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Cable Theft: Root Causes and Approaches to Reduction in Local Government in South Africa

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Abstract

Cable theft is a major infrastructure security issue in South Africa, especially in Gauteng municipalities where poverty is spatially concentrated to the extent that it has given rise to high-scale thefts of electricity distribution infrastructure. This essay focuses on the complexity of the reasons behind cable theft, including unemployment-related desperation, organized crime syndicates, governmental corruption, and the international commodity markets. The study conducted on 19,919 reported cases in the country and 5,914 cases in Gauteng since April 2019 shows that cable theft is not limited to property crime but poses a threat to basic service delivery in the electricity, water, health, and education systems. The study finds that effective mitigation should involve both combined interventions using advanced technology (intrusion detection systems, smart meters, mechanical barriers), enhanced law enforcement and prosecution, community involvement, and socioeconomic development measures. Evidence-based policies, such as special detection offices, scrapyard control, dedicated prosecution, legitimacy programs that integrate infrastructure security and affordability approaches are put across as critical elements of sustainable reduction strategies. The paper concludes that the solution to cable theft is closely connected with the constitutional obligation of South Africa to progressive fulfillment of socioeconomic rights, which means that municipal, provincial, and national governments must act in collaboration.

Keywords: Cable Theft, Infrastructure Security, Electricity Distribution, Service Delivery, Municipal Governance, South Africa, Gauteng Municipalities, Organized Crime, Socioeconomic Inequality, Poverty and Unemployment, Copper Theft, Community Participation, Technological Solutions, Law Enforcement, Institutional Corruption, Informal Settlements, Illegal Electricity Connections, Scrapyard Regulation, Infrastructure Resilience, Development Sustainability

Introduction

Executive Summary

One of the most problematic infrastructure challenges in South Africa is the theft of electricity distribution infrastructure cables, and it has a particularly high impact in Gauteng municipalities, where spatial legacies of apartheid planning have led to concentrated poverty in townships and informal settlements. This essay addresses the causal factors, implications of service delivery, and evidence-based reduction strategies based on the South African institutional and development realities. The research shows that cable theft is an expression of intersecting socioeconomic stressors, market, and institutional failures that require a multifaceted intervention comprising technology, law enforcement, community participation and economic development. The scale of this problem demands urgent municipal action since the decay of infrastructure threatens the central systems on which people especially historically marginalized communities depend to enjoy the basic services guaranteed by the constitutional democracy of South Africa.

In South Africa, cable theft is an epidemic, and Gauteng Province has recorded 5,914 cases since April 2019, which is nearly one-third of the total nationwide 19,919 cases reported in the power distribution networks of the country [1]. The state-run national electricity utility, Eskom, which generates about 95% of the electricity in South Africa has reported losses of over R2 billion through cable theft alone. City Power in Johannesburg and Ekurhuleni Metropolitan Municipality, City of Tshwane and smaller municipalities within Gauteng have similarly been decimated by the same extent of destruction to their already strained

financial means as municipal utilities in other areas. This crisis develops in the context of the South African peculiarities of the post-apartheid environment in which municipalities were left with disjointed, spatially disintegrated infrastructural systems based on decades of apartheid spatial planning which actively marginalized Black communities on the lists of service provision. In addition to direct financial losses, cable theft has cascade effects on important service systems: water supply is disrupted and risks public health; healthcare facilities are unable to attend to patients who need life-support systems; educational institutions close schools affecting learning; and economic processes are halted taking away jobs.

These effects are concentrated in poor communities, which are mainly in Gauteng townships, such as Alexandra, Soweto, East Rand communities in Ekurhuleni, and the growing informal settlements in Tshwane and Sedibeng. The cascading impact of infrastructure theft causes loops of additional degradation as less utility revenue is raised to invest in needed maintenance, and infrastructure degradation increases in the areas where municipal capacity to respond is most limited. This essay discusses the problem of cable theft because it specifically impacts the electricity distribution infrastructure of the Gauteng municipalities, such as overhead distribution lines, underground cables, transformer infrastructure, and substation equipment, and explores the underlying causes of cable theft based on realities of South Africa, as well as its effects on service delivery within the water, health, and education systems, and evidence-based prevention methods that can be applied at the levels of municipal governance structures. The urgency of this issue can hardly be overemphasized in the context of the South African developmental process. Every month of inaction enables cable theft networks to get more established, more organized, and more lucrative.

