

UNIVERSITY OF CAPE TOWN



THE EFFICIENCY OF SERVICE DELIVERY MECHANISMS OF METROPOLITAN MUNICIPALITIES IN SOUTH AFRICA

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ABSTRACT

Municipalities in South Africa continue to struggle with service delivery because they lack the personnel, resources, and leadership to provide residents with timely, high-quality service. The study examined whether inefficiencies exist in the delivery channels of services to Metropolitan Municipality of South Africa; and also examine the effect of these modes of delivery of service delivery on returns to scale (constant and variable). The modes of delivery are in-house and outsourcing. The input-oriented method was applied to examine whether inefficiencies exist; while panel data regression was applied to determine the effect. The results show that inefficiencies exist in service delivery within some municipalities; both in input and output. The city of Johannesburg and Ekurhuleni recorded the highest slacks in output efficiency across all four services; while Mangaung was the most efficient in water, electricity and solid waste delivery with the least or no output slacks. The mode of delivery generally had a negative significant effect on service delivery with electricity topping the ranks in terms of inefficiency.

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GLOSSARY OF TERMS

COGTA Affairs	Department of Cooperative Governance and Traditional Affairs
MFMA	Municipal Finance Management Act 56 of 2003
MSA	Municipal Systems Act 32 of 2000
NT	National Treasury
PFMA	Public Finance Management Act 29 of 1999
SA	South Africa

CHAPTER 1 - INTRODUCTION

1.1 BACKGROUND TO THE STUDY

There have been several changes at the municipal and county levels of administration in South Africa since the introduction of democratic rule in 1994. Early concerns centred on maintaining administrative, political, and social stability. Municipal financial management, efficiency, and effectiveness have all received more focus since the passage of the Municipal Finance Management Act (MFMA) in 2003. Efficiency in the delivery of these services is crucial for enhancing the welfare of members and making the most of limited resources, since communities rely on municipalities to provide essential and basic services including electricity, water, sewerage and sanitation, and waste management.

The issue of efficiency in government will continue to rise to prominence and be scrutinised in light of budgetary constraints. Moreover, communities and organised community groups are increasingly holding the government responsible for how the government spends its money as a result of a growing democracy and informed citizenry. There has also been a rise in what are called "service delivery protests" in South Africa, in which individuals go to the streets to express their discontent with the government's provision of essential services. The government is under growing pressure from these sources to provide services in the most cost-effective ways possible.

Facilitating economic development is a key responsibility of local governments in developing nations, and this is particularly true when it comes to attracting investments and providing basic services to citizens. This duty strengthens the role of major cities as growth and development catalysts and providers of essential public services.

There are three levels of governance in South Africa: the national, provincial, and local. Policymaking is delegated mostly to the national and provincial levels, but service delivery falls primarily on the shoulders of municipal governments, which are also

sometimes called the "coal face" of government. There are three levels of local governments: the local, district, and metropolitan authorities.

Local governments may choose to offer these services in-house or contract them out to private companies. For the most part, local governments have always had to rely on their own employees to meet the needs of their residents. They have, however, begun to rely on other agencies, and the reasons for this transition differ. Some of them include higher production costs affected mostly by heavy bureaucratic overhead, easier access to novel ideas, and enhanced efficiency through concentrated effort. Since private manufacturing tends to have lower production costs, it is more efficient (Rodrigues, Tavares and Araujo, 2012). In urban locations, however, where local governments serve larger populations, services are presumably delivered domestically due to economies of scale that reduce manufacturing costs (Brown and Potoski, 2003). This study will thus determine whether South African metropolitan regions cut production costs by outsourcing in line with Rodrigues et al. or by increasing production inside the region in light of the argument based on increased economies of scale.

According to Globerman and Vining (1996), outsourcing should be done only if doing so would reduce both production costs and transaction costs (the cost of maintaining the interaction between the government and the agency outsourced to). Further, they state that although outsourcing may reduce production costs, the true rationale for externalisation relies on whether or not it reduces transaction costs in addition to production costs (Globerman and Vining, 1996).

The capacity to provide a thorough accounting for the choice to outsource services is challenged by additional reasons. An incomplete understanding of internal production costs before outsourcing might lead to an incorrect estimate of in-house production costs and, eventually, external production costs once the service has been outsourced (Kulmala, 2006). Also, Brown, Ryan, and Parker (2000) discovered that increased cost effectiveness and service quality may be achieved without resorting to the extremes of privatisation or outsourcing.

As a consequence of this research, we will have a better understanding of whether or not prioritising the option with the lowest transaction costs in the municipal sector is the only important consideration. This will make a substantial addition to literature in South African studies on the government's cost consideration when it comes to the means of service delivery, which is especially relevant given the ongoing relevance and significance of state-owned businesses vis-à-vis privatisation.

This study investigates how metropolitan municipalities in South Africa provide their citizens with energy, water, sewerage and sanitation, and waste management. The study evaluates the connection between the method of service delivery chosen and the financial expenses associated with delivering that service to the community, as well as the efficiency with which that service is provided.

According to Article 155 (1) of the Constitution of South Africa, metropolitan municipalities are created as Category A municipalities with exclusive municipal executive and legislative competence. South Africa is home to eight different metropolises (or "metros"): Johannesburg, Cape Town, Ekurhuleni, Tshwane, eThekweni, Mangaung, Nelson Mandela Bay, and Buffalo City. More than 20 million people, or about 40% of the South African population, are served by the country's metros, which account for more than 67% of the total municipal expenditures (Steytler and Powell, 2010).

Considering the population, it is clear that large cities play a crucial role in providing essential services and fulfilling their Constitutional duties. There is also a growing trend of municipalities choosing alternative service delivery methods, making it imperative to investigate the factors that influence these choices and how they affect service delivery speed and efficiency.

This study categorises the means through which services are provided as follows:

Table 1.1: Classification of Service Delivery Mechanisms

Internal Mechanisms		External Mechanisms	
Department/Division	Ring-fenced unit	Municipal entity/agency	Other i.e., other organ of state, non-profit organization

1.2 PROBLEM DEFINITION

Providing excellent services to communities quickly is still a significant issue for South African towns because to insufficient service delivery skills, community engagement, leadership infrastructure, resources, and upkeep. Lack of municipal infrastructure ultimately hinders development in other spheres. The government's inability to provide adequate services has led to a decrease in funding, the elimination of employment possibilities, the elimination of jobs, and the general deterioration of people's standard of life.

The purpose of this research was to get a better knowledge of the nature and issues of metropolitan service delivery in South Africa, as well as to give a general overview of metropolitan local government and the external context in which it functions. Legal frameworks that establish, define, and regulate municipal governments are discussed, as are the interrelationships between different levels of government. The research focuses on how local government operates (within its component institutions, especially municipalities) according to predetermined norms and frameworks.

The starting point for this investigation is the idea that examining metropolitan government and administration globally and in South Africa specifically, as well as the causes that have a significant impact on such government-based systems, is important. In light of the foregoing, the study's overarching perspective was that of a documentary and conceptual analysis employing qualitative research methods to investigate the particular specifications that are established for the service delivery requirements of citizens within metropolitan municipalities.

The purpose of this research was to provide a theoretical framework derived from the existing literature in order to shed light on the problems and difficulties associated with implementing metropolitan service delivery in municipal contexts. The research set out to develop a more nuanced knowledge of local government and management by tracing its conceptual roots and tracing the inputs that may affect the effectiveness and efficiency of service delivery in urban areas. The study also utilised techniques of constant comparison to the data in order to identify recurrent variables and themes.

Any discussion of constitutional mandates will necessarily touch on some topics that will influence the other levels of government in general, and the whole legislative and policy effort in particular, due to the interconnectedness of all levels of Government. Thus, measuring efficiency on critical service delivery items is essential for answering the issue of whether or not there are links between mechanism of delivery and service delivery efficiency.

The following research questions are raised in the study:

1. How efficient is service delivery in metropolitan municipalities in South Africa?
2. Does externalization of services lead to production or cost sustainability gains?

1.3 RESEARCH OBJECTIVES AND HYPOTHESIS

When it comes to energy, housing, water, sanitation, and waste management, South Africa still has a long way to go. The government is always exploring new and innovative approaches to delivering services to citizens more quickly.

1.4 RESEARCH OBJECTIVES

The research objectives have been formulated as follows:

1. To investigate efficient frontier for SA Metros with relation to the delivery of the 4 big services
2. To examine the effect of the externalization of services (service delivery mechanism) on service delivery efficiency of metropolitan municipalities in South Africa.

1.5 HYPOTHESIS

The hypothesis being examined is as follows:

Hypothesis One (H_1): The processes used to provide municipal services in South Africa's major cities are inefficient.

Hypothesis Two (H_2): Service effectiveness in South Africa's major cities varies according to the mode of service delivery.

1.6 JUSTIFICATION OF THE STUDY

Metropolitan municipalities are an integral part of South African governance, as mentioned in the introductory chapter. In order to track the country's overall success in providing services, particularly to the poor, a deeper familiarity with the inner workings of these institutions is essential. More than 40% of South Africa's population is served by these municipalities, and they are all situated in the country's most important economic hubs; thus they do much more than just serve their residents. The combined yearly departmental budgets of the whole province of Eastern Cape are less than the annual budgets of municipalities like the City of Johannesburg. As a result, this highlights the value of these organisations in South Africa's service delivery system.

Several methods of service delivery are in use by metropolitan municipalities. This is in light of the question of whether or not the government is able to manage effective systems for the external supply of services, therefore improving both service delivery and efficiency. This essay argues that external service delivery mechanisms, notwithstanding the transaction and production expenses involved, should achieve higher levels of productivity owing to inefficiencies with internal service delivery methods. There has been much discussion concerning the effectiveness of government-owned enterprises in South Africa, as well as the question of whether or not their establishment represents an admission of the government's inability to provide the necessary services on its own.

Evaluation and shaping of public policy also rely on research on the efficacy of local government institutions. With the help of the Municipal Demarcation Board, the South African government has been rationalising municipal borders to better ensure that these areas can maintain themselves. From 2011 to 2014, the number of municipalities shrank from 283 to 278. These cities get federal funding to complement local income and enable the provision of additional services. Therefore, it is crucial to evaluate this component of fiscal policy by looking at whether or not municipalities use effective processes in providing services.

1.7 ORGANIZATION OF THE STUDY

This research is broken down into five sections, the first of which provides context for the rest of the study. In addition, the study's goals, rationale, and problem statement are described in the introduction and background chapter. Following is a breakdown of the remaining chapters:

The theoretical foundation of the study as well as empirical investigations on related research are reviewed in Chapter 2. The theoretical aspects of the method of delivery, such as the theoretical grounds for adopting a given form of delivery, are the primary emphasis of the literature review, particularly as they pertain to governmental organisations. The empirical studies are based on comparable research that was undertaken to assess the effectiveness of service delivery by institutions.

The research methods are discussed in Chapter 3. This chapter describes the research hypothesis as well as the methodologies employed in the investigation. In addition, this chapter analyses the input and output variables selected and their respective data sources.

Research findings are discussed and compared to those of other studies in Chapter 4. The findings and conclusions are presented in Chapter 5, along with suggestions for further research.

CHAPTER 2 - LITERATURE REVIEW

2.1 INTRODUCTION

An examination of South Africa's municipal assembly legislation is covered in this chapter. Further, it provides a synopsis of South Africa's nine provinces.

2.2 DESCRIPTION OF LOCAL GOVERNMENT IN SOUTH AFRICA

Local government is "...that level of government that is commonly defined as a decentralised representative institution with general and specific powers delegated to it by a higher tier of government within a geographical area" (Ismail et al, 1997:3). Local government, in its most basic sense, is the system of governance in place in all cities, towns, villages, and similarly structured communities (Coetzee, 1985:26-27). However, the Constitution of the Republic of South Africa, 1996 (Act 108 of 1996:40(1)) establishes that local government is a separate sphere of government, with powers that are derived from the Constitution, 1996 supra, and other statutes rather than devolved from the provincial and national levels of government. Consequently, this means that municipalities are given authority from the beginning.

In agreement with the aforementioned definitions, Lockhard (1968:451) defines local government as a public organisation having the authority to oversee and govern a certain geographical area. In this context, "local government" denotes a level of governance rather than a specific municipality. In its aggregate form, local government consists of all the various municipalities (Reddy, 1996:50).

