE 12

Trend lines for Metering Ratio in WSPs



Metering ratio is expressed as a percentage of total number of active water connections. It measures the extent to which WSPs have been able to install meters to their customers. This is

important for WSPs since it is only through the meters that the WSPs are able to charge consumers and thereby raise revenue.

Figure 12 trend lines shows a general improvement of metering ratio apart from WSPs 16, 28 33 which shows decline meaning a deterioration in performance.

FIGURE 13

Overlain plot of Metering Ratio in WSPs

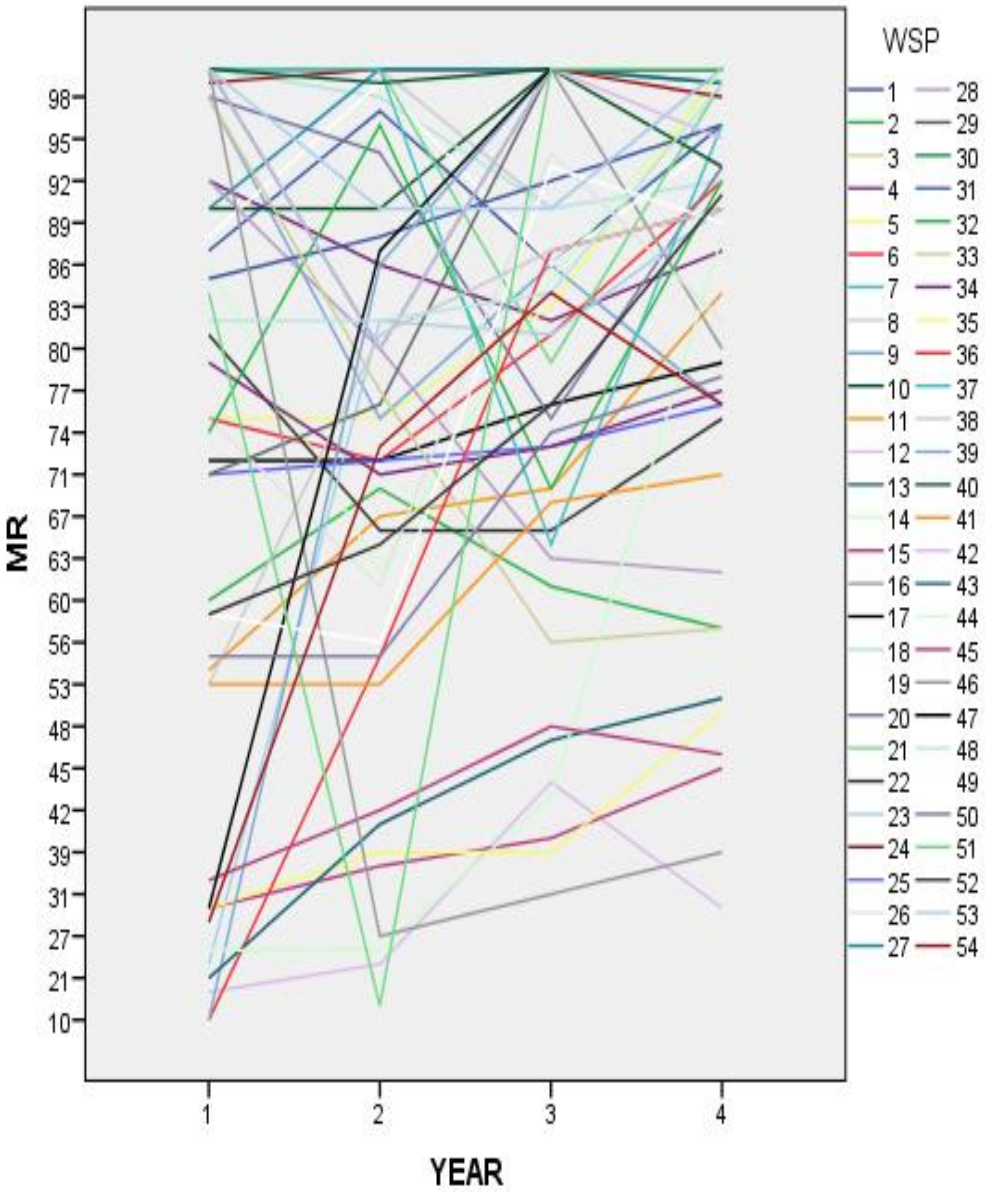
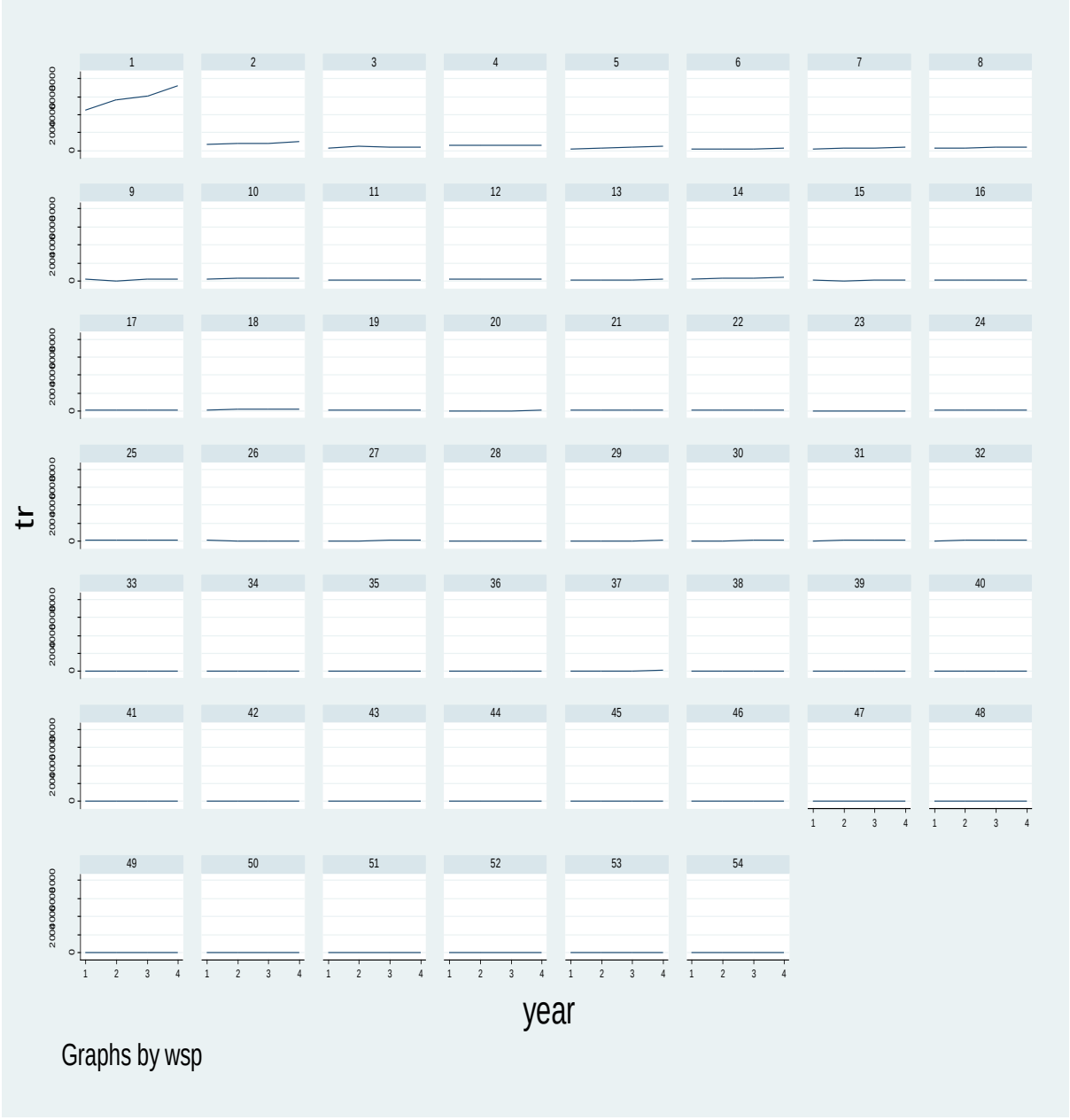


