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Navigating the effects of load shedding on agricultural productivity and food security: a case study of South Africa

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ABSTRACT

Eskom's electricity generation can't satisfy rising demand. Eskom's installed capacity of 52,000 MW surpasses production of 47,000 MW, a large discrepancy. Eskom uses voluntary load shedding to address this gap and protect the national grid. A desk review study on power outages' socio-economic effects on South African agriculture and food security is presented in the paper. The study also assessed electricity supply and load shedding legislation. Power outages have disrupted farming activities, from irrigation to food processing, and farmers' capacity to maintain production levels. This has caused crop losses, livestock production reductions, and food distribution delays. Thus, food costs have risen, worsening food insecurity, especially for disadvantaged groups. Focussing on agricultural production and energy supply, the study proposed evidence-based solutions and suggestions to lessen load shedding's detrimental effects on South Africa's food systems and improve food security for all.

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Introduction

Despite the growing demand in South Africa, the power producing capacity of Eskom is not sufficient to meet the country's needs. There is a large difference between Eskom's actual production of approximately 47,000 MW and its installed capacity of 52,000 MW, which is significantly higher. Eskom has introduced load shedding, often known as voluntary power outages, in order to correct this disparity and protect the national grid. The findings of a desk review study on the socio-economic impact of power outages on agricultural output and eventual food security in South Africa are presented in this paper. The study was conducted in South Africa. In addition to that, the study included an analysis of the legislative framework that governs the management of load shedding and the supply of power. Outages of electricity have had a significant impact on the agricultural industry and the nation's food security. These outages have caused disruptions in farming operations, ranging from irrigation to food processing, and have made it more difficult for farmers to maintain sufficient levels of production. Because of this, there have been losses in crop production, decreased productivity among livestock, and delays in the provision of food. As a direct result of this, food prices have skyrocketed, which has an adverse effect on food insecurity, particularly among vulnerable people. The research was able to give evidence-based remedies and suggestions to assist alleviate the negative effects of load shedding on South Africa's food systems and promote better food security for everybody. This was accomplished by concentrating on agricultural productivity and its relationship with the supply of power.

This paper reports the findings of a study examining the economic impact and implications of load shedding on agriculture and food security, focusing on the policy challenges that South Africa faces in addressing this ongoing crisis. Understanding these impacts is essential for developing solutions to stabilize both the energy and agricultural sectors, ensuring long-term food security and economic resilience. By reviewing the legislative documents and policies, study sought to inform decision-makers on how to address load shedding challenges and enhance intervention strategies thereof. It also provides insights into the systemic issues surrounding the

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electricity supply, the factors contributing to load shedding, and the potential interventions needed to mitigate its economic impact. Secondary data collected through legislative framework inform this approach and help illuminate the broader challenges faced by the sector in addressing food insecurity during periods of load shedding.

The article begins with an overview of the regulatory framework governing the energy sector, followed by a discussion of the impacts of electricity shortages on agriculture and food security. It then presents the theoretical framework, and the methodology used in the research. The findings provide insights into how South Africa can better manage its energy crisis while safeguarding food production, offering recommendations for improving governance and policy in both energy and agriculture to mitigate these challenges.

Literature Review

The legislative landscape of the energy sector and its impact on agriculture and food security

South Africa's energy sector, including the implementation of load shedding, is governed by a robust regulatory framework designed to manage electricity generation, distribution, and consumption. According to the National Energy Regulator Act (Act No. 40 of 2004) (Republic of South Africa, 2004), load shedding is a regulated measure used to stabilize the electricity system when demand exceeds supply. This measure involves rolling outages across various geographic locations to reduce electricity consumption. Load shedding, which has become a recurring issue in South Africa, continues to disrupt the agricultural sector, affecting food production, prices, and overall food security. The power outages hinder farming operations by damaging irrigation systems, reducing the efficiency of food processing, and disrupting supply chains. As a result, farmers face challenges in maintaining consistent production levels, leading to crop losses, decreased livestock productivity, and delays in food distribution. This disruption significantly impacts food prices, causing an increase in the cost of food, which exacerbates food insecurity, particularly for vulnerable populations.