The Constitution of the Republic of South Africa (1996) establishes municipalities around the country to provide services in defined regions (Act 108 of 1996: Section 151). Local authority and municipality both refer to and mean the same thing, but the term municipality has been favoured in recent South African legislation, including the Constitution (Act 108 of 1996), the White Paper on Local Government (1998), the Local Government Municipal Systems Act (Act 32 of 2000), and the Local Government: Municipal Structures Act (Act 117 of 1998). A municipality is being employed for the purposes of this study. In a more historical context, especially prior to 1996, the term "local authority" may be more appropriate.

2.3 CHARACTERISTICS OF MUNICIPALITIES

The following features set municipalities apart from other spheres/forms of governance, according to Ismail et al. (1997:5):

- Municipalities have limited power over a certain region and the people who live there, and citizens have a voice in the decision-making process.
- Elections are used to achieve this goal.
- The primary reason for the existence of municipalities is the provision of various essential services. Local governments get money through constitutionally authorised rates and taxes, and they also have the right to enact binding bylaws.
- It is legal for municipalities to hire workers to carry out and oversee administrative tasks.

All of the aforementioned are typical of municipalities, whose primary duty is to serve the residents of the areas under their control. The Constitution of the Republic of South Africa, 1996 provides a constitutional framework under which municipalities may function alongside national and provincial administrations (Act 108 of 1996). Local governments are prohibited from enacting bylaws that run counter to federal or provincial law or the Constitution of 1996 (Section 41(1)).

2.4 HISTORICAL CONTEXT OF LOCAL GOVERNMENT IN SOUTH AFRICA

South Africa has been transitioning from an apartheid regime to a democratic one since 1994. In South Africa, racial segregation was institutionalised and enforced by the apartheid regime. According to Van Niekerk et al. (2002: 34), apartheid was "...a value system, a form of government, and a policy of racial segregation..." when it was implemented as official policy in South Africa in 1948. During the apartheid era, laws were passed to codify the discriminatory apartheid policy. These laws, such as the Group Areas Act, 1957, supra, promoted segregated government by creating distinct administrative bodies for each racial group. Mixed marriages were illegal under the Immorality Act, 1957 (Act 23 of 1957), which served to further solidify apartheid ideals. There are still several "Black areas" that are severely under-serviced, leaving many

residents without access to even the most basic necessities like clean drinking water, reliable power, safe housing, and working toilets. In the past, municipalities relied on taxation of their own citizens, such as the sale of property, as a primary source of income. This worked out well for the White communities since they had fewer people to take care of and more money to tax. However, this presented difficulties for Black towns, since restrictions on retail and industrial growth in Black districts reduced their tax base and, therefore, their revenue for meeting the needs of the people they served. The apartheid strategy made sure money was spent on the advancement of a minority group (White Paper on Local Government, 1998: Section A.2 cf. also Reddy, 1996:53). In their efforts to address these inequalities, national and local governments continue to face obstacles related to service delivery to these underserved communities.

2.5 LOCAL GOVERNMENT TRANSFORMATION

In the middle of the 1980s, South Africa experienced civil unrest as citizens and community groups came together to protest against apartheid's undemocratic policies. These policies favoured a small elite while leaving the majority of the population impoverished and deprived of basic amenities. The economic and social hardships faced by Black people in townships and rural regions were major drivers behind these protests.

During this period, protesters adopted tactics such as boycotting rent, service charges, and consumer goods (White Paper on Local Government (WPLG), 1998: Section A). In response to escalating political tensions and the collapsing Black local authorities, the apartheid government attempted to allocate funding to disadvantaged Black communities through ad hoc payments in the late 1980s. However, it became evident that the existing Black local councils were not sustainable, and the boycotts continued until White towns also felt their impact, leading to the realization that a new accord and system were necessary (White Paper on Local Government WPLG, 1998: Section A).

In 1993, a significant step was taken towards municipal change with the establishment of the Local Government Negotiating Forum, which ran parallel to the national constitutional talks. This Forum, facilitated by the South African National Civics Organisation, brought together representatives from all levels of government and civil

society, aiming to reform local government in South Africa (Reddy 1996:58). One outcome of the Forum was the Agreement on Finance and Services, which resulted in the writing off of debts for the then Black local authorities. Additionally, the Forum discussed and drafted the Local Government: Municipal Transition Act, 1993 (Act 209 of 1993). The White Paper on Municipal (WPLG); 1998: Section A provided a fundamental framework defining the process of local government reform.

2.6 LOCAL GOVERNMENT IN SOUTH AFRICA AFTER 1994

The process of transforming local governments in South Africa has been lengthy and complex, mirroring the challenges faced during any transition period. As society evolves, cities and towns must also adapt to reflect these changes. Since South Africa became a democratic state, the task has been to align all government institutions, including local governments, with the principles of democracy.

The new municipal government in South Africa consists of six category A metropolitan regions, representing around 6.6 million electors and 1052 councillors. These regions operate under different systems of governance: mayoral executive systems are in place in Johannesburg, Tshwane, Ekurhuleni, and Nelson Mandela Bay, while executive committee systems are used in eThekweni and Cape Town. According to Act 108 of 1996, the Constitution of the Republic of South Africa, local government holds the same status as the national and provincial levels of government. To achieve the government's objectives, all three branches must engage in cooperative governance and work harmoniously together.

Section 151 of the Constitution of the Republic of South Africa (Act 108 of 1996) outlines provisions concerning municipal administration. Firstly, municipalities across South Africa are established as the primary level of local administration. Secondly, the municipal council possesses both legislative and executive authority, responsible for creating and implementing bylaws and policies. Thirdly, municipalities are granted the power to act on their own initiative (original powers), provided they do so in alignment with national and provincial regulations (co-dependent). Fourthly, federal and/or provincial governments must not interfere with a municipality's autonomy in performing

its duties, responsibilities, and authority. These provisions aim to safeguard the integrity and independence of local government in the country.

2.7 LEGISLATIVE FRAMEWORK OF MUNICIPAL ASSEMBLIES IN SOUTH AFRICA

South Africa's municipal structures are spelled out and divided into three types by the Constitution of the Republic of South Africa (Act No. 8 of 1996) and the Municipal Structures Act 117 of 1998 (MSA, 1998). Category A refers to the metropolitan municipalities, often established in big cities with over 500,000 voters, and charged with delivering all services mandated by the Constitution. Categories B and C respectively represent all the minor local municipalities and the district municipalities. Currently, South Africa is home to 278 different municipalities, 226 of which are considered "local," 44 which are considered "district," and 8 which are considered "metro" (MSA, 1998). This paper's introduction notes that the eight metropolitan municipalities are responsible for spending two-thirds of the total municipal budget and housing forty percent of South Africa's population.

2.8 METROPOLITAN MUNICIPALITIES

According to the Urban Dictionary, a metropolitan area is characterized as large urban settlements or areas with high population densities, diversified economies, and a high degree of functional integration across a larger geographic region. In such areas, residents may choose to live in one municipality while working and spending leisure time in another, driven by the interconnected nature of the region's economy and society (White Paper on Local Government, 1998:2.1). These metropolitan areas are often Class A cities, also known as "unicities" or "mega-cities," which have complete control over their respective territories. An example of a metropolitan council is the Tshwane Metropolitan Municipality.

There are several reasons for the prevalence of metropolitan councils compared to other types of municipalities, as outlined in the White Paper on Local Government (1998:2.1):

Firstly, the establishment of a metropolitan municipality aims to lay the groundwork for fair and socially just metropolitan governance, addressing the historical neglect of the poor in terms of economic, recreational, and social infrastructure during the apartheid era. Urban apartheid led to the exclusion of the large Black majority of urban poor from enjoying the benefits of commercial growth controlled by White municipalities. Although township inhabitants contributed to the tax basis of White municipalities, these funds were not utilized to provide services to townships. Metropolitan councils offer a more equitable and fair method of resource distribution and service provision.

Secondly, a metro council fosters long-term land use planning and oversees public investment in physical and social infrastructure. Given the interconnected functions of metropolitan regions, certain services, such as roads, may be paid for by one municipality's tax base but utilized by citizens of another. To address this, all city inhabitants should contribute to the cost through taxation and a joint planning and budgeting process, enabling a coordinated approach facilitated by metropolitan administrations.

Thirdly, a metropolitan council can enhance a city's economic competitiveness and well-being by creating a citywide framework for economic and social growth. This is achieved through the use of an Integrated Development Plan (IDP), which helps foster economic and social development across the entire metropolitan area.

2.9 ROLES AND RESPONSIBILITIES OF A METROPOLITAN COUNCIL

Metropolitan councils' primary function and obligation is to provide residents with high-quality services at reasonable prices. Local governments have the additional duty of ensuring citywide spatial cohesion and socially equitable development. Equity, social fairness, and economic development should also be priorities for metropolitan governments. In order to best serve their constituents, metropolitan councils must encourage and facilitate public engagement in decision-making processes. However, this might be difficult in major urban areas because of the presence of many distinct populations (e.g., racially, economically) with varying requirements and goals. These varying requirements must be taken into account by metropolitan councils. City forums and neighbourhood councils need to be set up to facilitate community involvement.

Pretoria, Johannesburg, Ekurhuleni, Port Elizabeth, eThekweni, and Cape Town are the six megacities that have been formed in South Africa (NBI, 2000:13).

2.10 THE GENERAL ENVIRONMENTAL FRAMEWORK FOR LOCAL GOVERNMENT SERVICE DELIVERY

In the same way that the human body or a car works as a system, so do cities. The dictionary defines a system as "...a collection of elements that function together to form a unified whole" (Robbins, 1987: 10 in Roux et al, 1997:28). Municipal governments, like the societies they serve, are complex systems made up of interrelated pieces. The output of one part of the system may be fed back into the input of another. The eyes, heart, hands, ears, legs, and brain are just few of the many components that make up the human body, and they all need to operate together in order for the body as a whole to function. One's ability to breathe and continue living is thanks to the nose and veins.

Each inhale, in turn, allows the heart to beat, the blood to circulate, and the brain to think and direct the body's many systems. An individual may suffer from pain or even death if fails to operate properly. To achieve its fundamental requirements, the body also makes use of external components like the oxygen it breathes and the food it consumes (input), both of which come from plants and animals (output). It is possible to classify systems into two broad categories: open and closed. A closed system is one that does not let any of its output into the larger environment and takes in no input from the outside world (Robbins, 1987:12 as in Roux et al, 1997:30). Since every living thing needs help from outside itself to stay alive, it follows that the concept of a closed system is false when applied to biological systems. In contrast to closed systems, open ones acknowledge the dynamic interconnectedness of all elements of the environmental system of which all living beings are a part. In this way, each part is essential to the whole.

According to Scott (1992: 76), "...a system is open means, not simply that it interchanges with the environment but that this interchange is an essential factor underlying the viability of the system." The open system's capacity to process environmental resources and release its outputs, the latter of which will act as input for other components in the wider environment, is what makes the system viable

(Scott, 1992:83). Cities and towns do not function independently from one another. They are structures or systems that are open to the outside world, drawing resources from it and being shaped by the things happening there. Cities are not autonomous, independent entities, but rather they are interconnected parts of a larger whole that must work in harmony with their natural surroundings (Jonathan Boston in Savoie et al, 1998:295). In this context, "environment" means "...the totality of the existing social, economic, and political circumstances that cause problems (provide opportunities) for policy makers" (Sharkansky, 1978:9 as in Du Toit 1997:113).

Microenvironments and macroenvironments are two categories that describe the contexts in which municipalities operate. The micro-environment, often called the internal environment, includes everything inside the municipality's own institutional or governmental framework that either helps or hinders its progress toward its objectives. Organizational structure, human resources, culture, rules, and procedures are all examples of internal influences. The term "macroenvironment" may also refer to the "general" or "outside" setting. The macroenvironment consists of extra-local elements that have an effect on a municipality, both immediately and over time. Because of the direct and indirect effects these external events may have on any organisation, municipal managers must keep a close eye on them, accurately identify their causes, and react to them in a timely manner. According to Kast and Rosenzweig (1994) (quoted in Schwella et al., 1996:19), the general/macro environment consists of anything beyond the boundaries of the municipality. There is no let-up in the environmental trends' impact, for better or worse, on the municipality and its resources. Communities need systems for tracking social movements and the ways in which they affect municipal operations. SWOT analysis, which stands for "Strengths, Weaknesses, Opportunities, and Threats," is one such method (SWOT). A well-executed SWOT analysis will reveal potential threats to the municipality early on, allowing for preventative measures to be taken. The same is true of opportunities, which a SWOT analysis may highlight for the benefit of the municipality. There is no municipality that is immune to the effects of environmental variables, and these elements must be addressed (to the extent feasible) proactively to prevent them from having a negative effect on the municipality's effectiveness.