Figure 13 the overlain WSPs 7,10 4,12 42,27 share the same intercept and their slops differ meaning that fixed time effect is not significant between them.

Figure 14

Trend lines of Total Turnover (millions) for WSPs



Turnover measures the total revenue collected by the WSP.

Figure 14 the trend lines shows a constant turnover trend except for WSP 1 which has an improvement trend.

FIGURE 15

Overlain plot of Total Turnover (millions) for WSPs

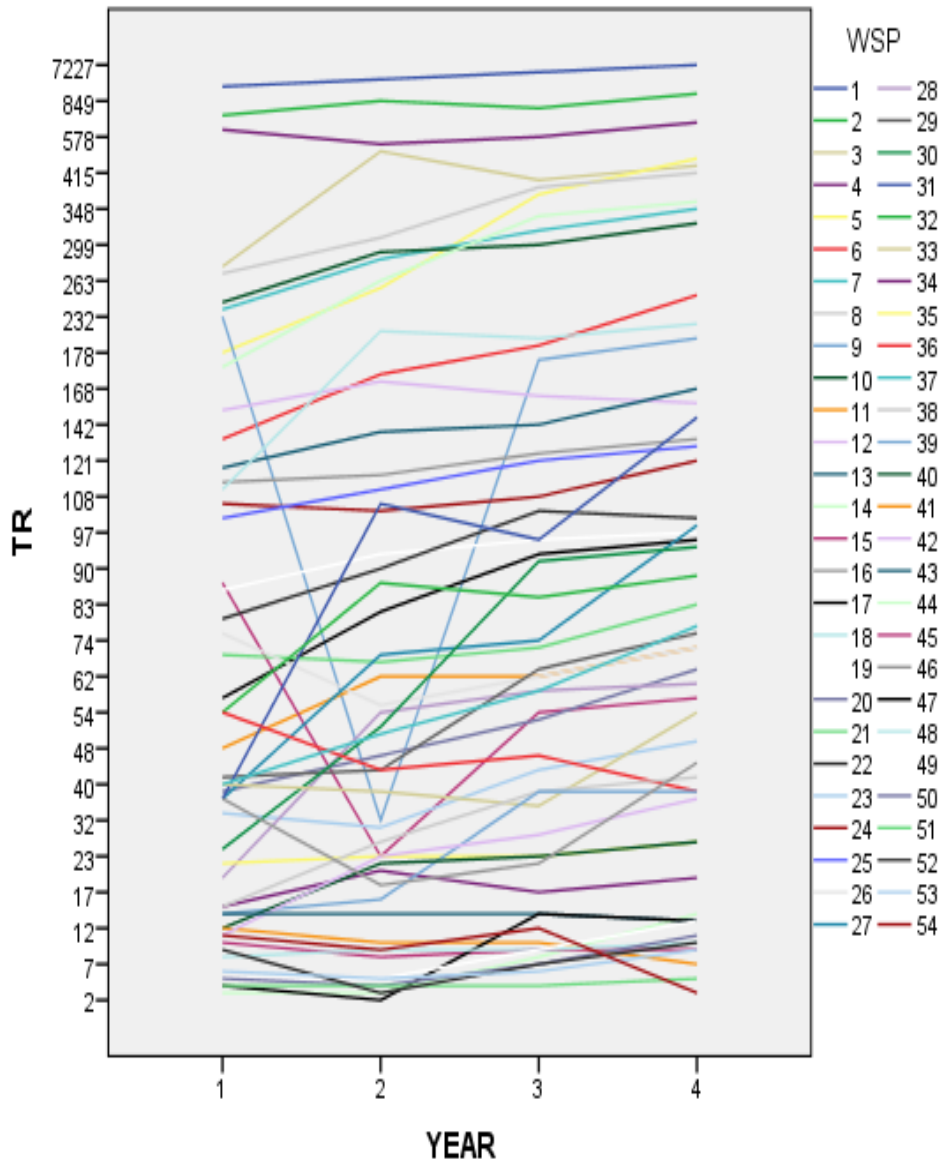


Figure 15 the overlain plot confirms the pattern that the turnovers remain constant with a struggling improvements.

4.2 Panel Data Analysis

Panel data analysis using either the fixed effects or the random effects model was applied to analyze the data for the 54 WSPs. To decide between fixed or random affects run a Hausman test where the null hypothesis is that the preferred model is fixed effects vs. the alternative the random effects. It basically tests whether the unique errors (μ_i) are correlated with the regressors, the null hypothesis is that they are not. Run a fixed effects model and save the estimates, then run a random model and save the estimates, then perform the test. If the p-value is significant (for example <0.05) then use fixed effects, if the inference indicates that there is no random effects.

First the study tested whether there were time fixed effects that were required when running the fixed effect model. The results are presented in Table 5 indicated that there were no time fixed time effects that were required to be included in the model ($p > 0.05$).

TABLE 5

Test for fixed time effects

Model	Dependent variable	F	Prob > F
1	SP1C	0.98	0.5172
2	TR	2.19	0.3128
3	MR	1.16	0.4719
4	CR	1.33	0.4111

Then establish which model was well suited for the random effect a Bresuch Pagan LM test was run to establish if the random effect was appropriate The Hausman test results indicated that the random effects panel data analysis model was the best suited for the data ($p > 0.05$). Four models using the random effects regression model were run relating the independent variables with each

of the four dependent variables: Breusch-Pagan Lagrange multiplier (LM) test (Table 6). This was done to establish whether there were significant random effects from one WSP to another which made random effects model better than the fixed effect model. The results indicated that there were significant differences across WSPs ($p < 0.05$) and hence running a random effects model was more appropriate.

Table 6

Bresuch Pagan LM test for Random Effects

Model	**Dependent variable**	**Chi^2**	**Prob > Chi^2**
1	SP1C	143.86	0.0000
2	TR	170.13	0.0000
3	MR	31.98	0.0000
4	CR	63.81	0.0000

4.3 Diagnostic Analysis

Before performing the panel regression model, the data was subjected to diagnostic tests to test whether the data was fit to be analyzed through panel regression analysis. First, any linear regression model assumes homoskedasticity where all variance of residuals are assumed to remain constant. To test for homoskedasticity, the Modified Wald test for group-wise heteroskedasticity was applied. The results are presented in Table 7 These results indicate that there is no evidence of the presence of heteroskedasticity in all the four models as the significance for all of them is above 0.05.