The agricultural sector, a key component of South Africa's economy, suffers greatly from these power outages, which also affect job security and the livelihoods of those working in this industry. This problem has far-reaching consequences, contributing to financial losses in the billions each year. With Eskom's power cuts now being a longstanding issue, the sector faces continued uncertainty, and the challenges to stabilise food production are growing. The ongoing struggles within the agricultural industry highlight the urgency for addressing load shedding's impact, as it continues to threaten both economic growth and national food security.

In addition to food security concerns, persistent energy crisis impedes agricultural innovation and limits future investment in the sector. Therefore, a solution to load shedding is critical not only to secure the agricultural industry's immediate stability but also to ensure long-term sustainability and resilience.

The Electricity Regulation Act (Act No. 4 of 2006) (Republic of South Africa, 2006) lay the legal foundation for the regulation of electricity, establishing bodies like the National Energy Regulator of South Africa (NERSA). NERSA is tasked with regulating electricity, piped gas, and petroleum pipelines. Other crucial pieces of legislation such as the Electricity Supply Industry Act (ESI) (Act No. 40 of 1998) (Republic of South Africa, 1998), along with the National Energy Regulator Act (Act No. 40 of 2004) (Republic of South Africa, 2004), create a comprehensive framework for the generation, transmission, and distribution of electricity in South Africa.

While the ESI Act facilitates the restructuring of the electricity supply industry, NERSA, as an independent regulatory authority, oversees licensing, tariff determination, and compliance monitoring. In addition to these energy-specific regulations, other broader legislative frameworks such as the Constitution of South Africa (Act No. 108 of 1996) (Republic of South Africa, 1996), the National Development Plan (NDP) (Republic of South Africa, 2013), and the Promotion of Administrative Justice Act (PAJA) (Act No. 3 of 2000) (Republic of South Africa, 2000) provide indirect oversight on energy governance, focusing on sustainable growth, infrastructure development, and energy security.

While these frameworks primarily regulate energy sectors directly, they also have implications for agriculture, food security, and the broader economy. Agriculture, being highly dependent on consistent electricity for operations like irrigation and food processing, is particularly vulnerable to the impacts of load shedding. The regulatory measures that determine energy tariffs, infrastructure investments, and the integration of renewable energy sources can have a profound effect on the agricultural sector's ability to maintain steady food production. Furthermore, the economic disruptions caused by load shedding such as reduced productivity and higher operational costs, negatively affect food prices, making it harder for consumers to access affordable and nutritious food.

The Integrated Resource Plan (IRP) (2023), which is part of the country's long-term energy planning strategy, plays a crucial role in promoting renewable energy sources and improving energy security. As South Africa seeks to increase its renewable energy capacity, the agricultural sector stands to benefit from the shift toward cleaner, more reliable energy solutions. However, these transitions need targeted legal and policy frameworks to avoid monopolies, foster competition, and encourage investment in renewable energy.

South Africa's regulatory framework surrounding load shedding, electricity generation, and renewable energy integration plays a significant role in assuring well-functioning agricultural sector and, by extension, food security. A sustainable energy supply, supported by clear legal regulations, can help mitigate the negative impacts of load shedding on agriculture, ensuring that South Africa's farming and food production systems remain resilient and capable of feeding the nation.

Addressing inflation and ensuring energy security

Persistent inflation in South Africa, largely driven by rising commodity prices and supply chain disruptions, has forced the South African Reserve Bank to increase interest rates to combat rising prices. This inflationary pressure has been particularly pronounced in sectors like food and transportation, which directly affect the cost of living for ordinary South Africans. At the same time, businesses in energy- intensive industries such as mining and manufacturing are increasingly turning to private, small-scale power generation in response to the unreliability of Eskom's supply (Walsh, Walz, & Fenn, 2021)).

To ensure long-term energy security and economic growth, South Africa must focus on comprehensive energy reforms that integrate technological, economic, and social considerations. This will require substantial investments in renewable energy, improved electricity pricing strategies, and the development of new energy infrastructure. Addressing these challenges will be critical for achieving sustainable development and energy security, as outlined in global frameworks such as the Agenda 2063 and the Sustainable Development Goals (SDGs).

A discussion of salient theoretical frameworks on food insecurity

Food insecurity is a multifaceted issue influenced by a wide range of socio-economic, environmental, and political factors. Various theoretical frameworks have been developed to better understand the causes, consequences, and potential solutions to food insecurity, providing insights into how food systems function and how policy interventions can help address gaps in food access and availability.