2.11 MUNICIPALITIES AND SERVICE PROVISION

As was indicated in the previous paragraph, municipal governments' primary role is to provide essential public services. Part B of Schedule (5) of the Constitution of the Republic of South Africa, 1996 (Act 108 of 1996) lists the functions of local government and the resulting municipalities. These include things like fire protection, police protection, ambulance service, water purification, electricity purification, road and storm water purification, waste management (refuse collection), and emergency services. The Constitution of 1996, as amended, grants local governments authority over the following issues, as listed in Part B of Schedule 4:

- air pollution,
- building regulations
- child-care centres
- utilities
- fire-fighting
- local tourism
- airports
- planning
- health services
- public transport
- public works
- pontoons, ferries, jetties, harbours excluding the regulation on international and national shipping and matters related thereto
- tracking regulators
- water and sanitation

Services provided to the general public within the boundaries of a municipality are referred to as "external services." Services provided inside a municipality are known as "internal services." Human resource management and IT support are two examples of such offerings. These are in-house operations and services that help other divisions carry out their duties more effectively. Staff functions are another name for the aforementioned in-house services (Gildenhuys, 1997: 24). Local government in South

Africa continues to struggle with the enormous service delivery backlogs that exist, especially in once ignored regions.

2.12 STRUCTURE OF LOCAL GOVERNMENT SYSTEM

Given its proximity to its constituents, local government is often seen as the front line of service provision. There are three types of local governments: Category A, which includes large cities, Category B, which includes all other local towns that are not large cities, and Category C, which includes district municipalities. In addition to the eight metropolitan municipalities and the 44 district municipalities, South Africa also has 226 small municipalities.

2.12.1 CATEGORY A - METROPOLITAN MUNICIPALITIES

In accordance with Article 155 of the Constitution, "Category A Municipalities" are those that also serve as the seat of government (RSA Constitution, 1996). The nine major cities in this area fit this description. What sets Category A municipalities apart from the rest of the municipalities is their larger population and range of public services. For a municipality to be designated as a "metropolitan area," its population must be at least 500,000.

2.12.2 CATEGORY B – LOCAL MUNICIPALITIES

Local municipalities include anything else that cannot be included in a metropolitan municipality. A category B municipality is one that "shares municipal executive and legislative authority in its area with a Category C municipality within whose area it falls," as defined by the Constitution. Municipalities at the local level often have populations of less than 500,000 and are focused on only one or two commercial nodes, as opposed to the many commercial nodes found in metropolitan municipalities.

2.12.3 CATEGORY C – DISTRICT MUNICIPALITIES

Local municipalities that lie inside a district municipality's boundaries often have executive and legislative authority as well.

2.13 OVERVIEW OF THE EXPENDITURE BY MUNICIPALITIES IN SA

For financial sustainability, municipalities are authorised to provide utilities such as power, water, and garbage collection. This money comes from a variety of sources, including taxation, grants from other levels of government, and interest and principal payments on loans and borrowings. To maintain sustainability, it is essential that towns use effective procedures for providing these services.

2.14 SERVICE DELIVERY MECHANISMS

In addition, the Constitution requires that the municipality provide a range of services to its residents. Municipalities generate income via the selling of these services and through the collection of rates, taxes, and grants. There are many obstacles that cities must overcome in order to generate income and provide essential services in light of the current economic climate and the high unemployment rate. Because of this, service providers must be frugal with their spending and creative with their methods.

When it comes to meeting the demands of their constituents, state and local governments must make choices about not just the quality benchmarks for service delivery but also the means through which services (and the commodities and products they facilitate) should be provided. The government, like any other business or institution, strives to minimise production and distribution expenses. With this goal in mind, the government is often forced to make choices on how to best provide services, including selecting a method that reduces both production and management expenses. Historically, the factors of production—labour, capital, and assets—have weighed heavily on decision-makers' minds when it came to selecting a particular method of service delivery. However, recent research has shown that it is also important to consider the transaction costs associated with non-traditional methods of service delivery like outsourcing.

2.15 THEORIES OF SERVICE DELIVERY MECHANISMS

The three most prevalent ways of service delivery for government are internal service delivery, where the government provides the full service, external service delivery, where services are outsourced out to other government agencies, private

corporations, or non-profit entities, and a hybrid of the two. The third approach has the government providing some of the service while outsourcing the rest. Brown et al. (2008) state that historically governments have made their distribution mechanism decision statically, which means that they choose one way of delivery and stick with it for a while.

It has been common practise to provide services using an organization's own internal mechanisms, sometimes known as direct service delivery mechanisms. This is because setting it up is easy and does not cost a lot of money. A developmental state that recognises the need of centralised state control over the means of production and distribution also tends to favour this kind of distribution. The second method of distribution, known as "agencies," entails completely subcontracting functions to an external organisation. The use of third-party contractors is rationalised on the grounds that doing so enables a greater breadth of innovation, reduced levels of red tape, and enhanced output. The hybrid approach is favoured because it enables the government to keep its hands on the most important procedures and decisions while freeing up commercial entities to concentrate on other ways to improve service delivery.

The reason for adjustments and the selection of service delivery methods may be clarified with the use of various cost theories and approaches. According to transaction cost theory, a company's governance structure of choice for a service delivery mechanism should be the one that minimises the costs of both delivering the service internally and handling the transaction if the service was offered outside (Bello, Shirish and Dent, 1997).

Government service outsourcing is on the rise and is being hailed as a way to save costs and improve effectiveness in the public sector (Warner and Hefetz, 2012). According to Warner and Hefetz's (2012) analysis of American cities, 41 percent of services were provided in-house while 35 percent were subcontracted. Intriguingly, this research found that 23.5% of the services were being outsourced to third parties. That which was previously outsourced is being brought back in-house. It is fascinating to see this trend develop as nations like South Africa increasingly outsource service industries.

It is in the best interest of a business to maximise profits while cutting expenses whenever possible. Transaction costs, which are incurred as part of operating an economic system, are present wherever services are outsourced. There may be transaction costs associated with things like setting up systems for addressing disputes and resolving disagreements, drafting and managing contracts, and monitoring their performance (Johnsen et al., 2004).

Community preferences for the service type at hand may also factor into the selection on the service delivery strategy. According to Nelson (1997), local governments are less inclined to outsource services if there is a lack of consensus among residents about the importance of such services.

2.16 EMPIRICAL STUDIES

Multiple investigations of the effectiveness of local governments in both developed and emerging economies have been conducted to gauge the quality of services they provide to their constituents. For instance, Van Der Westheizen and Dollery's (2009) Data Envelopment Analysis research on the efficiency of service delivery at the district and local municipality level showed inconsistent findings across provinces. About 47% of district municipalities were assessed to be technically efficient by Van Der Westheizen and Dollery (2009).

It was determined by Mahabir (2014) that between 2005 and 2009, local and metropolitan municipalities improved their service delivery efficiency by 42%-46%. The research went on to reveal that local governments required far lower inputs in the form of spending to provide the outputs that they were able to accomplish within the same time.

According to Rodrigues et al. (2012), efficiency advantages from externalising services are diminished by the ensuing rise in transaction costs, which in turn raises production costs. When a result, as the price of outsourcing rises, additional considerations, such as service complicity, asset specificity, and political and administrative considerations, become more important. However, it is still unclear whether or if cost efficiency benefits occur when using external mechanisms, even when transaction costs are included in.

According to research by Rodrigues et al. (2012), outsourcing happens when producing a service in-house is inefficient or too expensive. The external processes in this scenario not only reduce manufacturing costs, but also avoid the political and administrative red tape often involved with making products in-house.

Complete externalisation of services was similarly linked to cost efficiency and savings by Rowan and Lerner (1995), who also found that it reduced production costs. Joha and Janssen (2010) conduct a related investigation into what drives people to choose certain source arrangements. Findings from this research show that cost-cutting and the pursuit of better service levels are the primary motivations for sourcing choices, especially the shift toward external methods (Joha and Janssen, 2010). Possible savings are predicated on the idea that businesses would stop making their services in-house whenever the price of doing so equals the price of doing the same thing outside in the market. However, it is debatable whether the nature of the municipal services themselves can explicitly reflect the cost of the extra transaction.

According to the findings of Brown and Potoski's investigation, local governments aim to reduce transaction costs by coordinating the delivery of different services via the same channels. Services with low transaction costs tend to be outsourced out, whereas those with high transaction costs tend to be supplied in-house. Municipal and county governments fall somewhere in the middle, continuing to contract despite transaction expenses but also taking measures to reduce the likelihood of contract failure (Brown and Potoski, 2003). This study makes the case that municipalities make the switch to external mechanisms notwithstanding the expenses because they are motivated by other goals.

Future studies might investigate the extent to which the government uses municipal bodies for contracting out, or if such entities only serve to increase the administrative burden on their parent institutions without reaping any of the advantages. This is vital, since one of the key advantages of outsourcing is avoiding the red tape of government and administration. Bureaucracy adds to production and transaction costs, reducing the efficiency gains from outsourcing service provision, if municipal institutions do not function as external private mechanisms and independently of the shareholder, i.e. parent municipality. Future studies might the effect of the management qualification

on the performance of service delivery across metros. This area and relationship continues to be of interest to stakeholders who have keen interest on the challenges regarding service delivery in the country and the officials tasked with delivery.

By outsourcing certain services to commercial vendors or even other forms of government, smaller towns may benefit from economies of scale, as stated by Tullock (1969) as cited by Bosnich et al (2011). According to Mehdi and Hafner's (2014) analysis of local government efficiency in Morocco's municipalities, districts or municipalities with a high population tend to generate worse efficiency outcomes, placing them farther from the efficiency production frontier.

Municipalities in New South Wales, Australia were given an average technical efficiency score of 0.819 by Woodbury and Dollery, 2007. New technologies may be used to enhance services and increase efficiency, and the research indicated that many municipalities face declining returns to scale. The same research revealed that four municipalities classified as special councils for wastewater services improved efficiency and served as a model for the rest of the country (Woodbury and Doller, 2007). The importance of these results from a policy perspective cannot be overstated, as they indicate that specialisation may be achieved more efficiently via ring-fenced and outsourced systems of delivery.

Utilizing statistics from 2001, Afonso and Fernandes (2006) calculated an efficiency index for Lisbon's municipal agencies. The research indicated that municipalities could maintain the same outputs and service delivery with 41.2% less resources, yielding an average score of 0.588. Compared to municipalities with lower per capita spending, those with greater per capita expenditures were shown to have worse efficiency ratings. Also, metro areas were able to attain better efficiency than non-metro areas.

Brettigny and Sharp (2016) used the data envelopment analysis method to compare the effectiveness of municipal water service authority in urban and rural areas of South Africa. This research also included the operational expense and the number of service recipients as two of its independent factors. As can be seen from the data, metropolitan municipalities outperformed their local and district counterparts in terms of efficiency.

This research aims to contribute to the existing literature by using the DEA technique to examine the decision-making unit at a more granular level of the mechanism utilised in service delivery, employing current data, and concentrating on a variety of service delivery items.

2.17 ECONOMIES OF SCALE OF LOCAL GOVERNMENT

To improve the efficiency of local public service delivery, several nations have followed a strategy of local government merger. This has led to a substantial decline in the number of municipalities around the world; for example, in the Netherlands, the number has dropped from 1015 in 1950 to 355 in 2019. The process of municipal consolidation in the Netherlands is well-documented. The promise of greater efficiency via consolidation is the primary argument for merging municipal governments. More and more municipalities are working together to increase their economies of scale in the provision of specialised services (Bernardelli, Dollery and Kortt, 2021). Money saving is often highlighted as a motivating element in the growing trend of inter-municipal cooperation throughout Europe.