TABLE 7
Modified Wald Test for Group-wise Heteroskedasticity

Model	**Dependent variable**	**χ^2- value**	**p-value**
1	SP1C	3.17	0.121
2	CR	2.29	0.141
3	MR	2.81	0.136
4	TR	1.18	0.244

Further, a test was done using Woodridge Drukker statistic to establish whether the error terms were serially correlated (Table 8). In the case of the data that was included in the study, the assumption of no serial correlation was not satisfied in the panel regression model relating to the ratio of staff per 1000 customers. This was because the p-value was below 5%. All other models indicated that errors were not serially correlated ($p > 0.05$). However in time series data, this assumption is hard to satisfy since some of the performance factors are affected by previous years. Nevertheless, in relation to serial correlation, Bryman (2007) noted that it does not bias the estimators when the number of periods is less than 10. Since our case had four years, the serial correlation could not bias the regression estimators and hence the estimators could be relied on.

Table 8
Woodridge Drukker Test For Serial correlation

Model	Dependent	F-value	p-value
1	SP1C	4.119	.045
2	CR	3.382	.093
3	MR	3.281	.148
4	TR	2.932	.177

Panel Regressions

Results in Table 9 indicate the panel regression of the ratio of staff to 1000 customers against the three independent variables.

Table 9

Panel regression against ratio of staff to 1000 customers

```
. xtreg sp1k ct gr cbs ppp, re

Random-effects GLS regression                   Number of obs      =       216
Group variable: wsp                             Number of groups   =        54

R-sq:  within  = 0.0239                         Obs per group: min =         4
       between = 0.3993                                        avg =       4.0
       overall = 0.3381                                        max =         4

                                                Wald chi2(4)       =     38.40
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

sp1k	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ct	.1431516	.0242707	5.90	0.000	.095582	.1907212
gr	.0100855	.0424725	0.24	0.812	-.0731592	.0933301
cbs	.022826	.0107325	2.13	0.033	.0017907	.0438613
ppp	-.0043219	.0205969	-0.21	0.834	-.0446911	.0360473
_cons	.545761	.313291	1.74	0.082	-.0682781	1.1598
sigma_u	.16850531					
sigma_e	.11457367					
rho	.68384497	(fraction of variance due to u_i)				

The regression results presented in Table 9 indicate that the model has explanatory power at 5% significance level ($F = 38.58$; $p < 0.05$). Further, the model explains 39.93% of the differences in the ratio of staff to 1000 customers in WSPs. Moreover, capacity building sessions ($\beta = 0.0228$; $p < 0.05$) had significant positive effect on the ratio of staff per 1000 customers. However, grants ($\beta = 0.0101$; $p > 0.05$) and PPPs ($\beta = -.0043$; $p > 0.05$) had no significant influence on the ratio

of staff to 1000 customers in the WSPs. The category of the WSP (β = .1432; p < 0.05) which was used as the control variable indicated that the larger WSPs had lower ratio of staff to 1000 customers.

Further the regression of cost recovery ratio against the three independent variables was conducted. The results are presented in Table 10

TABLE 10

Panel regression against cost recovery ratio

```
Random-effects GLS regression                   Number of obs      =       216
Group variable: wsp                             Number of groups   =        54

R-sq:  within  = 0.0050                         Obs per group: min =         4
       between = 0.4555                                        avg =       4.0
       overall = 0.3305                                        max =         4

                                                Wald chi2(4)       =     43.13
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

cr	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ct	-.1040378	.0169222	-6.15	0.000	-.1372047	-.070871
gr	.0518755	.041307	1.26	0.209	-.0290848	.1328358
cbs	.0008947	.0106116	0.08	0.933	-.0199037	.021693
ppp	-.017638	.0203571	-0.87	0.386	-.0575371	.0222611
_cons	1.901513	.2998372	6.34	0.000	1.313842	2.489183
sigma_u	.10786229					
sigma_e	.11566171					
rho	.46514946	(fraction of variance due to u_i)				

Results presented in Table 10 indicate that the model was statistically significant (F = 43.13; p < 0.05). The three independent variables however; grants (β = 0519; p > 0.05), capacity building sessions (β = 0.00089; p > 0.05), PPPs (β = -0.0176; p > 0.05) did not have significant influence on the cost recovery ratio in the WSPs. The category of the WSP (β = -.104; p < 0.05) which was

used as the control variable indicated that changing status to a larger category adversely affect cost recovery.