One of the most widely recognised frameworks for understanding food insecurity is the Food Security Model, developed by the Food and Agriculture Organisation (FAO). This model highlights four key dimensions of food security: availability, access, utilization, and stability (FAO, 2001). Food availability refers to the physical availability of food, which can be sourced either from domestic production or imports. Access focuses on individuals' ability to acquire food, considering economic factors such as income levels and social capital. Utilisation concerns on how food is used, including its nutritional value and how it is prepared and consumed. Finally, stability addresses the consistency of food security over time, considering seasonal, economic, or environmental shocks that can disrupt food availability or access.

Building on this model, Amartya Sen's Entitlement Theory (1981) offers another useful framework. Sen's theory posits that food insecurity occurs when individuals lack the "entitlement" to acquire food through their own means, whether through production, purchasing, or social exchange. Sen's framework stresses the importance of economic access to food, noting that inequalities in income, wealth, and social power contribute significantly to food insecurity. This model shifts the focus from merely the availability of food to the broader issue of how structural inequalities influence people's inability to obtain food (Sen, 1981).

The Household Food Security Model, developed by Maxwell and Smith (1992), provides a more granular look at food insecurity by considering household-level dynamics. This model argues that food insecurity is driven not just by external factors, but also by internal household factors, including resource management, decision-making, and coping strategies. For instance, household income generation, access to healthcare, and social support networks play a crucial role in a household's ability to achieve food security. This approach highlights the importance of household context, particularly in resource-poor environments where coping strategies might be limited (Maxwell & Smith, 1992).

Another important framework is the Sustainable Livelihoods Approach (SLA), which views food security within the broader context of livelihoods and sustainable development. Introduced by Chambers and Conway (1992), the SLA emphasises the need for diverse assets—such as human, financial, social, and natural capital rather than solely focusing on food. According to SLA, achieving food security is deeply tied to improving livelihoods and addressing the broader social, economic, and environmental factors that affect an individual or community's ability to produce, access, and properly utilise food (Chambers & Conway, 1992).

Political Economy Approaches highlight the role of governance, policy, and international trade in shaping food security. These approaches argue that food insecurity is often rooted in systemic structural issues, such as market inequalities, land distribution, and government policies (Jones, 2008). Conversely, Odhiambo, (2009) posit that political economy frameworks explore how power relations, economic systems, and state interventions in agricultural markets can either exacerbate or alleviate food insecurity, with an emphasis on addressing inequality in access to food and resources.

Lastly, the Climate Change and Environmental Security Framework explores how environmental changes, particularly climate change, affect food security. Environmental factors like droughts, floods, and temperature fluctuations directly impact food production, especially in regions that rely heavily on agriculture. This framework recognises the growing challenge of climate change in ensuring a stable food supply, emphasising the importance of environmental sustainability in the context of food security (FAO, 2018). As climate change exacerbates environmental variability, it is increasingly crucial to address food insecurity within the context of a changing climate.

These theoretical frameworks offer complementary perspectives on food insecurity, reflecting the complexity of the issue. They emphasize that food security is not solely about the availability of food but also about access, utilization, and stability. By incorporating structural, economic, environmental, and political factors, these frameworks provide essential guidance for designing

interventions and strategies to combat food insecurity at multiple levels, ensuring a more resilient and sustainable food system for the future.

Integrated framework analysis

It is crucial to integrate these different frameworks so as to develop a nuanced view of a model to use in connecting load-shedding to agricultural productivity and food security in South Africa.

In Figure 1, the integrated framework reveals how vulnerability, entitlements, food security, and environmental security intersect when considering the effects of load shedding on agricultural productivity and food security. Load shedding is an environmental stressor that exacerbates vulnerabilities in agriculture by disrupting essential production and processing activities. The Entitlement Theory highlights that farmers' entitlements to resources, such as electricity and market access, are undermined, while the Food Security Model demonstrates how disruptions to food production affect the core dimensions of food security (availability, access, utilization, and stability).