Multiple fields of study have taken an interest in the quest to determine the "optimal" size of local government authority. Arguments in favour of approachable, local governments and engaged people, on the one hand, and massive, cost-effective governments, on the other, are at the heart of the small-versus-large debate. It seems that economies of scale are the strongest argument in favour of larger municipal governments (Bernardelli, et al, 2021).

In municipal governance, economies of scale have been the subject of much empirical study. Research in this area often involves attempting to fit cost functions by regressing cost measurements against metrics of (output) size (Holzer, Fry, Charbonneau, van Ryzin, Wang, and Burnash, 2009). More than sixty years have passed since the introduction of applications. There is a distinction to be made between studies that examine local government as a whole and those that examine individual services, such as garbage collection, road maintenance, or even office management. Population count is by far the most prevalent measure of output size in

the study at the local government level, despite being considered as a poor estimate of local government production.

Output measurements, such as garbage collected per capita, kilometres of maintained roads, or tax receipts per capita, have shown to be considerably more informative than population estimates in service-specific research (Dollery and Fleming, 2006). Recent comprehensive reviews of the literature on local government efficiency often reflect on economies of scale as a side effect of using frontier methods like Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA) to estimate cost functions (DEA). Recent research has shed light on the topic of economies of scale and efficiency in South African local administrations, which have hitherto been understudied (Drew, Kortt and Dollery, 2014).

Based on a comprehensive international comparison of empirical studies, Holzer (2009) concluded that cities with populations of less than 25,000 can still improve efficiency, though this is highly dependent on the specific circumstances of each case and is typically confined to specialised, capital-intensive services. There is stronger evidence that diseconomies of scale remain for populations beyond 250,000. There is a vast variety of services provided by local governments, and it is generally accepted that certain services are more amenable to economies of scale than others (Holzer et al, 2009). In capital-intensive services and highly specialised, seldom utilised services where there is space for labour specialisation, economies of scale are more probable because of the related fixed costs.

Strangely, researchers have paid little attention to the factors that may lead to diseconomies of scale in local government services. Diseconomies of scale are often considered in the context of bureaucratic issues, as was indicated before (Dollery and Fleming, 2006). Diseconomies of scale arise when the inputs needed for coordination grow at a faster rate than the growth in output quantities. There may be more evident diseconomies of scale for high-complexity services, but little research has been done on the moderating variables driving bureaucratic congestion in local government and why some may be more vulnerable than others. In a nutshell, economies of scale are based on the following three mechanisms: fixed costs, specialisation, and bureaucratic congestion (Dollery and Fleming, 2006).

Almost every system of local governance consists of individual municipalities that vary greatly in terms of population size, density, location, and topography. Scale economies at both the system-wide and individual municipal functions and services, especially in urban transportation, water, and wastewater, have been the focus of extensive empirical research into the operational efficiency of local government (Caillan, Dollery and Rui Marques, 2021). Public policy aiming to improve municipal performance via structural transformation through municipal mergers, shared service programmes, and other policy instruments all recognise the importance of scale economies in local government (Bernardelli, Dollery and Kortt, 2021).

2.18 SUMMARY

Having thoroughly examined the existing literature on the efficiency of service delivery mechanisms in metropolitan municipalities in South Africa, Chapter 2 has laid the groundwork for understanding the complexities and challenges faced in this domain. As we move into Chapter 3, the focus shifts towards outlining the methodology employed in this study to investigate and analyse the specific aspects related to service delivery efficiency within these urban centres. The upcoming chapter will detail the research design, data collection methods, and analytical approaches used to gain valuable insights into the functioning and effectiveness of service delivery mechanisms in South Africa's metropolitan municipalities. By employing a robust methodology, this research aims to contribute significantly to the understanding and improvement of service delivery systems, ultimately promoting the well-being and development of these vital urban areas.

CHAPTER 3 - METHODOLOGY

3.1 INTRODUCTION

In this chapter, the researcher lays out the methodology that was used to evaluate the hypotheses and accomplish the objectives. The sample frame, method for efficiency estimation, data source, and study boundaries are all part of this.

3.2 SAMPLE FRAME

The research looks at the provision of energy, water, sanitation, and waste management in South Africa's eight metropolitan municipalities from 2011 to 2020. The budget and cost numbers connected to the provision of services are made public by municipalities, as is information on the backlog of services under their jurisdiction and the level of services supplied for a given fiscal year. Study hypotheses will be tested using secondary data collected primarily from yearly financial statements prepared in line with relevant accounting rules established by the Accounting Standards Board and the National Treasury. The municipal annual reports include audited financial accounts that have been conducted by the Auditor-General of South Africa.

The National Treasury evaluates the performance of metropolitan governments by comparing their budgets to national standards. With this data, we can examine the differences between service prices in various municipalities. There may be difficulties in making fair comparisons across various organisations, particularly in their early years, since some metropolitan municipalities are older than others. Financial and non-financial data from municipal and agency financial statements and annual reports will be used to empirically examine the ideas and patterns identified in the literature review.

Production or cost efficiency, as defined by Van Der Westhuizen and Dollery (2009), is the "optimal use of resources to maximise output from a given input set." Thus, it is believed that the most efficient service delivery system would provide greater results while using less resources. The purpose of this research is to compare the outcomes

achieved by metropolitan municipalities with the input variables used, taking into account the delivery method chosen by these entities.

3.3 EFFICIENCY: DATA ENVELOPMENT ANALYSIS

This research makes use of the Data Envelopment Analysis (DEA) technique, which has found widespread usage in gauging technological efficiency. Non-parametric in nature, DEA has long been used to assess the efficiency of a DMU (decision-making unit) like a business or government agency by considering a number of inputs and outputs (Ray, 2004). Efficiency is measured by looking at each DMU's or jurisdiction's outputs relative to their inputs. When using the DEA technique, jurisdictions are considered effective if they not only outperform individual jurisdictions, but also outperform all linear combinations of other jurisdictions (Geys and Moesen, 2008).

Measuring efficiency involves establishing a boundary of theoretically possible levels of output. The efficiency point is established by the inputs and outputs of the first DMU. Each subsequent DMU evaluation will use this efficiency benchmark as a yardstick to judge whether or not the unit is efficient. The DEA uses a distance from the production frontier as a proxy for technological efficiency (Ray and Van De Sijpe, 2007). When measured as a ratio of output to input, DMUs with a score of 1 or above are considered efficient. Next, inefficient DMU performance is evaluated against that of high-performing units.

Critical benefits of the DEA may be shown in studies of this kind, where inputs are used and transformed into outputs in a variety of contexts, including physical space and social contexts. When evaluating and contrasting the effectiveness of DMUs, the DEA may take into account a wide variety of input and output characteristics expressed in a variety of units of measurement (Worthington and Dollery, 2001). For this research, this aspect of the DEA model is crucial since various services in each municipality may use different metrics for inputs and outputs.

In addition, the DEA does not need rigorous assumptions for input and output variables, which is helpful for this research since many factors, such as past backlogs, customers' capacity to pay for service, and socioeconomic situations, impact inputs

and outputs in different towns. However, despite these limitations, comparing efficiency and performance is still possible with the use of methods like DEA.

Unlike other techniques of evaluating production efficiency, the DEA does not need an explicit a priori link between inputs and outputs (Tongzon, 2001). As a result, this will be useful for research of this kind in which the inputs and outcomes have been selected a priori, based on the common belief that inputs like staffing levels have a significant impact on outcomes like service use rates.

The input-oriented DEA is the emphasis of this study, which is comparable to Hafner and Mehdi's (2014) evaluation of the effectiveness of Morocco's municipalities. This suggests that the results of minimising inputs while increasing outputs will be the primary emphasis of the research. For governments, and particularly for local governments that have limited resources but must prioritise service delivery, an input-oriented strategy makes the most sense.

There have been several studies on the topic of government efficiency, each with its own unique emphasis. Brettigny and Sharp (2016) used the Charnes-Cooper-Rhodes (CCR) and Banker-Charnes-Cooper (BCC) DEA models to assess the effectiveness with which municipalities provided a single service, water. One model presupposes consistent returns to scale, whereas the other allows for fluctuations in these figures. Despite their similarities, the returns to scale for metropolitan communities may vary widely based on variables including population and service delivery backlogs. This study therefore accounts for and makes use of the latter.

Afonso and Fernandes (2006) provide out a structure for picking efficiency indicators and variables according to each stage of using inputs and processes connected to turning them into outputs. Figure 1 displays the modified model. The South African government's standard procedure for planning, monitoring, and reporting has been included into this model. The input and output variables used here are consistent with this model and with the method used in other studies of local government efficiency.

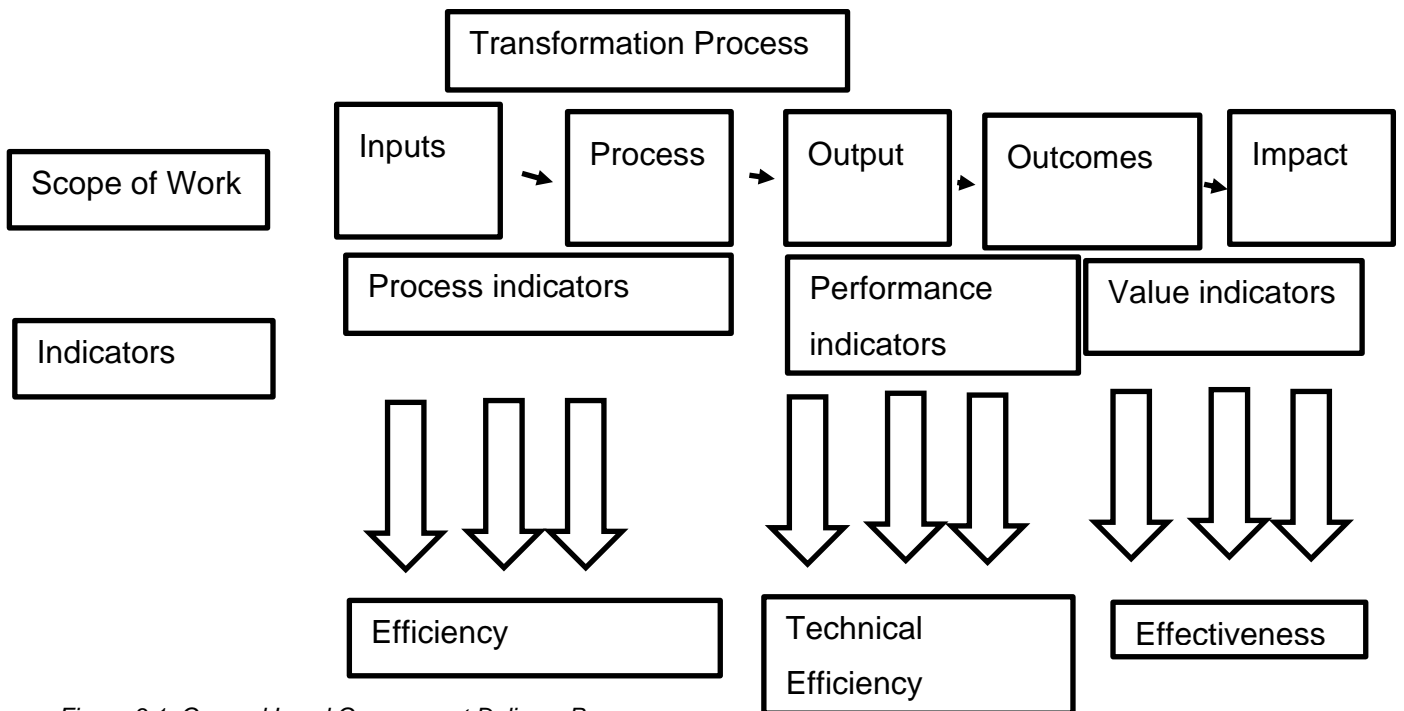


Figure 3.1: General Local Government Delivery Process

3.4 REGRESSION MODEL

This research uses an empirical t-test to analyse the impact of municipal assembly efficiency in South Africa's municipalities on the choice of service delivery mode. The t-test is a statistical test for contrasting the means of two sets of data. Tests of hypotheses employ it to determine whether or not a certain procedure has an effect on the population of interest, or to determine whether or not two groups are distinguishable from one another.