TABLE 11

Panel regression against metering ratio

```
Random-effects GLS regression                   Number of obs      =       216
Group variable: wsp                             Number of groups   =        54

R-sq:  within  = 0.0494                         Obs per group: min =         4
       between = 0.1432                                        avg =       4.0
       overall = 0.0980                                        max =         4

                                                Wald chi2(4)       =     16.84
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0021
```

mr	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ct	-.0383273	.0177675	-2.16	0.031	-.0731509	-.0035038
gr	.1041243	.0509965	2.04	0.041	.0041729	.2040757
cbs	-.0352852	.0132782	-2.66	0.008	-.0613101	-.0092604
ppp	-.0110838	.0254673	-0.44	0.663	-.0609988	.0388311
_cons	1.33169	.367669	3.62	0.000	.6110718	2.052308
sigma_u	.10307848					
sigma_e	.14567916					
rho	.33362562	(fraction of variance due to u_i)				

A regression of metering ratio against the three independent variables was conducted. Results are presented in Table 11 which indicate that the model was statistically significant ($F = 16.84$; $p < 0.05$). Further, findings indicated that capacity building sessions had a negative and significant effect on metering ratio ($\beta = -0.353$; $p < 0.05$). Grants ($\beta = 0.041$; $p < 0.05$) had significant and positive effect on metering ratio. This indicates that increase in capacity building sessions would lead to a reduction in metering ratio by the WSPs while increase in grants would lead to an improvement in metering ratio in the WSPs. However, PPPs ($\beta = -.0111$; $p > 0.05$) did not have

significant influence on the metering ratio in the WSPs. The category of the WSP (β = -.0383; p < 0.05) which was used as the control variable indicated that changing category to a larger one would adversely affect the firm's metering ratio.