Finally, the Climate Change and Environmental Security Framework calls for more resilient energy systems and adaptation strategies to ensure that load shedding does not undermine agricultural productivity or food security, particularly in the context of broader environmental risks. This integrated approach emphasizes that load shedding is not only an energy issue but also a food security issue that requires multi-dimensional solutions. These could include investing in resilient agricultural technologies, improving energy infrastructure, and enhancing adaptive capacity to address vulnerability. By integrating Vulnerability Theory, Entitlement Theory, the Food Security Model, and the Climate Change and Environmental Security Framework, stakeholders can develop more holistic strategies to mitigate the impact of load shedding on food security, ensuring a sustainable and secure food system in South Africa.

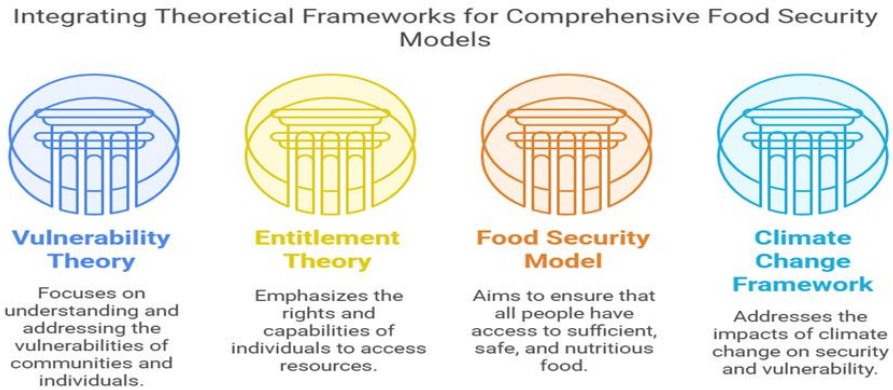

Figure 1: Integrating theoretical frameworks for comprehensive food security models; *Source:* Author's own Construction (2025) adapted from (FAO, 2001), (Sen, 1981), and (Eriksen, Brown, & Kelly, 2005)

Conceptual framework of the study

The food security theories combine with other concepts, and empirical data from the literature to serve as the foundation for this study's conceptual framework's development, linking South Africa's experience of load-shedding to agricultural productivity and food security. This is shown in Figure 2 where it is, to some extent, depicted that load-shedding affects each economic sector directly and indirectly. For instance, load-shedding affects agricultural sector energy demand, the sector's water supply, and land productivity, all of which can affect sector-wide decisions. At the agricultural sector level, load shedding has different impact on livelihood. Load-shedding impacts on agricultural sector management, such as soil management, afforestation (re-establishment of forests), forest management, fertilizer and chemical input management etc. These are also tied to crop planting, weeding, harvesting management as well as the rearing of livestock and poultry. Management of livestock and poultry are also individually tied to energy supply. Overall, a stable power supply is central food security, and eventual poverty alleviation in South Africa. On the contrary, load-shedding impacts on reduction in agricultural productivity and leads to decreased food security.