The problem goes well beyond property crime to be a fundamental challenge to the capacity of the municipal service provision and the sustainability of the promise of South Africa to achieve socioeconomic rights to all its citizens in a progressive manner. The analysis of this crisis in the South African context is that it is multidimensional: the desperation of people who are unemployed and whose unemployment rate is above 40% in Gauteng townships; the existence of organized criminal syndicates that take advantage of the global markets of copper commodities; and the systemic nature of corruption in state institutions and law enforcement to allow perpetrators to act with relative impunity.

The Scope and Prevalence of Cable Theft

South Africa is considered one of the hardest-hit countries concerning cable theft [2]. Cable theft is a method of stealing copper and aluminium conductors used in electricity distribution systems, such as overhead lines, underground conductors, distribution infrastructure, primary conductors off poles and transmission towers, secondary distribution conductors, internal building wiring and copper parts in substations. The magnitude of this issue is something that has not been witnessed in the history of South African infrastructure. According to the recent statistics, the average number of cases of cable theft in municipalities is about 444 cases reported every quarter, and January months are often characterized by more than 200 reported cases. This translates to an average of five cable theft incidents per day in major Gauteng municipal areas. The offenders fall along a continuum of subsistence thieves motivated by short-term economic desperation to major criminal syndicates with provincial and international operations. These syndicates bribe off government officials, open up well-developed supply networks to unscrupulous scrapyards and finally connect South African copper theft to international criminal markets, especially in China and India where stolen materials are re-processed and sold. The global aspect of cable theft suggests that local municipal initiatives should be aligned with national law enforcement and global trade surveillance organizations in order to disrupt supply chain disruptions.

The economic consequences are much more than the cost of the stolen copper. Removal of cables causes more than material value in a functioning infrastructure; the municipalities have to consider emergency repairs, lost time, loss of services, compensation claims and administrative expenses to deal with significant scale outages. These indirect costs can be considerably more expensive than direct replacement costs, and the actual cost of cable theft can be much greater than the scrap metal value implies.

Causes of Cable Theft in Gauteng Municipalities

Cable theft has several related factors that indicate a wider structural issue in South Africa. The major contributor is the extreme socioeconomic distress in South Africa. The national rate of unemployment is more than 30% with greater levels in Gauteng townships and informal settlements. One kilogram of copper would fetch R90-R120 in black markets, which would provide unemployed people with a source of instant revenue when other jobs are still unavailable. To individuals with rent commitments, food insecurity, and simple survival needs, cable theft is a fast source of income that needs little skills or capital outlay. Studies show that theft cases have been rising at a faster pace during an economic recession, especially during the 2020 COVID-19 lockdown, when unemployment rates increased significantly and social support networks were overwhelmed.

Petty cable theft is highly associated with substance abuse, and the addicts need urgent funds to buy drugs. Addiction creates desperation daily where people are ready to get to the substances before long-term effects, and cable theft is an easy way to get quick money. Combining unemployment, poverty, and addiction leads to conditions were stealing infrastructure is an accepted survival strategy and not an extraordinary crime.

The level of cable theft is directly related to the international price of commodities via a market mechanism. In South Africa, cable theft cases surged sharply when copper prices doubled from April 2020 to June 2021 [3].

This price sensitivity shows that the organized syndicates observe commodity markets in systematic fashion and increase their activities when copper valuation is high. The level of theft decreases in line with the price, implying that the criminal organization is highly organized to respond to the market and petty crime is not random.

The scrapyard business in South Africa has enabled stealing as 85 percent of scrap metal exported is processed with little scru-

tiny of the material source. Numerous dealers take the stolen materials without verifying ownership, thus providing guaranteed markets of stolen cables. This demand certainty is essential; thieves will take great risk just because of the fact that they are sure that stolen materials will be sold in the market at the predictable price. The theft-to-international-reprocessing supply chain cannot be interrupted without effective scrapyard regulation.

Poor infrastructure security is a contributing factor to vulnerability. Eskom has 395,419 kilometers of overhead line with little barrier protection and extensive physical security is not economically viable using traditional methods. There are numerous high-risk cables serving remote locations that have little surveillance or patrol. Informal settlements often have underground conduits that are not adequately protected and the access to substations is often based on the old security systems that are easily penetrated by the skilled offenders.

Cable theft has become a high-level organized crime that involves insiders such as Eskom contractors, municipal employees, and police officers. These insiders assist in the execution of theft, give information regarding the valuable cable location, and in transportation and sales. This institutional corruption is especially devastating since it sends the message to lower-tier offenders that they are not likely to face any consequences even when caught. The deterrent effect of the police is completely broken when police officers are bribed to turn a blind eye to thieves or to avoid arrests.