TABLE 12

Panel regression against turnover

```
Random-effects GLS regression                   Number of obs      =       216
Group variable: wsp                             Number of groups   =        54

R-sq:  within  = 0.0524                         Obs per group: min =         4
       between = 0.8006                                        avg =       4.0
       overall = 0.7655                                        max =         4

                                                Wald chi2(4)       =    209.68
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

tr	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ct	-.5515875	.0398355	-13.85	0.000	-.6296636	-.4735114
gr	.1379983	.0598001	2.31	0.021	.0207923	.2552042
cbs	-.0415919	.0150434	-2.76	0.006	-.0710765	-.0121073
ppp	-.0390521	.0288755	-1.35	0.176	-.095647	.0175429
_cons	2.463205	.4455168	5.53	0.000	1.590008	3.336402
sigma_u	.27792995					
sigma_e	.15662918					
rho	.75895813	(fraction of variance due to u_i)				

Lastly, a regression on the effect of the three independent variables on turnover of the WSPs was conducted. The results are presented in Table 12. The study results indicate that the model was significant (F = 209.68; p < 0.05). The study findings indicate that grants (β = .1380; p < 0.05) had a significant positive effect on turnover. However, capacity building sessions (β = -.0416; p < 0.05) had significant negative effect on turnover of the WSPs. Further the study results reveal that PPP contracts arranged by WSTF had no significant effect on turnover of the WSPs (β = -

.0391; $p > 0.05$). This indicates that increase in PPP contracts would result to an insignificant negative effect on turnover of the WSPs. The category of the WSP ($\beta = .5515$; $p < 0.05$) which was used as the control variable indicated that changing categories to larger one would adversely affect turnover.

CHAPTER FIVE

FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summery of findings; the conclusion and recommendations of the study on the effect of donor support by water services trust fund on the performance of water services providers in Kenya.

5.2 Discussion of the study findings

Firm evidence of the contribution that grant aid makes to performance outcomes is not easy to come by due to paucity of rigorous studies undertaken that examine the relationship between grants and performance outcomes of institutions; they focus mostly on the mechanics of aid delivery (Riddel, 2008). General review of sectorial aid have pointed to positive outcomes, especially in relation to an expansion in access to services such as provision of water. Many of the grant objective that are expected to be achieved are premised on the fundamental assumption that grants are effective. Yet the effectiveness of grant on performance and other developmental outcomes have been questioned for a while now. Some think that support generally is harmful, a failure or counterproductive in terms of effectiveness criteria (McGillivray, 2003). Burnside and Dollor (2000) found out that grants have no effect on performance and that effectiveness is contingent of conditions of the recipient organization. The reason that appears to support grant, after years of no clarity in research circles over effectiveness is the employment of better empirical methods and have access to better data, making it possible to observe such an effect. This of course implies that aid might always have been effective, and that earlier studies were simply not able to observe such an impact (McGillivray, 2003). Hence it leads us to the agency

theory and examine whether the agent (read WSPs) has acted in the best interest of the principal (WSTF). WSTF funding and indeed many other funding must comply with certain conditionality. In the case of WSTF, water must be extended to serve areas that are underserved or not served at all. Except for a few WSTF funded projects at least 98% implemented through funding the WSPs have been completed and commissioned. They have been further certified as to meet there initial objectives. It follows that goal congruency has been achieved.

5.2.1 Grant

Grant has a positive effect on metering ratio and turnover. These two measurement of performance have a direct relationship with the financial health of the WSPs. Therefore WSTF and WSPs can take advantage to maximize their return. The study shows that grants do not have significant effect on the staff productivity and cost recovery ratio. Most aid focuses on whether immediate goals have been achieved and this one is not different. The issue of sustainability then emerges because WSPs expect WSTF to understand their goals; clearly this is the case. If the funding of the projects do translate to WSPs enhanced performance, then it has the supported of WSPs. the immediate objectives are met of supplying water to the underserved and the benefits of enhanced performance are enjoyed by WSPs as well.