The following DEA model is used in this study:

$\theta_0 \rightarrow \max ; \theta_0 = 1$ means that the mechanism is efficient

$$y_{sk} = \sum_{i=1}^n \lambda_i y_{si} \quad (s = 1, 2, \dots, m)$$

$$\sum_{i=1}^n \lambda_i = 1 \text{ for the BCC DEA model}$$

To further enhance the evaluation and evaluate the efficacy of municipalities, we will use a variety of financial and non-financial ratios. Profit margins, both net and gross, for providing each service are included.

Alfonso and Fernandez (2008) applied the same DEA model in explaining the relative efficiency of local governments in Portuguese municipalities.

$$efficiency_{i,t} = \beta_0 + \beta_1 X1_{i,t}$$

$$efficiency_{i,t} = \beta_0 + \beta_1 X2_{i,t}$$

$$efficiency_{i,t} = \beta_0 + \beta_1 X3_{i,t}$$

$$efficiency_{i,t} = \beta_0 + \beta_1 X4_{i,t}$$

where $efficiency_{i,t}$ is the estimated efficiency score for municipality in year t;

$X1$ refers to the Number of households receiving electricity services

$X2$ refers to the Number of households receiving water services

$X3$ refers to the Number of households receiving sewerage (sanitation) services

$X4$ refers to the Number of households receiving waste management services (solid waste)

a priori expectations are:

$$\beta_1; \beta_2; \beta_3; \beta_4; \beta_5; \beta_6 > 0$$

3.5 DESCRIPTION OF VARIABLES

The input variables were selected because of their substantial effect on service-providing firm operations. Using the DEA approach, Bosnich et al. (2011) analyse the correlation between city size and efficiency. Table 3.1 lists many input and output factors that, including the number of service users and population size, will be evaluated as part of this research. Woodbury and Doller, 2007 used operational expenses (expenditure) and wastewater quality as input and output variables, respectively, while evaluating the efficacy of wastewater services in New South Wales, Australia. These factors are also used, spending on services, in addition to personnel count, is a common input variable in research like this. Input costs that are directly related to the production of services are included in service expenditures. Money is

spent on things like hiring employees and purchasing equipment in order to provide a service.

Selected output variables reflect the quality of services delivered in relation to the resources used. The number of households who are getting municipal services may be monitored on a yearly basis. Statistics South Africa's surveys supplement this data, which has been independently reviewed by the Auditor General. Tongzon's (2001) research on the effectiveness of Australian and international ports using the DEA employs similar factors. Each organization's staff size is a critical input variable, which may be collected from the yearly reports.

Table 3.1 below contains a description of each variable chosen for the study as well as the a priori expectation of how each variable will impact on the efficiency of municipalities.

Table 3.1: Description of Variables

VARIABLE	DESCRIPTION
Number of households receiving electricity services	<p>This variable relates to the number of households receiving electricity from the municipality. It is considered that if the municipality utilises an external service delivery mechanism, it will be efficient in providing electricity services. Therefore, a positive relationship between the number of households receiving electricity services and efficiency is expected.</p> <p>The data for this variable will be collected from Statistics South Africa as well as from the audited annual report of each municipality</p>
Number of households receiving water services	<p>This variable relates to the number of households receiving water services from the municipality. It is considered that if the municipality utilizes an external service delivery mechanism, it will be efficient in providing water services. Therefore, a positive relationship between the number of households receiving water services and efficiency is expected.</p>

	<p>The data for this variable will be collected from Statistics South Africa as well as from the audited annual report of each municipality</p>
<p>Number of households receiving sewerage (sanitation) services</p>	<p>This variable relates to the number of households receiving sanitation services from the municipality. It is considered that if the municipality utilizes an external service delivery mechanism, it will be efficient in providing sanitation services. Therefore, a positive relationship between the number of households receiving sanitation services and efficiency is expected.</p> <p>The data for this variable will be collected from Statistics South Africa as well as from the audited annual report of each municipality</p>
<p>Number of households receiving waste management services (solid waste)</p>	<p>This variable relates to the number of households receiving waste management services from the municipality. It is considered that if the municipality utilizes an external service delivery mechanism, it will be efficient in providing waste management services. Therefore, a positive relationship between the number of households receiving waste management services and efficiency is expected.</p> <p>The data for this variable will be collected from Statistics South Africa as well as from the audited annual report of each municipality</p>
<p>Rand amount spent on employee related costs</p>	<p>This variable relates to the expenditure on employee related costs. This is one of the biggest unit cost in delivering services. The municipalities utilizing an external service delivery mechanism is expected to have greater control in the management of employee related costs and therefore be more efficient in management of costs and in turn delivering services. Therefore, a positive relationship between the number of households receiving employee related costs and efficiency is expected.</p> <p>The data for this variable will be collected from the audited annual report of each municipality</p>

3.6 DATA SOURCE

The eight metropolitan governments' annual reports and audited financial statements served as the data sources. This is because the municipalities all use the same accounting procedures as required by the National Treasury. The recommended variables of interest will guide the data collection process. This includes the performance output of the municipalities through any methods of delivery, the budget of the municipality/agency, and the expenses of giving the service. Other data sources, such as Statistics South Africa's Annual Census of Non-Financial Information, will be analysed to supplement this study. These data sets will provide insight into topics including service delivery access.

The data will be analysed and interpreted using ratios of employee complement, compensation, backlog numbers, revenue for each service, and cost for each service. The National Treasury, lenders, the Department for cooperative governance and traditional affairs (COGTA), the Demarcation Board of South Africa, and the International Monetary Fund's Government Financial Statistics will all be used as reference points against which the trends in the economy will be analysed (IMF). In order to support the statistical analysis and set regional standards, financial ratios will be calculated.

Since all eight metro areas are included in the research, no sample is required. Because of the availability of secondary data sources, no data collecting tools like surveys will be needed. In addition to standard statistical tests and analyses, we will make use of methods such as correlation and regression analysis.

3.7 RELIABILITY AND VALIDITY

This section discusses the measures taken to ensure the validity and reliability of the data and research methods used in this study to examine the efficiency of service delivery mechanisms in South Africa's metropolitan municipalities.

3.7.1 VALIDITY

3.7.1.1 CONSTRUCT VALIDITY

To establish construct validity, careful consideration was given to the selection and operationalization of key variables. The variables chosen for analysis are based on established literature and expert knowledge in the field of service delivery efficiency. Additionally, the use of Data Envelopment Analysis (DEA) and regression modeling aligns with recognized methods for assessing efficiency in similar studies, ensuring that the research measures what it intends to evaluate.

3.7.1.2 INTERNAL VALIDITY

To address internal validity, data collection processes were meticulously designed and executed. Standardized procedures were followed to minimize potential biases and confounding factors. Moreover, the regression model incorporates control variables to account for any potential lurking variables that could influence the outcomes. The researcher also maintained a comprehensive audit trail to ensure transparency and replicability of the analysis.

3.7.1.3 EXTERNAL VALIDITY

External validity is addressed by selecting a diverse and representative sample frame of metropolitan municipalities in South Africa. The inclusion of a variety of municipalities with different sizes, population densities, and socio-economic characteristics enhances the generalizability of the findings to similar contexts.

3.7.2 RELIABILITY

3.7.2.1 DATA RELIABILITY

To ensure data reliability, primary data sources were carefully chosen for accuracy and completeness. Data was collected from reputable government reports and official records, which are subject to rigorous quality control and validation processes. Additionally, the researcher employed consistent data collection methods and cross-checked data entries to minimize errors and inconsistencies.

3.7.2.2 TEST-RETEST RELIABILITY

For quantitative variables, a test-retest reliability analysis was conducted on a subset of the data to assess the consistency of measurements over time. This process confirmed the stability of data over repeated measurements and demonstrated the reliability of the data used in the analysis.

Careful attention to validity and reliability throughout the research process ensures the accuracy and robustness of the findings. By addressing potential sources of bias and error, this study strives to provide credible insights into the efficiency of service delivery mechanisms in metropolitan municipalities in South Africa.

3.8 LIMITATIONS

It is not expected that the form of government would influence local or municipal government spending. This assertion is taken from the empirical research by Partridge and Sass (2011) in Lewis (2018). A review of 30 articles that empirically address the effects of government form on local government spending and/or performance, particularly the efficiency (variously defined) with which public services are delivered, revealed no clear pattern regarding the impact of government form on expenditure and efficiency. If a single conclusion can be formed, it seems that most research have revealed no substantial differences in budgetary results between types of governance. In this research, it is assumed that there would be some political or managerial reasons and justifications for the metros' choice of procurement technique. These reasons are currently outside the scope of this investigation.

Other factors such as grant received, distance from capital, is not included in the adopted model.

For metropolitan municipalities, which have distinguishing features in comparison to typical municipalities, the use of benchmarks may be constrained in cases where appropriate standards have not yet been developed. Although international standards

are another option, their applicability to the local South African context is not always guaranteed.

Also, the research only looked at 5 inputs in estimating the efficiency of the municipalities in relation to financial sustainability.

There are a number of hurdles associated with efficiency estimates, and this research reflects the issues raised by Van Der Westheizen and Doller (2009). There are a number of factors outside of local government's control, such as the many input variables involved in service delivery, the difficulty in accurately estimating the indirect and direct costs of service delivery, competing needs that may impede efficiency improvement (such as political considerations), and so on.

Even though there are 278 municipalities throughout the nation, only eight of them were included in the study's metropolitan areas. Therefore, the findings can only be used to infer the situation in these particular towns; they cannot be used to justify the choice of any of the several service delivery systems utilised at the local level. There is some justification for selecting these megacities, since it is claimed in the introduction that they manage sizable budgets and provide services to more than 40% of the South African population.

3.9 ETHICAL CONSIDERATIONS

This section outlines the ethical considerations taken into account while using secondary data in the study on the efficiency of service delivery mechanisms in South Africa's metropolitan municipalities.

3.9.1 DATA SOURCE AUTHORIZATION

The use of secondary data in this study was based on obtaining appropriate authorization and permissions from the original data sources. Data was accessed only from reputable and reliable sources, ensuring compliance with copyright laws and data-sharing agreements.

3.9.2 DATA PRIVACY AND CONFIDENTIALITY

Since the data used was already collected and publicly available, no direct contact with individuals or entities was made. Nevertheless, utmost care was taken to maintain the privacy and confidentiality of the data during the analysis process. Identifiable information or sensitive data that could compromise the privacy of municipalities or individuals was not disclosed or used in the research.

3.9.3 DATA ACCURACY AND VERIFICATION

The reliability and accuracy of the secondary data were crucial considerations. Efforts were made to cross-verify the data from multiple sources and ensure consistency in its application. Any inconsistencies or data quality issues were addressed and appropriately documented.

3.9.4 AVOIDING BIAS AND MISINTERPRETATION

The researcher took precautions to avoid bias or misinterpretation of the secondary data. A clear understanding of the data sources and their limitations was maintained, and interpretations were made with objectivity and impartiality.

3.9.5 TRANSPARENCY IN DATA REPORTING

The origins of the secondary data used in the study were properly cited and referenced. All data sources were acknowledged in the research report to maintain transparency and give credit to the original data providers.

3.9.6 ETHICAL REVIEW AND COMPLIANCE

Since this study used pre-existing, publicly available data, it was exempt from formal ethical review. However, the ethical principles of respect for data ownership, confidentiality, and data usage were upheld throughout the research process.

3.9.7 BENEFICENCE AND SOCIAL IMPACT

While no direct contact with participants occurred, the study aimed to contribute valuable insights to promote the enhancement of service delivery mechanisms in metropolitan municipalities, ultimately benefiting the broader society. The potential social impact of the research was considered in the context of the research objectives.

3.10 SUMMARY

Chapter 3 presented the methodology employed in this study to investigate the efficiency of service delivery mechanisms in South Africa's metropolitan municipalities. The chapter commences with an introduction, providing an overview of the research design. It then discusses the sample frame used for the study and outlines the approach of using Data Envelopment Analysis (DEA) to assess efficiency. Additionally, a regression model is described, facilitating further analysis. A comprehensive description of the variables under consideration is provided, and the data source utilized for the study is specified. The chapter concludes by highlighting the limitations encountered during the research process.