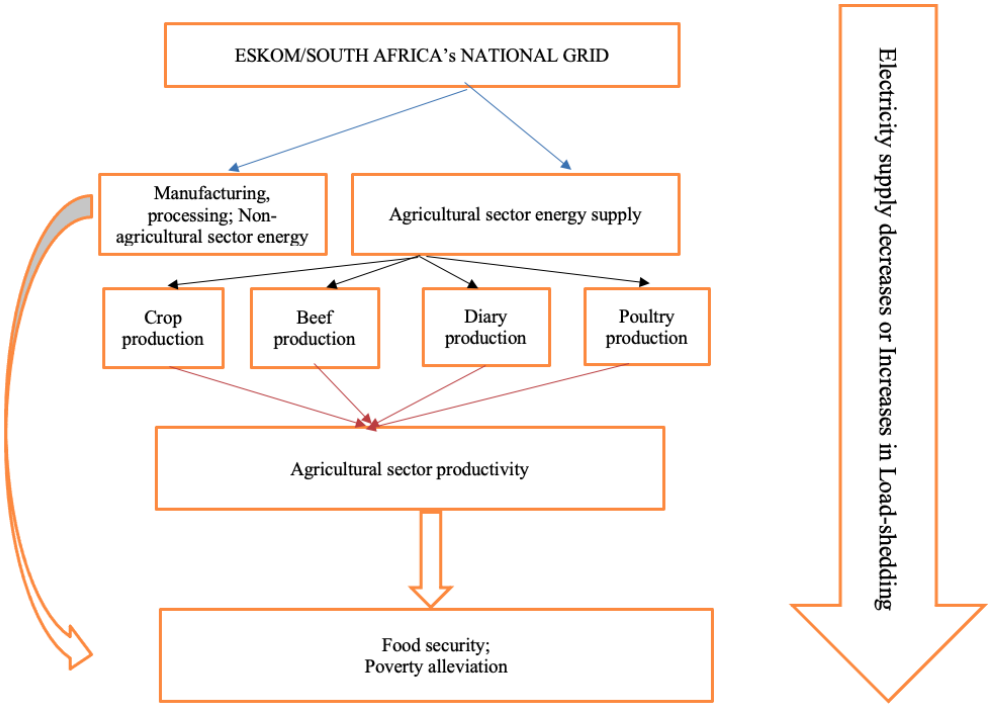

Figure 2: Conceptual Framework depicting the effects of load-shedding on agricultural productivity and food security in South Africa; *Source:* Authors (2025)

Research and Methodology

The study has employed a qualitative research methodology to explore the social and economic impacts of load shedding on agriculture and food security. A desk review was conducted to analyze the load shedding impact and to evaluate the legislative framework that governs electricity supply and load shedding management in South Africa. Secondary data collected during the research helped clarify key issues, especially the policy and legislative gaps that may need to be addressed to ensure more effective management of the energy crisis. By examining the interconnectedness of laws, regulations, and operational practices, the study also aimed to propose actionable solutions that could help alleviate the economic burdens imposed by load shedding on South African society.

The study was designed to understand how electricity supply disruptions affect agricultural activities, food production, and food security in South Africa. The primary objectives of this study were to:

i. Examine the impact of load shedding on agricultural production and assessing the economic effects on food security.
ii. Evaluate the adaptation strategies on the challenges faced in the agricultural sector.
iii. Explore policy interventions for enhancing agricultural resilience.

Population and sample of the study

This study involved a thorough and extensive literature search across various academic databases, including Google Scholar, Web of Science, ResearchGate, and Sabinet. A range of search terms such as "load shedding," "food security," "agriculture," "just energy transition," and "sustainable development" were utilized to identify relevant publications. To broaden the scope of the search, references from peer-reviewed journals as well as government documents were incorporated. The final selection of articles consisted of 40 publications, with a focus on studies conducted in South Africa after 2006, as load shedding was officially implemented in 2007. Articles that were not in English or were conducted outside of South Africa were excluded from the review. After carefully reviewing the abstracts for relevance, duplicate entries were removed, stakeholders can develop more holistic strategies to mitigate the impact of load shedding on food security, ensuring a sustainable and secure food system in South Africa.

Research Findings

The study finds that, due to load shedding, a lot of factors such as increased operational costs, loss of production efficiency, and decreased competitiveness in both local and international markets were affected. Load shedding directly affects farm operations, especially in rural areas. Load shedding, or scheduled power cuts, had substantial negative impacts on the agricultural sector and food security in South Africa. This is because load shedding disrupts essential agricultural operations such as irrigation systems, crop

processing, and food storage. Many farms, especially those in rural areas, rely on electricity to power irrigation pumps for crop watering. Without a stable power supply, farmers face challenges in maintaining adequate irrigation, leading to reduced crop yields, particularly in water-intensive crops like maize, vegetables, and fruit. Many farmers turn to backup generators, diesel-powered pumps, or solar energy solutions. However, these alternatives significantly increase operational costs. For small-scale farmers, these additional expenses are often unmanageable, further exacerbating financial difficulties. The increased cost of production, combined with reduced yields, negatively impacts the profitability of agricultural operations.

Load shedding impacts food processing facilities, refrigeration, and cold storage systems, critical for preserving perishable agricultural products. During power cuts, perishable items like dairy, meat, fruits, and vegetables often spoil, leading to wastage and losses in the supply chain. This not only increases food costs but also affects the availability of fresh food products, contributing to food insecurity. According to Timilsina & Steinbuks, (2021), the agricultural sector's vulnerabilities to load shedding lead to a rise in food prices, as higher production and storage costs are passed on to consumers. For low-income households, already facing financial pressures, increased food prices become a barrier to accessing affordable and nutritious food. The higher cost of food, coupled with decreased availability of fresh produce due to spoilage, exacerbates food insecurity, particularly in marginalised communities. Smallholder farmers are particularly vulnerable to the effects of load shedding. These farmers often lack the resources to invest in backup energy solutions and struggle to maintain production levels during power outages. The impact of load shedding on small-scale farms led to their closure, further exacerbating rural poverty and unemployment. Additionally, it disrupts the local agricultural value chain, affecting rural economies that are highly dependent on agriculture.