5.2.2 Capacity building

Another major component of WSTF support is ‘technical assistance’ (TA). This is aid in the form of trained personnel deploying their skills to achieve specific tasks and gradually sharing the skills with the recipient institution staff to eventually take over the tasks themselves (capacity building). Studies have shown that institutions are finding it hard to retain the skilled obtained. More often than not the staff trained would rather be ‘selfish’ in disseminating the skills to the rest of concerned colleagues or in some cases opt for greener pastures (World Bank,

2005). Stakeholders' theory postulates that the support that WSPs receive from WSTF should be maximized so as to benefit WSTF as part of stakeholders. The study suggests that capacity building has a positive effect on staff productivity therefore such intervention should be encouraged. However, there is a negative influence on metering ratio and turnover which may indicate that capacity building is harmful, a failure or counterproductive in terms of effectiveness criteria (McGillivray, 2003). This would require more study in this area to establish the reason for such relationship.

5.2.3 Public-Private Partnership

PPP is designed to "fill the gap" created by capacity building. By deploying independent consultants to train WSPs on matters technical, finance and social. The private partners would impart knowledge and training to the institution as a whole as opposed to capacity building which targets the staff who are directly involved in the project implementation. The private partner in conjunction with WSPs staff will identify institutional weakness and design training to disseminate the knowledge. Though this is a noble idea, most WSPs lack enough resources to implement what the 'knew knowledge' entails. Issues like an overhaul of old production facilities to become efficient, new quality control methods, new maintenance equipment and new durable materials would surely require major capital injection. It is for this reasons rapid improvement on performance would remain elusive.

According to the results PPP has no significant effect on turnover, staff productivity, cost recovery ratio and metering ratio. This relationship as contrived by WSTF need to be relooked and find ways of implementing suggested intervention in terms of internal weaknesses.

5.3 Conclusion

According to Ed Freeman (1984), 'stakeholder' refers to those groups without whose support an organization would not exist. The survival of WSPs in Kenya has largely depended of the generosity of Government and the donors. As part of the study, stakeholders' theory focuses on the understanding of WSPs performance in light WSTF assistance. The theory stipulates that management of the WSPs should aim at providing best value to all stakeholders. There is no doubt that the WSTF's support to WSPs is important. However, we must put assistance to test and gauge whether the support that WSPs get has resulted to higher value.

The findings indicates that grant has a major of support to WSPs, has a significant positive effect on the metering ratio and turnover. This means that an increase in grants to WSPs will positively affect performance on metering ratio. That is, it will result to increase in number of active connected customers. It is through meters that WSPs are able to charge customers and therefore raise revenue. Grants have a positive effect on turnover as well. This is consistent with the relationship of more customer being charged and direct correlation with revenue. However, on the other hand Grant seems not to have any effect on cost recovery and staff productivity. In terms of metering ratio WSPs seems to maximize WSTF's 'return' by having more people served. They further increase revenue to maximize other stakeholders return and increasing the WSPs' sustainability.

Agency theory describes the relationship between the principal that delegates work to another called agent. It explains their differences in behaviour or decisions by noting that the two parties often have different goals and dependent on their various goals, may have different attitudes towards risk. WSTF views WSPs as their agent to actualize their objective of financing