Having established the methodology in Chapter 3, we now turn our attention to Chapter 4, where the data analysis is conducted. Building upon the framework outlined in the previous chapter, Chapter 4 delves into the examination of key variables related to service delivery efficiency in South Africa's metropolitan municipalities. By employing both Data Envelopment Analysis and regression modelling, this chapter aims to gain valuable insights into the factors influencing efficiency and effectiveness in delivering essential services to urban communities. The findings derived from this data analysis will serve as a crucial foundation for drawing conclusions and formulating recommendations in the subsequent chapters, contributing significantly to the understanding and improvement of service delivery mechanisms in these urban areas.

CHAPTER 4 - DISCUSSION OF FINDINGS

4.1 INTRODUCTION

This chapter presents the findings from the analysis of data. It starts with a descriptive statistic of the input and output variables; the efficiency scores; and then the regression results. For this study, the input variable is the mode of delivery of services to the municipalities. There are two modes of delivery - in-house, denoted by 0; and outsourced, denoted by 1. The output variable number of households that receive the service in the municipality. The Average cost per unit is also analysed as a key variable in the data.

4.2 DESCRIPTIVE STATISTICS OF KEY VARIABLES

4.2.1 INPUT VARIABLE – MODE OF DELIVERY

The mean mode of delivery was either 0 or 1 for each municipal city. A mean of 0 indicates that the main mode of delivery for that particular service was in-house; and a mean of 1 indicates that the main mode of delivery for that particular service is outsourcing. Table 4.1 shows the mean mode of delivery of services according to municipality.

Table 4.1: Mean mode of delivery for services according to municipality

Municipal	Water	Electricity	Sanitation	Solid Waste
BUFFALO CITY	0	1	0	0
CITY OF CAPE TOWN	0	1	0	1
CITY OF JOHANNESBURG	1	1	1	1
CITY OF TSHWANE	0	1	0	0
EKURHULENI	0	1	0	0
ETHEKWINI	0	1	0	0
MANGAUNG	0	1	0	0
NELSON MANDELA BAY	0	0	0	1
Grand Average	0	1	0	0

Source: Research data

4.2.1.1 WATER

The main mode of delivery of water services is in-house. This means that the municipality uses government provided resources to provide water to households within the municipality. Apart from the city of Johannesburg, all other cities applied in-house resources for water delivery.

4.2.1.2 ELECTRICITY

The main mode of delivery of electricity services is outsourcing. This means that the municipality uses privately provided resources to provide water to households within the municipality. Apart from the Nelson Mandela Bay, all other cities outsourced the electricity service for households in their municipality.

4.2.1.3 SEWERAGE AND SANITATION

The main mode of delivery of sewerage and sanitation services is in-house. This means that the municipality uses government provided resources to provide sewerage and sanitation services to households within the municipality. Apart from the city of Johannesburg, all other cities applied in-house resources for sewerage and sanitation services delivery.

4.2.1.4 SOLID WASTE

Out of the eight cities, five (Buffalo City, City of Tshwane, Ekurhuleni, Ethekewini, Mangaung) used in-house resources for solid waste services. The remaining three (Cape Town, Johannesburg and Nelson Mandela Bay) provided solid waste services by outsourcing.

4.2.2 OUTPUT VARIABLE: NUMBER OF HOUSEHOLDS RECEIVING SERVICE

Figure 4.1 shows the mean number of households that received water per municipality. In all, an average of 638,551 of households received water. City of Johannesburg received the highest, 980,855; and Mangaung received the lowest, 199.222.

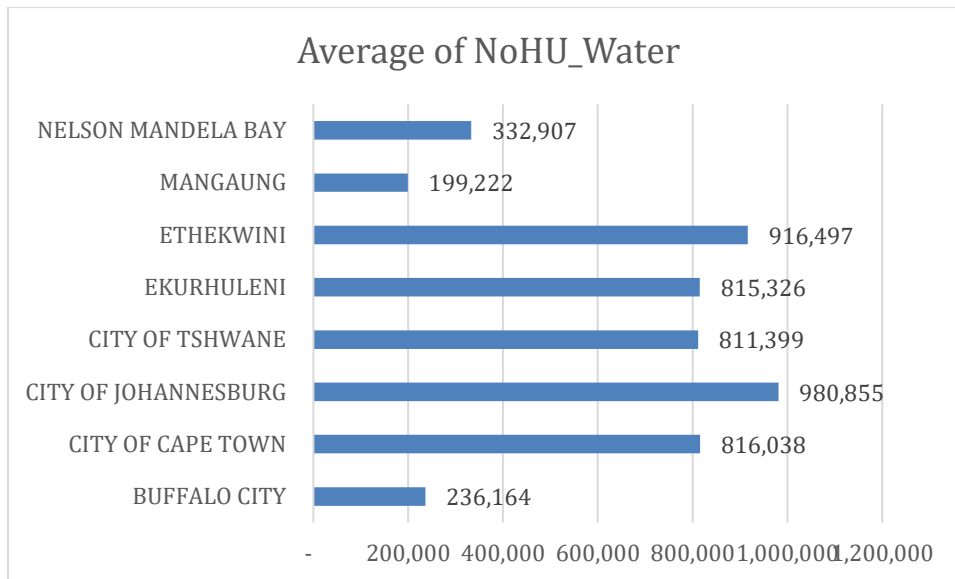


Figure 4.1: Average Number of Households that received Water

Figure 4.2 shows the number of households that received electricity per municipality. In all, an average of 553,407 of households received electricity. City of Cape Town received the highest, 983,640; and Buffalo City received the lowest, 148,167.

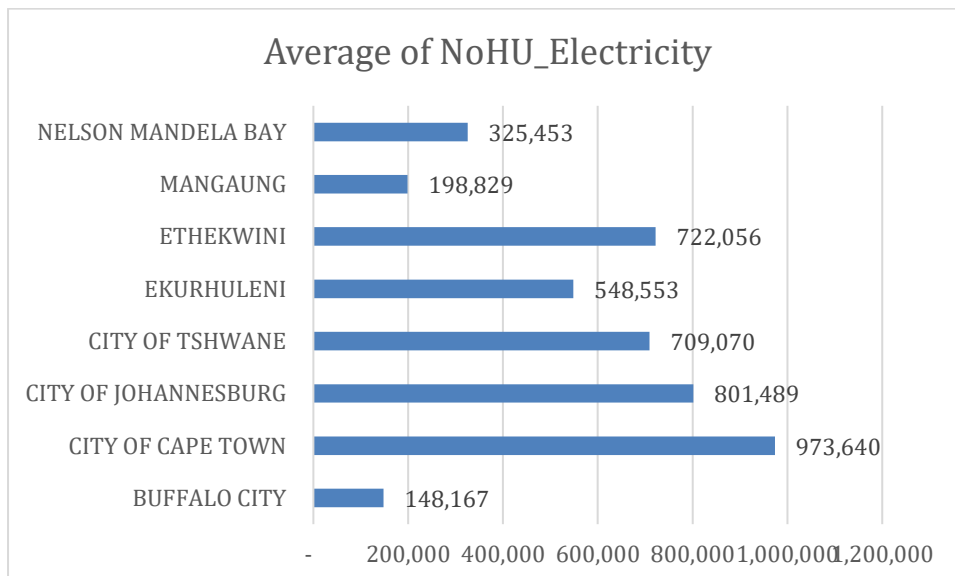


Figure 4.2: Average Number of Households that received Electricity

Figure 4.3 shows the average number of households that received sewerage and sanitation services per municipality. In all, an average of 544,915 of households received sewerage and sanitation services. City of Johannesburg received the highest, 833,692; and Mangaung received the lowest, 177,275.

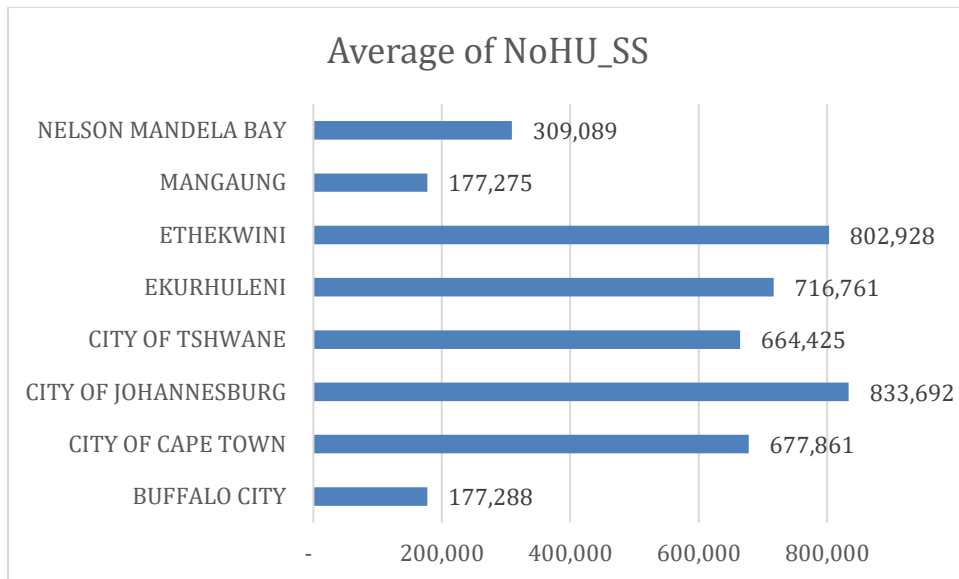


Figure 4.3: Mean Number of Households that received Electricity

Figure 4.4 shows the average number of households that received solid waste services per municipality. In all, an average of 650,189 of households received solid waste services. eThekweni received the highest, 1,015,120; and City of Cape Town received the lowest, 179,485.

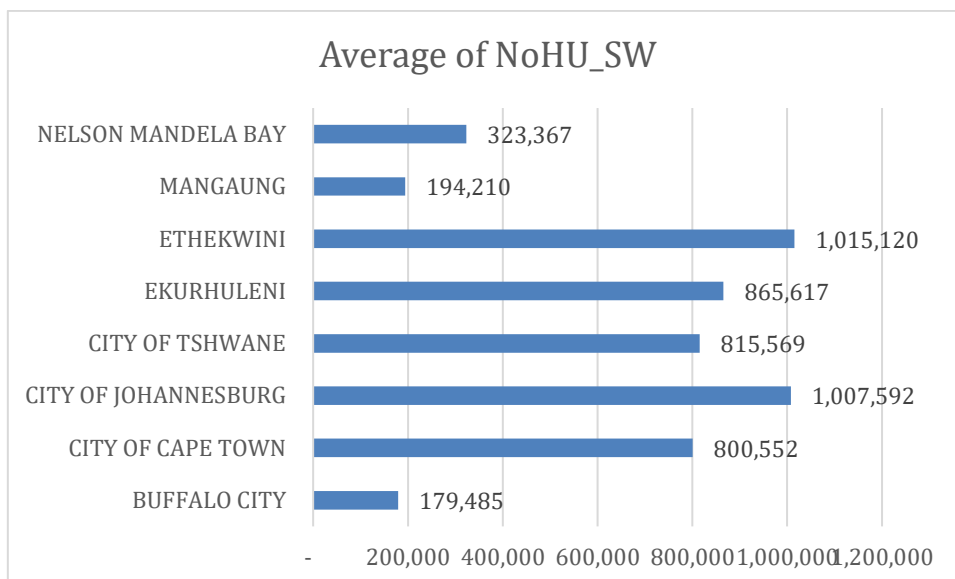


Figure 4.4: Mean Number of Households that received Solid Waste

4.2.3 MEAN AVERAGE COST

Table 4.2 shows the mean average cost per unit spent on delivering services to household units per service by municipality.

Table 4.2: Mean average cost per unit spent on delivering services to household units per service by municipality

Row Labels	Average of AUC_Water	Average of AUC_Electricity	Average of AUC_SS	Average of AUC_SW
BUFFALO CITY	0.75	7.57	2.35	1.67
CITY OF CAPE TOWN	2.09	7.25	1.99	1.42
CITY OF JOHANNESBURG	3.88	11.86	3.57	1.95
CITY OF TSHWANE	2.07	9.22	0.94	1.40
EKURHULENI	2.85	14.67	0.89	1.57
ETHEKWINI	1.90	9.99	0.79	0.89
MANGAUNG	2.14	6.32	1.27	0.92
NELSON MANDELA BAY	0.28	7.72	1.84	1.07
Grand Total	2.00	9.33	1.71	1.36

Source: Research data

Table 4.2 shows the mean average cost per unit spent on delivering water to households per municipality. In all, an average unit cost of R2 was spent on delivering water over the period. City of Johannesburg spent the highest R3.88; and Nelson Mandela Bay spent the lowest, R0.28.