The unpredictable nature of load shedding disrupts agricultural supply chains, including the transport and distribution of food from farms to retail markets. Trucks that rely on refrigeration to transport perishable goods are often delayed due to power outages, leading to spoiled goods and loss of income for farmers. Additionally, the inefficiencies in the supply chain contribute to inflated food prices and market volatility. In response to the challenges posed by load shedding, some farmers have adopted alternative energy solutions, such as solar panels or wind turbines, to maintain their operations. However, the high initial cost of these solutions and the difficulty of securing financing for such investments limit their widespread adoption, especially among smallholder and emerging farmers. There is a need for supportive policies and incentives to make these technologies more accessible and sustainable for the agricultural sector.

As agricultural productivity declines due to load shedding, many workers in rural areas, especially those employed in agriculture, are forced to migrate to urban areas in search of employment opportunities. This migration further contributes to the decline of rural economies and the loss of skilled labour in agricultural areas, which in turn hampers long-term agricultural growth and food production capabilities.

Kanchev, Mikhaylov, & Tsonev (2014), suggested that while general energy policies exist, there is insufficient focus on how energy shortages, like load shedding, affect agricultural production and food security. To ensure the resilience of the agricultural sector, it is recommended that government policies specifically address the energy needs of agriculture, including offering subsidies or incentives for renewable energy adoption, improving rural electricity infrastructure, and providing financial support for farmers to mitigate the impact of load shedding.

Load shedding has far-reaching consequences for agriculture and food security in South Africa. The disruption of agricultural operations, increased production costs, food wastage, and rising food prices negatively affect farmers, consumers, and the broader economy. Addressing these challenges requires targeted policy interventions, investment in energy infrastructure, and support for sustainable energy solutions to ensure food security and the resilience of South Africa's agricultural sector. Load shedding, or scheduled power cuts, presents profound challenges to South Africa's agricultural sector, which is a key pillar of the economy and food security (Phiri, (2018). Power outages have significant repercussions on productivity, costs, and food security, necessitating urgent policy and governance reforms to ensure a stable and reliable power supply.

Agriculture, being energy-intensive, is heavily reliant on consistent electricity to power irrigation systems, processing plants, and refrigeration units that preserve perishable goods. In the absence of reliable electricity, farmers face considerable challenges in maintaining productivity, particularly during peak agricultural seasons, heightening food insecurity, particularly in regions heavily dependent on agriculture.

The inability to maintain proper irrigation schedules due to power outages exacerbates drought and water scarcity issues, affecting crop yields. Furthermore, the use of alternative energy solutions such as diesel generators or solar power to mitigate the impact of load shedding increases costs for farmers, particularly small-scale and subsistence farmers, who are less likely to afford these alternatives. This, in turn, reduces their profitability, thereby threatening their long-term viability and food supply.

Discussion

Economic impact, rising costs and declining competitiveness

According to Mabunda, Mkhize, & Phiri, (2023), the agricultural sector is deeply integrated into the broader economy, and any disruptions within the sector triggers ripples across various industries, including food processing, transport, and retail. The increased

cost of agricultural production, particularly for energy- intensive crops and livestock, leads to higher food prices, which affect consumers. For small and medium- scale producers, the financial burden of buying backup power sources or increasing energy capacity to sustain operations is unsustainable.

As evidenced by studies, including the work of Akpeji et al. (2020), Inglesi-Lotz, & Ajmi (2021), Ngoepe-Ntsoane, (2024), Govinda, M., & Steinbuks, J. (2021), load shedding has been responsible for substantial revenue losses, which have a compounding effect on the agricultural economy. Rising food prices, due to reduced supply and increased operational costs, significantly undermine the purchasing power of the average South African consumer, especially in vulnerable communities.