projects that would serve the underserved or not at all. On the other hand, WSPs would view WSTF as a principal who would help solve the problem of performance. WSTF is therefore motivated by their mission to make water accessible to all while WSPs are motivated by the need to improve performance. To minimize goal incongruence WSTF endeavor to capacity build staff in the WSPs who deal with the project directly with skills and knowledge in order to execute the project as desired. The imparting of skills and knowledge is with the understanding that they will be shared with the rest in the organization. The result of the study confirms this that with more capacity building sessions there is a positive effect on staff productivity. Therefore, we would safely say that WSTF has put measures in place to ensure the agency problem is minimized. However, capacity building sessions seems to have negative effect on metering ratio and turnover. This is a peculiar relationship is the instance where support is considered to be harmful as alluded to by McGillivray, 2003. PPP as contrived by WSTF seems not to have any effect on the overall performance of WSPs. This relationship need to be re-examined.

5.4 Suggestions for Further Research

The study would recommend a further study on:

(a) Impact of WSPs' governance on performance.

(b) How WSTF would effectively deliver aid to improve performance of water services providers.

References

Andrea Guerrini Giulia Romano Bettina Campedelli, (2011),"Factors affecting the performance of water utility companies", *International Journal of Public Sector Management*, 24 Issue 6. 543 – 566

Bayliss, K. (2003). Utility privatization in sub-Saharan Africa: A case study of water. *The Journal of Modern African Studies,* 41, 507–531.

Clarke, G., Kosec, K., & Wallsten, S. (2009). Has private participation in water and sewerage improved coverage? Empirical evidence from Latin America. *Journal of International Development*, 21, 327– 361.

Curtis C. Verschoor. (1999) Corporate Performance is Closely Linked to a Strong Ethical Commitment

DANIDA (2010).Lesson learned and good practices from the support to the water sector in Kenya, Working Paper.

Daniel K. Sambua & Aondover Tarhule (2013) Progress of water service providers in meeting millennium development goals in Kenya. African Geographical Review, 32:2, 105-124,

Dennis Mwanza (2006).Benchmarking of utilities for performance improvement, *Seminar paper*

Estache, A., & Kouasi, E. (2002). Sector organization, governance and the inefficiency of African Water Utilities (Policy Research Working Paper 2890). Washington, DC: World Bank Institute

Etzioni, A. (1998) A communitarian note on stakeholder theory. *Business Ethics Quarterly*, 8 (4): 679-691.

Francesc Bellaubi & Jan Teun Visscher (2014) Water service delivery in Kenya and Ghana: an area-based assessment of water utility performance, Water International, 39:7,952-968,

Freeman, R., Harrison, J. and Wicks, A. (2008) Managing for Stakeholders: Survival, Reputation, and Success. New Haven and London. Yale University Press

Galiani, S., Gertler, P., & Schargrodsky, E. (2005). Water for life: The impact of the privatization of water services on child mortality. *Journal of Political Economy*, 113, 83–120.

Gathairu James (2012) An investigation on financial performance of water service providers licensed by Rift Valley Water Services Board. Unpublished Thesis

Githinji, Stephen (2012) Factors affecting the performance of water service providers in Kenya: a case of Tana Water Service Board. Unpublished Thesis

GoK(2007).The National Water Services Strategy (NWSS) (2007 – 2015)

Grace Wambui (2011).Factors influencing revenue generation among water service providers in Kenya: a case of Nyeri County, Kenya. Unpublished Thesis

Hukka J. and Katko T. (2004).*Liberalization of Water Sector*. Japan: UNU Press.

Jensen MC, Meckling W (2006). Theory of the firm: managerial behavior, agency costs, and capital structure. *Journal of Finance and Economics, 3*, (1): 305-360.

Jensen, M. C (2006). Agency costs of free cash flow and corporate finance and Okeyo, Joseph.(2013). The public service delivery challenge: a public-private sector partnership in water service provision in the Lake Victoria basin, Kenya. Unpublished Thesis

John Hailey and Rick James (2003). NGO Capacity Building: the Challenge of Impact Assessment. INTRAC, Oxford

K'akumu, O., & Appida, P. (2006). Privatization of urban water service provision: The Kenyan experiment. Water Policy, 8, 313–324.

Kayaga, S. (2008). Public-private delivery of urban water services in Africa. Management, Procurement and Law, 161, 147–155.

Kingdom B.,Liemberger R. and P. Marin,(2006). The Challenge of Reducing Non-Revenue Water (NRW) in Developing Countries. Washington DC: World Bank

Maria Zenovia, Viorica Mirela(2010). Agency theory and optimal capital structure, research paper

McGillivray, M. and Ouattara (2004), "Aid, Debt Burden and Government Fiscal Behaviour in of African Economies, forthcoming.

Mehta, M.Cardone,Fugelsnes (2009). How can reforming African water utilities tap local financial markets? : Insights and recommendations from a practitioners' workshop in Pretoria, South Africa. Nairobi, Kenya