The Criminal Matters Amendment Act of 2015 has created harsh punishments of 30-year maximum imprisonment in case of infrastructure damage, but the prosecution is ineffective. Between March 2019 and March 2022, out of thousands of incidents only 1,200 suspects were arrested, and only 40 of them were convicted, with a low conviction rate of less than 3.3%. This incredible disparity between law and its realization makes it possible to have crimes being committed with impunity. Factors contributing to this include backlogs in the court, lack of forensic resources, lag in investigations, and lack of the capacity to gather evidence. Most criminals are released on bail and end up disappearing or returning to crime as they await the resolution of the trials.

Moreover, about 8 percent of South African households do not have access to electricity and informal settlements are growing at a rate of faster distribution infrastructure connection. High power bills drive marginal households to the illegal connections forming feedback loops that tariff rises both decrease utility revenues and increase their motivation to steal due to desperation. In cases where locals are unable to afford the cost of legal connections, they form parallel networks with cable theft, generating enormous demand of stolen material.

Service Delivery and Network Performance Impacts

Cable theft has a direct impact of resulting in the massive power outage of several supply nodes and the ripple of interconnected systems. In early 2023, City Power Johannesburg recorded 444 cable theft incidents in three months, necessitating immediate repair, which postponed other important infrastructure projects. The Ekurhuleni metropolitan area had to face severe power outages after cable theft cut off transmission lines serving various substations serving water to five municipalities, including Tshwane and Lesedi. In a different case, structural collapse due to stolen metal rungs on transmission towers operating the 132kV powerlines impacted traffic systems, businesses, and people living in extensive geographic regions.

The provision of water entirely relies on the availability of electricity to treat, pump, and distribute. The theft of cables in water infrastructure leads to an acute supply crisis with direct health impacts on the population. Millions of residents were impacted by cable theft when the cable thieves destroyed essential supply equipment, resulting in disruptions to the supply from Rand Water. Metsimahlo announced R1.9 million in stolen cables to water systems, which had immediate service failures that compelled communities to find other water sources. Prolonged outages permit sewage retention, posing health risks to populations and introducing the risk of spreading diseases in instances where communities turn to alternative sources of water which are contaminated. When water systems become ineffective the spread of cholera, typhoid and gastrointestinal diseases is very quick and it demands the attention of health facilities which is already hampered by power interruptions due to cable theft.

Hospitals and clinics rely entirely on continuous electricity to support life support machines, surgery theatres, diagnostic services and medication refrigeration. Cable theft which leads to power outages in healthcare facilities directly compromises patients' safety by breaking equipment used in critical procedures. Cable theft at Bongani Regional Hospital in Free State province led to the emergency transfer of 21 critical care patients to the facilities of the private sector at a staggering cost, showing how infrastructure theft can be turned into direct failure of health systems [4]. Emergency services such as police stations, fire departments and ambulances are also vulnerable, as the capacity to respond collapses at the time when the needs of the population to safety are the most pressing in case of darkness and power interruptions.

Electricity is needed in schools to provide lighting, computers, and laboratory equipment. Long-term cable theft interruptions lead to educational discontinuity causing learning losses that are disproportionately experienced among poor communities whose home learning environments do not have access to other resources. Learners waste time in the process of learning and instructors encounter extra administrative costs in addressing emergency shutdowns. Such learning interruptions exacerbate intergenerational poverty by lowering the human capital formation among already disadvantaged groups of people.

Business ventures close down when outages occur, leading to lost production, wasted materials and order cancellations. The manufacturing processes are losing revenue and incurring costs on the damaged materials. The retail businesses are faced with losses in sales and also with high security threats in the dark. Businesses in service sectors such as banking, telecommunications, and hospitality are brought to a standstill. The aggregate effects are felt on macroeconomic contraction since investors consider infrastructure unreliability as systemic governance failure, discouraging foreign direct investment and lowering capital formation. The competitive position of South Africa in the international markets is already weak and becomes even worse when

the reliability of the infrastructure is unpredictable.