Table 4.2 shows the mean average cost per unit spent on delivering electricity to households per municipality. In all, an average unit cost of R9.33 was spent on delivering electricity over the period. Ekurhuleni had the highest R14.67; and Mangaung spent the lowest, R6.32.

Table 4.2 shows the mean average cost per unit spent on delivering sewerage and sanitation service to households per municipality. In all, an average unit cost of R1.71 was spent on delivering sewerage and sanitation over the period. City of Johannesburg spent the highest R3.57; and eThekwini spent the lowest, R0.79.

Table 4.2 shows the mean average cost per unit spent on delivering solid waste services to households per municipality. In all, an average unit cost of R1.36 was spent on delivering solid waste services over the period. City of Johannesburg spent the highest R1.95; and eThekwini spent the lowest, R0.89.

4.3 EFFICIENCY OF MUNICIPAL ASSEMBLIES

To determine the efficiency of operations by municipalities, an input-oriented DEA model the constant return to scale (CRS) representing technical efficiency, and variable returns to scale (VRS) representing pure technical efficiency was applied. It measures efficiency based on minimising the input values. The lower the values, the less efficient; and the maximum efficiency score is 1.

4.3.1 WATER

Table 4.3 shows the mean efficiency scores for water delivery per municipality. The mean CRS is 82.4% and the mean VRS is 91.4%. This means that input inefficiencies exist by 9 to 18%. City of Cape Town was the most input-efficient at Water delivery and Ekurhuleni was the least efficient. On the other hand, City of Johannesburg was the least efficient in terms of output with a slack of 710948. Again, City of Cape Town did not have any output slack in water delivery. This means that City of Cape Town was the most efficient at Water delivery.

Table 4.3: Mean Efficiency Scores for Water according to municipality

Municipality	CRS	VRS	Slack (Output)
CITY OF JOHANNESBURG	0.574	0.6225	710948.000
EKURHULENI	0.558	0.8125	710532.000
NELSON MANDELA BAY	0.988	1.0000	131714.000
CITY OF TSHWANE	0.840	1.0000	127445.000
ETHEKWINI	0.886	1.0000	120075.000
CITY OF CAPE TOWN	1.000	0.8750	0.000
BUFFALO CITY	0.884	1.0000	0.000
MANGAUNG	0.863	1.0000	0.000
Grand Mean	0.824	0.9138	225089.250

Source: Research data

4.3.2 ELECTRICITY

Table 4.4 shows the mean efficiency scores for electricity delivery per municipality. The mean CRS is 86.9% and the mean VRS is 98.8%. This means that input inefficiencies exist by 2 to 13%. Ekurhuleni was the most input-efficient at electricity delivery with CRS of 98.3% and Tshwane was the least efficient with CRS of 67.5%.

On the other hand, City of Johannesburg was the least efficient in terms of output with a slack of 1054985.

Table 4.4: Mean Efficiency Scores for Electricity according to municipality

Municipality	CRS	VRS	Slack (Output)
CITY OF JOHANNESBURG	0.921	0.9115	1054985.000
EKURHULENI	0.983	0.9944	1046052.000
NELSON MANDELA BAY	0.930	1.0000	480548.000
CITY OF CAPE TOWN	0.926	1.0000	449879.000
MANGAUNG	0.902	1.0000	390111.000
BUFFALO CITY	0.928	1.0000	387141.000
CITY OF TSHWANE	0.675	1.0000	103091.000
ETHEKWINI	0.685	1.0000	0.000
Grand Mean	0.869	0.9882	488975.875

Source: Research data

4.3.3 SEWERAGE AND SANITATION

Table 4.5 shows the mean efficiency scores for sewerage and sanitation delivery per municipality. The mean CRS is 77.1% and the mean VRS is 100%. This means that input inefficiencies exists by 23%. City of Cape Town was the most input-efficient at sewerage and sanitation delivery with CRS of 96.3% and City of Johannesburg was the least efficient with CRS of 49.7%. On the other hand, City of Johannesburg was the least efficient in terms of output with a slack of 783489.

Table 4.5: Mean Efficiency Scores for Sewerage and Sanitation according to municipality

Municipality	CRS	VRS	Slack (Output)
CITY OF JOHANNESBURG	0.497	1.0000	783489.000
EKURHULENI	0.500	1.0000	783489.000
CITY OF TSHWANE	0.840	1.0000	85008.000
ETHEKWINI	0.860	1.0000	76888.000
NELSON MANDELA BAY	0.941	1.0000	11985.000
BUFFALO CITY	0.791	1.0000	0.000
CITY OF CAPE TOWN	0.963	1.0000	0.000
MANGAUNG	0.777	1.0000	0.000
Grand Mean	0.771	1.0000	

4.3.4 SOLID WASTE

Table 4.6 shows the mean efficiency scores for solid waste delivery per municipality. The mean CRS is 68.6% and the mean VRS is 93.1%. This means that input inefficiencies exist by 7 to 32%. EThekwini was the most input-efficient at solid waste delivery with CRS of 93.4% and City of Johannesburg was the least input-efficient with CRS of 48%. On the other hand, City of Johannesburg and Ekurhuleni were the least efficient in terms of output with a slack of 783489.

Table 4.6: Mean Efficiency Scores for Solid Waste according to municipality

Municipality	CRS	VRS	Slack (Output)
CITY OF JOHANNESBURG	0.480	0.6870	783489.000
EKURHULENI	0.608	0.7638	783489.000
CITY OF TSHWANE	0.897	1.0000	85008.000
ETHEKWINI	0.934	1.0000	76888.000
NELSON MANDELA BAY	0.728	1.0000	11985.000
BUFFALO CITY	0.537	1.0000	0.000
CITY OF CAPE TOWN	0.807	1.0000	0.000
MANGAUNG	0.492	1.0000	0.000
Grand Mean	0.686	0.9313	

Source: Research data

4.4 REGRESSION RESULTS

4.4.1 WATER MODE OF DELIVERY AND CRS AND VRS

After running testing for fixed and random effects for the effect of mode of delivery of water on CRS, the Hausman test p-value is greater than 5%; which shows that the random effects model best fits the data. The results in Table 4.7 shows the effect of mode of delivery on CRS in water service delivery to the metropolitan municipalities. From the results table, the R-squared is about 30%. This means that the model of delivery (in-house or outsourcing) determines explains about 30% of all the variability in the number of houses that can be served at constant returns to scale. The significance F or p-value of the model is 0.000 (less than 0.05) also means that the null hypothesis that the coefficient of the independent variable is zero is rejected and that there is a significant relationship between the independent variables (mode of water service delivery and number of houses served) and the dependent variable

(CRS in water delivery). Also, the mode of water delivery (outsourcing) shows a coefficient score of -0.2863 and corresponding p-value of 0.000 (less than 0.05); which indicates a there is enough evidence or confidence that there is a significant negative linear relationship between mode of water delivery (outsourcing) and CRS in water delivery.

Similarly, after running testing for fixed and random effects for the effect of mode of delivery of water on VRS, the Hausman test p-value is greater than 5%; which shows that the random effects model best fits the data. The results in Table 8 shows the effect of mode of delivery on VRS in water service delivery to the metropolitan municipalities. From the results table, the R-squared is about 28.9%. This means that the model of delivery (in-house or outsourcing) and number of houses served together explain about 29% of all the variability in the number of houses that can be served at constant returns to scale. The significance F or p-value of the model is 0.000 (less than 0.05) also means that the null hypothesis that the coefficient of the independent variable is zero is rejected and that there is a significant relationship between the independent variables (mode of water service delivery and number of houses served) and the dependent variable (VRS in water delivery). Also, the mode of water delivery (outsourcing) shows a coefficient score of -0.0936 and corresponding p-value of 0.000 (less than 0.05); which indicates a there is enough evidence or confidence that there is a significant negative linear relationship between mode of water delivery (outsourcing) and VRS in water delivery.

Table 4.7: Random Effects results on Water mode of delivery and technical efficiency

	REM		REM	
	CRS		VRS	
	Coefficient	std err	Coefficient	std err
Water Mod_Out	-0.2864***	0.0633	-0.0936***	0.0633
NoHU Water	-0.0104	0.6665	-0.1331	0.6665
Constant	0.8623***	0.1626	1.0314***	0.1626
F-stat (Wald chi2)	26.2		25.2	
Prob>F	0.000		0.000	
R-squared	0.3004		0.2894	

Hausman chi2	0.03			0.31	
Prob>chi2	0.9832			0.855	
No of Municipalities	8			8	
Observations	64			64	

Note: *** denotes significance at 1%. Mod_Out=Mode of Output; NoHU=Number of Household Units

4.4.2 ELECTRICITY MODE OF DELIVERY AND CRS AND VRS

Electricity mode of delivery and CRS and VRS after running testing for fixed and random effects for the effect of mode of delivery of electricity on CRS, the Hausman test p-value is greater than 5%; which shows that the random effects model best fits the data. The results in Table 4.8 shows the effect of mode of delivery on CRS in electricity service delivery to the metropolitan municipalities. From the results table, the R-squared is about 12.7%. This means that the model of delivery (in-house or outsourcing) determines explains about 12.7% of all the variability in the number of houses that can be served at constant returns to scale. The significance F or p-value of the model is 0.0115 (less than 0.05) also means that the null hypothesis that the coefficient of the independent variable is zero is rejected and that there is a significant relationship between the independent variables (mode of electricity service delivery and number of houses served) and the dependent variable (CRS in electricity delivery). Also, the mode of electricity delivery (outsourcing) shows a coefficient score of -0.1479 and corresponding p-value of 0.012 (less than 0.05); which indicates a there is enough evidence or confidence that there is a significant negative linear relationship between mode of water delivery (outsourcing) and CRS in electricity delivery.

Similarly, after running testing for fixed and random effects for the effect of mode of delivery of electricity on VRS, the Hausman test p-value is negative; which shows that the random effects model best fits the data (Schreiber, 2008). The results in Table 9 shows the effect of mode of delivery on VRS in electricity service delivery to the metropolitan municipalities. From the results table, the R-squared is about 12.40%. This means that the model of delivery (in-house or outsourcing) determines explains about 12.40% of all the variability in the number of houses that can be served at variable returns to scale. The significance F or p-value of the model is 0.0115 (less than 0.05) also means that the null hypothesis that the coefficient of the independent

variable is zero is rejected and that there is a significant relationship between the independent variables (mode of electricity service delivery and number of houses served) and the dependent variable (VRS in electricity delivery). Also, the mode of electricity delivery (outsourcing) shows a coefficient score of -0.1240 and corresponding p-value of 0.029 (less than 0.05); which indicates a there is enough evidence or confidence that there is a significant negative linear relationship between mode of water delivery (outsourcing) and VRS in electricity delivery.

Table 4.8: Random Effects results on electricity mode of delivery and technical efficiency

	REM			REM	
	CRS			VRS	
	Coefficient	std err		Coefficient	std err
Elect. Mod_Out	-0.1479**	0.05880		-0.124**	0.0554
NoHU Elect.	-1.322***	0.49857		-0.9157*	0.4803
Constant	1.2668***	0.13565		1.1633***	0.1302
F-stat (Wald chi2)	8.93			2.91	
Prob>F	0.0115			0.0633	
R-squared	0.1277			0.1243	
Hausman chi2	-9.22			-9.22	
Prob>chi2	n/a			n/a	
No of Municipalities	8			8	
Observations	64			64	

Note: ***, ** & * denote significance at 1%, 5% and 10% respectively. Mod_Out=Mode of Output; NoHU=Number of Household Units

4.4.3 SEWERAGE MODE OF DELIVERY AND CRS

After running testing for fixed and random effects for the effect of mode of delivery of sewerage and sanitation services on CRS, the Hausman test p-value is greater than 5%; which shows that the random effects model best fits the data. The results in Table 4.9 shows the effect of mode of delivery on CRS in sewerage and sanitation services delivery to the metropolitan municipalities. From the results table, the R-squared is about 12.7%. This means that the model of delivery (in-house or outsourcing) determines explains about 33.3% of all the variability in the number of houses that can be served at constant returns to scale. The significance F or p-value of the model is 0.000 (less than 0.05) also means that the null hypothesis that the coefficient of the independent variable is zero is rejected and that there is a significant relationship

between the independent variables (mode of sewerage and sanitation services delivery and number of houses served) and the dependent variable (CRS in sewerage and sanitation services delivery). Also, the mode of sewerage and sanitation services delivery (outsourcing) shows a coefficient score of -0.3404 and corresponding p-value of 0.000 (less than 0.05); which indicates a there is enough evidence or confidence that there is a significant negative linear relationship between mode of sewerage and sanitation services delivery (outsourcing) and CRS in sewerage and sanitation services delivery.