Morrissey, O. (2001), "Does Aid Increase Growth?" *Progress in Development Studies,* Vol. 1, No. 1, pp 37-50.

Nyaboke Onsomu, Walter Bichanga, Dr Charles Munene, Ongondo Obonyo(2013) Factors Influencing the Financial Viability of a Water Service Provider in Kenya: The Case of Gusii Water and Sanitation Company Limited *International Journal of Arts and Commerce Vol. 2 No. 9*

Nyangena, K.O. (2008). Privatization of Water and Sanitation Services in Kenya: Challenges and Prospects. *Africa Development,* Vol. XXXIII, No. 4, 2008, 117–131

Owuor, S.O & Foeken, D. W. J. (2009). Water reforms and interventions in urban Kenya: Institutional setup, emerging impact and challenges *ASC Working Paper* 83 / 2009

Philippe Marin, (2009).Public-Private Partnerships for Urban Water Utilities' Review of Experiences in *Developing Countries*. World Bank, Washington DC, USA.

Philippe Marin, (2009).Public-Private Partnerships For Urban Water Utilities' Review Of Experiences In Developing Countries.World Bank, Washington DC, USA

Sambu, D. (2011). Water reforms in Kenya: A historical challenge to ensure universal water access and meet the millennium development goals, A Published Ph.D. dissertation

Schwartz, K. (2006). Managing Public Water Utilities. An assessment of bureaucratic and new public management models in the water supply and sanitation sectors in low- and middle-income countries (PhD thesis), Erasmus University Rotterdam. Delft, the Netherlands: UNESCO-IHE Institute for Water Education

Surender Kumar & Shunsuke Managi (2010) Service Quality and Performance Measurement: Evidence from the Indian Water Sector, *International Journal of Water Resources Development,* 26:2, 173-191

Tynan,N and Kingdom W. (2002).Effective Water Service Provision. World Bank, Washington.

UNESCO. 2008. *Education for All by 2015 – will we make it?* The EFA Global Monitoring Report 2008. Paris: UNESCO. Retrieved 27 March 2008 from: http://portal.unesco.org/education/en/ev.php-URL_ID=49591&URL_DO=DO_TOPIC&URL_SECTION=201.html

WAREB (2014), A Performance Review of Kenya's Water Services Sector 2012 – 2013. Issue 4-7

WASPA (2014), Water and sanitation service providers bulletin Issue 1.

World Bank (2004), *Reforming infrastructure: Privatization, regulation, and competition.* World Bank Policy Research Report. Washington D.C.: World Bank.

World Bank (2010).*The Africa Utility Performance Assessment.* .Washington DC: World Bank.

WSTF (2008), WSTF Strategic plan 2008-2013

APPENDIX I

Urban WSPs		*Rural WSPs*		***Urban WSPs***		*Rural WSPs*	
	WSP		WSP				
Very large WSPs (≥35,000 Connections)				Medium WSPs (5000-9,999 connections) cont...			
1	Nairobi			38	NolTuresh Loitokitok		
2	Mombasa			39	Kiambu		
3	Eldoret			40	Lodwar		
4	Nakuru						
5	Thika						
Large WSPs (10,000- 34999 connections)				Small WSPs (>5,000 connections)			
6	Nzoia	65	Othaya	41	Kibwezi Makindu	80	Nyandarua
7	Nyeri	66	Murang'a South	42	Gulf	81	Murugi
8	Kisumu	67	Gatundu South	43	Karuri	82	Embe
9	Kakamega	68	Kahuti	44	Nyanas	83	Muthambi 4k
10	Kirinyaga	69	Imetha	45	Lamu	84	Rukanga
11	Malindi	70	Tetu	46	Kiambere Mwingi	85	Ndaragwa
12	Mathira	71	Karimenu	47	Eldama Ravine	86	Kikanamku
13	Nakuru Rural	72	Gatamathi	48	Narok	87	Mawingo
14	Embu	73	Ngandori	49	Mandera	88	Nyasare
15	Kilifi			50	Kapsabet Nandi	89	Kathiani
16	Tililbei			51	Kapenguria	90	Tachasis
17	Kericho			52	Naivasha	91	Engineer
18	Gusii			53	Mwala	92	Nyakanja
19	Nanyuki			54	Maralal	93	Mbooni
20	Nyahururu			55	Yatta	94	Kinja
21	Kikuyu			56	Itein Tambach	95	Tia Wira
22	Muranga			57	Olkalou	96	Upper Chania
23	Tavevo			58	Namanga	97	Ruiri Thau
24	Sibo			59	Runda	98	Gitei
25	Meru			60	Kiamumbi	99	Kathita Kiirua
26	Garissa			61	Matungulu Kangundo		
27	Kwale			62	Wote		
Medium WSPs (5000-9,999 connections)				63	Moyale		
28	Ruiru Juja	74	Gatanga	64	Olkejuado		
29	Machakos	75	Ngagaka				
30	Limuru	76	Nithi				
31	Kitui	77	Githunguri				
32	Mavoko	78	Kyeni				
33	Olooaiser	79	Tuuru				
34	Isiolo						
35	South						
36	Mikutra						
37	Amatsi						

APPENDIX II

List of WSPs funded by WSTF

1	Nairobi	15	Tililbei	28	Machakos	42	Kiambere Mwingi
2	Mombasa	16	Kericho	29	Limuru	43	Eldama Ravine
3	Eldoret	17	Gusii	30	Kitui	44	Kapsabet Nandi
4	Nakuru	18	Nanyuki	31	Mavoko	45	Kapenguria
5	Thika	19	Nyahururu	32	Oloolaiser	46	Naivasha
6	Nzoia	20	Kikuyu	33	Isiolo	47	Mwala
7	Nyeri	21	Muranga	34	South Nyanza	48	Maralal
8	Kisumu	22	Tavevo	35	Amatsi	49	Yatta
9	Kakamega Busia	23	Sibo	36	NolTuresh Loitokitok	50	Itein Tambach
10	Malindi	24	Meru	37	Kiambu	51	Olkalou
11	Mathira	25	Garissa	38	Lodwar	52	Matungulu Kangundo
12	Nakuru Rural	26	Kwale	39	Kibwezi Makindu	53	Wote
13	Embu	27	Ruiru Juja	40	Karuri	54	Olkejuado
14	Kilifi Mariakani			41	Nyanas		