Cable theft is catastrophic in the distribution operations within the municipalities in terms of revenue loss. Cable theft makes networks fail to provide customers, which removes billing opportunities. At the same time, the municipality is forced to finance emergency repairs at the expense of already exhausted funds. This establishes unsustainable fiscal processes in which decreased revenue due to theft and rising expenditure on repairs drains municipal reserves in tight timelines. According to the City of Johannesburg, City Power, the theft and vandalism costs amounted to R380 million in eight months, which constitutes a significant portion of operational budgets [5]. These expenses divert the system upgrades, maintenance and customer service enhancement funds to reactive damage repair. Municipal administrators in turn cut down other services such as pothole repairs, street lighting repairs and vegetation management, which results in apparent infrastructure decay and further diminishes public trust in the municipal governance.

In addition to the direct impact of cable theft on service interruptions, cable theft lowers network performance by decreasing redundancy and capacity. In the case of high-voltage transmission cables theft, the new infrastructure has to run at a lower capacity, which constrains grid reliability. Recurring thefts of the same cable routes ultimately lead to the end of utility to repeat investment and the eventual decommissioning of the routes or services that appear vulnerable. Transformer theft also leads to a decrease in capacity as well as distribution capacity. Overloaded remaining transformers will fail prematurely due to overload and will cause cascading failures of services.

Comprehensive Reduction Strategies

Cable theft needs a multi-dimensional solution to the problem involving the application of technology, law enforcement, community participation, and socioeconomic development. The use of intrusion detection systems based on Internet of Things is the new technology frontiers. A RAMAC system of G-Matrix, combined with the Sigfox 0G network, allows detecting the presence of cable tampering underground in real time and delivering silent alerts before stealing the cables. The systems operate on underground sensors that monitor any disturbances and instantly report to central monitoring facilities, which removes the issue of delay in responding, which in the past made CCTV systems irrelevant. Every theft prevented will save about R5,000 per meter in replacement costs; prevention of theft on 1,000 meters of cable will save R5 million in expenditure avoided. The cost of installing systems varies between R50,000 and R150,000 per kilometer and the payback time is also short, making technology investment worthwhile even in resource-limited municipalities.

The implementation of smart meters accomplishes two roles, both to prevent meter tampering by using anti-tampering technology and to provide the ability to monitor consumption granularly to detect illegal connections and bypass. The smart prepaid split meter that operates in Eskom proves to be effective in reducing meter-based theft by ensuring that meter tampering is detected in real-time and reported to the central system. The municipalities must focus on the implementation of smart meters in distribution systems, especially in informal settlements whereby illegal connections are centralized.

Cable Guard clamping systems and truck-tire protection barriers are mechanical barriers, which offer resistance to vehicle withdrawal of cables in underground conduits. Protection of vulnerable cables by installation at 5–10-meter intervals, is cost effective and compels potential thieves to manually cut the wires, which is time-consuming and puts the detection risk at a significant risk. The demonstration of testing proves that vehicles between motorcycles and heavy machinery cannot pull out the cord-wrapped cables, which then compels the perpetrators to engage in more activities that result in higher detection probability. Replacement of the infrastructure on a long-term basis should focus on designs that are resistant to theft. Anti-theft bolts that are installed on the transmission towers would inhibit systematic rung removal. Critical infrastructure has unique identification markers that are used to recover stolen goods. These infrastructure changes have long-lasting capital costs but provide long-lasting vulnerability reduction beyond short-term security enhancement.

Large cities such as Tshwane and Ekurhuleni have set up dedicated cable theft detection departments with some success. These specialized departments gain proficiency in evidence gathering, perpetrator networks and organized crime links. The multi-agency task force is formed by coordination with the SAPS specialized units as well as the Hawks that are beyond the capacity of individual organizations. Proper staffing of detectives, access to forensic equipment, and coordination of the prosecutors are critical success factors. Organized syndicates should be the primary target of units, not individual petty thieves, but at points in the supply chain where financial incentives are concentrated.

The scrapyard must be strictly monitored to close market connections of stolen cables. The municipalities in conjunction with the economic development departments should engage in development of licensing systems where the scrapyards are required to keep records of the material sources. Copper receipt origins are recorded by electronic tracking systems, which allow suspicious purchase patterns to be identified. Frequent checks of facilities that are close to infrastructure crime locations can keep the supply chains disrupted before stolen materials move out of the municipal jurisdictions.

The prosecutors need training and resources to implement the current harsh punishments effectively. Special prosecution units dealing with infrastructure crime should also be provided with increased funding and forensic assistance. Case management improvements in the magistrate courts should minimize years to months of time wasted in trials. Creating specialized infrastructure crime courts in large municipalities has more definite outcomes, which heightens deterrence effects.