Similarly, after running testing for fixed and random effects for the effect of mode of delivery of sewerage and sanitation services on VRS, the Hausman test p-value is greater than 5%; which shows that the random effects model best fits the data. The results in Table 10 shows the effect of mode of delivery on VRS in sewerage and sanitation services delivery to the metropolitan municipalities. From the results table, the R-squared is about 31.6%. This means that the model of delivery (in-house or outsourcing) determines explains about 31.6% of all the variability in the number of houses that can be served at variable returns to scale. The significance F or p-value of the model is 0.000 (less than 0.05) also means that the null hypothesis that the coefficient of the independent variable is zero is rejected and that there is a significant relationship between the independent variables (mode of sewerage and sanitation services delivery and number of houses served) and the dependent variable (VRS in sewerage and sanitation services delivery). Also, the mode of sewerage and sanitation services delivery (outsourcing) shows a coefficient score of -0.275 and corresponding p-value of 0.000 (less than 0.05); which indicates a there is enough evidence or confidence that there is a significant negative linear relationship between mode of sewerage and sanitation services delivery (outsourcing) and VRS in sewerage and sanitation services delivery.

Table 4.9: Random Effects results on Sewerage and Sanitation mode of delivery and technical efficiency

	REM			REM	
	CRS			VRS	
	Coefficient	std err		Coefficient	std err
Sewerage and Sanitation. Mod_Out	-0.3404***	0.0627		-0.275***	0.0570

NoHU Sewerage and Sanitation.	-0.7203	0.6316	0.1101	0.5743
Constant	0.9589***	0.1321	0.9435***	0.1201
F-stat (Wald chi2)	30.51		28.22	
Prob>F	0		0	
R-squared	0.3334		0.3163	
Hausman chi2	0.02		0.01	
Prob>chi2	0.9913		0.9961	
No of Municipalities	8		8	
Observations	64		64	

Note: *** denotes significance at 1%, Mod_Out=Mode of Output; NoHU=Number of Household Units

4.4.4 SOLID WASTE MODE OF DELIVERY AND CRS

After running testing for fixed and random effects for the effect of mode of delivery of solid waste services on CRS, the Hausman test p-value is greater than 5%; which shows that the random effects model best fits the data. The results in Table 4.10 shows the effect of mode of delivery on CRS in solid waste services delivery to the metropolitan municipalities. From the results table, the R-squared is about 3.1%. This means that the model of delivery (in-house or outsourcing) determines explains about 3.1% of all the variability in the number of houses that can be served at constant returns to scale. The significance F or p-value of the model is 0.313 (greater than 0.05) also means that the null hypothesis that the coefficient of the independent variable is zero cannot be rejected and that there is no significant relationship between the independent variables (mode of solid waste services delivery and number of houses served) and the dependent variable (CRS in solid waste services delivery). Also, the mode of solid waste services delivery (outsourcing) shows a coefficient score of 0.01093 and corresponding p-value of 0.882 (greater than 0.05); which indicates there is not enough evidence or confidence that there is a significant positive linear relationship between mode of solid waste services delivery (outsourcing) and CRS in solid waste services delivery.

Similarly, after running testing for fixed and random effects for the effect of mode of delivery of solid waste services on VRS, the Hausman test p-value is greater than 5%; which shows that the random effects model best fits the data. The results in Table 11

shows the effect of mode of delivery on VRS in solid waste services delivery to the metropolitan municipalities. From the results table, the R-squared is about 11.15%. This means that the model of delivery (in-house or outsourcing) determines explains about 11.15% of all the variability in the number of houses that can be served at variable returns to scale. The significance F or p-value of the model is 0.012 (less than 0.05) also means that the null hypothesis that the coefficient of the independent variable is zero is rejected and that there is a significant relationship between the independent variables (mode of solid waste services delivery and number of houses served) and the dependent variable (VRS in solid waste services delivery). Also, the mode of solid waste services delivery (outsourcing) shows a coefficient score of -0.1306 and corresponding p-value of 0.008 (less than 0.05); which indicates a there is enough evidence or confidence that there is a significant negative linear relationship between mode of solid waste services delivery (outsourcing) and VRS in solid waste services delivery.

Table 4.10: Random Effects results on Solid Waste mode of delivery and technical efficiency

	REM			REM	
	CRS			VRS	
	Coefficient	std err		Coefficient	std err
Solid Waste. Mod_Out	0.0109	0.0739		-0.1306***	0.0491
NoHU Solid Waste.	1.376	0.9216		-0.024	0.6023
Constant	0.3621	0.2282		0.9683***	0.1479
F-stat (Wald chi2)	2.32			7.65	
Prob>F	0.313			0.0218	
R-squared	0.0309			0.1115	
Hausman chi2	0.33			0.25	
Prob>chi2	0.8492			0.8824	
No of Municipalities	8			8	
Observations	64			64	

Note: *** denotes significance at 1%, Mod_Out=Mode of Output; NoHU=Number of Household Units

4.4.5 SUMMARY OF REGRESSION RESULTS

Table 4.11: Summary results on CRS

CRS	R ²	Coeff.	p-value	Remark	
Water	0.3004	-0.2864	0.000	Negative	Significant

Electricity	0.1277	-0.1478	0.012	Negative	Significant
Sewerage & Sanitation	0.3334	-0.3404	0.000	Negative	Significant
Solid Waste	0.0309	0.0109	0.882	Positive	Insignificant

Table 4.12: Summary results on VRS

VRS	R2	Coeff.	p-value	Remark	
Water	0.2894	-0.0936	0.000	Negative	Significant
Electricity	0.1277	-0.1478	0.012	Negative	Significant
Sewerage & Sanitation	0.3163	-0.2750	0.000	Negative	Significant
Solid Waste	0.1115	-0.1305	0.008	Negative	Significant

The summary regression results show that there is a negative significant effect of outsourcing services (water, electricity, sewerage & sanitation) on constant returns to scale in service delivery for all services except solid waste. And there is a negative significant effect of outsourcing services (water, electricity, sewerage & sanitation, and solid waste) on variable returns to scale in service delivery for all services.

4.5 SUMMARY

Chapter 4 presented the data analysis conducted to examine the efficiency of service delivery mechanisms in South Africa's metropolitan municipalities. The chapter begins with an introduction, followed by an overview of descriptive statistics for key variables. These variables include the mode of delivery for services such as water, electricity, sewerage, and solid waste, as well as the number of households receiving each service and the mean average cost.

The efficiency of municipal assemblies is then assessed for each service category, namely water, electricity, sewerage, and solid waste. Regression results are provided to explore the relationships between the mode of delivery and the efficiency measures, using Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS) models.

Having conducted a comprehensive data analysis in Chapter 4, we now proceed to Chapter 5, which presents a summary of the findings derived from this study. In addition, Chapter 5 provides the conclusions drawn from the analysis and offers practical recommendations to enhance the efficiency of service delivery mechanisms in metropolitan municipalities in South Africa. By examining the data in depth, this research seeks to contribute valuable insights to inform policy-making and decision-making processes, aiming to foster more effective and equitable service provision for the residents of these urban areas.

CHAPTER 5 - CONCLUSIONS AND RECOMMENDATIONS

This section contains the findings of a research on the effectiveness of service delivery methods across South African municipal administrations. It includes the study's overview, empirical analysis conclusions, and policy suggestions based on the findings.

5.1 SUMMARY OF THE STUDY

The study examined whether inefficiencies exist in the delivery channels of services to the municipalities in Johannesburg; and also examine the effect of these modes of delivery of service delivery on returns to scale (constant and variable). The modes of delivery are in-house and outsourcing. The input-oriented method was applied to examine whether inefficiencies exist; while panel data regression was applied to determine the effect.

The results show that inefficiencies exist in service delivery within some municipalities; both in input and output. The city of Johannesburg and Ekurhuleni recorded the highest slacks in output efficiency across all four services; while Mangaung was the most efficient in water, electricity and solid waste delivery with the least or no output slacks.

The municipalities generally operated on an increasing return to scale meaning that there was more room for improvement in their services. None of the municipalities recorded decreasing returns to scale for electricity; 25% (16) of the periods saw some municipalities recording decreasing returns for water; 14% (9) for sewerage and sanitation; and 6% (4) for solid waste.

The regression results show that there is a negative significant effect of outsourcing services (water, electricity, sewerage & sanitation) on constant returns to scale in service delivery for all services except solid waste. And there is a negative significant effect of outsourcing services (water, electricity, sewerage & sanitation, and solid waste) on variable returns to scale in service delivery for all services.

5.1.1 WATER

Apart from the city of Johannesburg, the mode of service delivery for water was in-house. Over the period eight-year period, increasing returns were recorded 37 times (54%); decreasing returns, 16 times (25%) and constant returns, 11 times (17%). The mode of delivery generally had a negative significant effect on service delivery with water ranking 2 from the top in terms of inefficiency. Only the City of Johannesburg and Ekurhuleni experienced decreasing return to scales to scale over the period. While the former applied outsourcing, the latter applied in-house resources.

5.1.2 ELECTRICITY

Apart from the Nelson Mandela Bay, the mode of service delivery for electricity was outsourcing. Over the period eight-year period, increasing returns were recorded 47 times (73%); no decreasing returns, and constant returns, 17 times (26.5%). The mode of delivery generally had a negative significant effect on service delivery with electricity topping the ranks in terms of inefficiency. There were no decreasing returns to scale in providing electricity.

5.1.3 SEWERAGE AND SANITATION

Apart from the city of Johannesburg, Nelson Mandela Bay, and City of Cape Town the mode of service delivery for water was in-house. Over the period eight-year period, increasing returns were recorded 47 times (73%); decreasing returns, 9 times (14%) and constant returns, 8 times (12.5%). The mode of delivery generally had a negative significant effect on service delivery with sewerage and sanitation ranking first in terms of efficiency. Only the City of Johannesburg and Ekurhuleni experienced decreasing return to scales to scale over the period. Again, while the former applied outsourcing, the latter applied in-house resources.

5.1.4 SOLID WASTE

Apart from the city of Johannesburg, Nelson Mandela Bay, and City of Cape Town the mode of service delivery for water was in-house. Over the period eight-year period, increasing returns were recorded 51 times (79.6%); decreasing returns, 4 times (6%) and constant returns, 9 times (14.1%). Only the City of Johannesburg and Ekurhuleni experienced decreasing return to scales to scale over the period. Once again, while the former applied outsourcing, the latter applied in-house resources.

5.2 CONCLUSIONS

The study concludes that majority of the municipalities are not operating at full capacity when it comes to service delivery. Only few are operating at constant returns to scale. The mode of delivery which is mainly outsourcing for most of the services has not yielded optimum results since there is lot more room for improvement in services in terms of the number of households receiving the various services.

5.3 RECOMMENDATIONS

The results showed that the status quo of service delivery may be better. When municipal governments lack the resources to provide a service internally, it is advised that they increase their usage of outsourcing and co-sourcing. Outsourcing might be especially helpful at the municipal level, where there are still gaps in service delivery for things like water and sewage systems and basic infrastructure maintenance. However, there are prerequisites that must be met before outsourcing may be used effectively. City governments that are thinking about outsourcing should do so only if they have a well-defined goal, a sound strategic rationale, an actual need for change, and a strong desire to enhance service delivery. For the greatest results, pick a service provider that is both capable and committed to meeting your needs. To effectively monitor and oversee the contract's execution, the appropriate control mechanisms must be in place and qualified, authorised personnel must be on hand.

CHAPTER 6 - REFERENCES

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