Education programs in the community should emphasize the links between theft and service interruptions to residents, health effects, economic, and safety risks. Successful campaigns utilize the power of community leaders, community schools and religious organizations, focusing on community cohesion, and not on punitive strategies.

The electrical apprenticeship programs provide the youth with an opportunity to gain employment and overcome shortages of

skilled labour. Cities can collaborate with Eskom to create paid apprenticeship programs in electrical maintenance, which would offer short-term income and create longer-term capacity to employ. The availability of legitimate income through microenterprise development that offers capital and business training opens up legitimate income opportunities. Cooperative business development in the informal settlements creates economic activity and enhances affordability by means of the electricity consumers cooperatives negotiating bulk rate discounts.

Legitimacy and consistency are achieved through community-based monitoring systems such as neighborhood watch groups that take infrastructure threat identification training. Municipal responses should be coordinated efforts involving Eskom, metropolitan authorities, provincial government, SAPS, Hawks, prosecutorial services and representatives of communities. Municipalities need to identify strong internal investigative units that deal with corruption and disciplinary processes that are prompt in sending strong organizational messages that corruption that enables stealing will not be entertained.

Periodic infrastructure monitoring determines the point of vulnerability before theft. Municipal electricity companies ought to adopt vigorous non-revenue loss minimization policies by adopting advanced metering and cost accounting to allocate the effects of theft to individual segments. Reducing cable theft in the long term involves electricity being made affordable to the now unserved populations by lifeline electricity programs, which offer subsidized supply of electricity to people to meet their basic needs.

Case Studies and Lessons

In Alexandra, Johannesburg, City Power cleared 10,000 kilograms of stolen cables, which enhanced the supply of electricity [6]. Enforcement was, however, not sufficient; the residents who are illegally connected to electricity often indicate tariff unaffordability. The success of Ekurhuleni to disconnect 4,500 illegal connections in Benoni showed coordination effectiveness, yet the rate of illegal connections re-established in the following months showed that enforcement in the absence of options created new repeat offenses [7]. The regions that combined enforcement and job creation programs and subsidized access to electricity programs proved to be more sustainable.

Conclusion

Electricity distribution infrastructure cable theft is the greatest infrastructure security issue facing Gauteng municipalities in the complicated development environment of South Africa. Root causes that include unemployment-related desperation, organized crime, laxity in enforcement, and susceptibility of infrastructure suggest that successful solutions should combine the use of technology, law enforcement, community involvement, and socioeconomic development that deals with historical inequalities. The National Development Plan of South Africa promised to eradicate energy poverty and to provide universal service delivery but cable theft is a direct challenge to these constitutional and policy promises. Disruption of municipal services goes further to water, health, education, and emergency services, which cause cascading effects on the welfare of the population, which in turn disproportionately impacts historically marginalized communities that are yet to see the dividends of the post-apartheid service delivery promised.

Cable theft suppression is directly related to the financial sustainability of municipal utilities because the loss of revenue and replacement costs are both resource-consuming and fiscal capacity-hobbling to municipalities already grappling with the complex inherited service delivery backlog. Evidence-based reduction methods focus on holistic solutions that involve the use of technology, specialized policing, community involvement, and socioeconomic options to deal with the underlying causes. The experience of Johannesburg and Ekurhuleni shows that multi-stakeholder coordination can deliver tangible improvements, but technological and enforcement interventions cannot work without dealing with underlying economic desperation and affordability impediments that may impact desperate populations.

In South African systems of governance, sustainable cable theft mitigation needs to include dedicated leadership by both national and provincial governments and municipalities; sufficient provision of resources to specialized investigation and prosecution capacity; cross-organizational coordination across institutional silos; and basic acknowledgement of the fact that infrastructure protection is interlinking with socioeconomic development and historical redress commitments. Cities that adopt a holistic approach of combining short-term security measures and long-term economic opportunity generation can gradually develop an infrastructure security that forms platforms of stable service delivery. This demands a concerted effort on unemployment by the apprenticeship and skills training; affordability by lifeline electricity schemes; corruption by institutional accountability; and infrastructure investment by protective technologies and design changes. The democratic promise of South Africa lies in the ability to provide services to all the communities equally. Cable theft undermines this promise by compromising infrastructure in those communities that rely on state service provision the most. The challenge requires the overall, multi-dimensional responses described in this essay based on the understanding that infrastructure security supports foundational human rights to water, electricity, healthcare, and education that South Africa Constitution provides but cable theft now denies to millions of the residents.

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