Disruption of food supply chains and consumer access

The South African food system, which heavily depends on a complex web of supply chains, is vulnerable to disruption due to load shedding. Power cuts affect food storage facilities, transportation, and processing plants, leading to spoilage and wastage of perishable goods. This creates a bottleneck effect, limiting the availability of food and driving up market prices. Notably, perishable products such as dairy, meat, vegetables, and fruits are among the hardest hit, resulting in significant losses along the food value chain.

Additionally, load shedding hampers communication and logistical coordination within the food supply chain, further exacerbating inefficiencies and delays. Small businesses in the agricultural value chain, including those involved in food processing, distribution, and retail, are particularly susceptible to these disruptions. These businesses often lack the financial resources to invest in backup power systems and may fail to meet the demands of consumers, resulting in lost customers, reduced income, and even closures.

Impact on foreign direct investment (fdi) in agriculture

The agricultural sector's reliance on consistent power supply also extends to foreign direct investment (FDI). According to Fowowe & Shuaibu (2014), the availability of electricity is a critical factor for foreign investors, who seek stable and predictable conditions to invest in agricultural projects, technology, and infrastructure. Frequent load shedding not only increases operational costs but also undermines investor confidence, leading to a decline in agricultural investments. Barteková and Ziesemer (2019) highlight the role of electricity costs in influencing FDI, with high power costs discouraging investment. As a result, agricultural development projects, which often depend on foreign capital for growth and technological advancement, are delayed or canceled (Iwasaki & Suganuma ,2015). This lack of investment further hinders the development of efficient agricultural systems and the potential for increasing food production.

Policy and governance recommendations for agricultural resilience

To mitigate the adverse effects of load shedding on agriculture and food security, targeted policy interventions are needed to address the energy needs of the sector. A comprehensive infrastructure investment plan is required to modernise the electricity grid, improve energy access in rural areas, and reduce the frequency and duration of load shedding. This could involve deploying smart-grid technologies, which allow for real-time monitoring and better management of electricity demand, particularly in energy- intensive agricultural operations as an adaptation strategy. Given the increasing cost of electricity and the vulnerability of agriculture to power outages, promoting renewable energy solutions, such as solar panels and wind energy, could reduce dependence on the national grid. Government incentives and subsidies for small-scale farmers to adopt renewable energy technologies would help alleviate the financial burden and enhance the resilience of the agricultural sector.

Phiri & Nyoni, (2016) elucidate that small-scale farmers, who are most vulnerable to the effects of load shedding, need targeted financial support to help them invest in backup power solutions and energy- efficient technologies. Additionally, financial assistance for these farmers during times of power disruptions could be a key adaptation strategy to maintain productivity and reduce food insecurity. Energy storage systems, such as batteries, could provide a viable solution to mitigate the effects of load shedding on agriculture. The government should prioritise the development of affordable and scalable energy storage technologies that can be used in agriculture, ensuring continuity of operations during power outages. Regulating electricity pricing within the agricultural sector could reduce the impact of rising energy costs. Policies that protect agricultural businesses from excessive price hikes and ensure stable energy prices could improve the competitiveness of the sector. Additionally, price reductions once load shedding is resolved could help lower the cost of living, particularly for low-income households that rely on affordable food. Load management strategies, including grid diversification, should be a priority and agricultural businesses should also be included in the government's critical infrastructure like the hospitals and others to benefit from the immunity during load-shedding. By increasing the use of renewable energy and diversifying energy sources, the electricity grid could become more reliable, reducing the likelihood of future power cuts. Improved energy forecasting and better coordination of energy supply will help ensure that agriculture can continue to operate without disruptions.

To a certain extent, the issue of load-shedding is taken seriously by the government of South Africa. In the State of the Nation Address (2023), the President made a commitment to appoint the Minister of Electricity in February. On the 6th of March 2023, Dr Kgosientsho Ramokgopa was appointed as the Minister in the Presidency for Electricity. In 2023, the President has outlined a set of concrete and measurable actions which were to end load shedding, restore the economy, tackle crime, improve service delivery and rebuild public institutions. The government made a commitment in 2023 to procure 6 800 MW additional electricity generation capacity through the renewable energy programme. Agreements have been signed for 26 renewable energy projects with a capacity of 2 800 MW.

Actualising these government commitments is vital for improving the lives of all South Africans leaving no one behind. Load shedding, unemployment, poverty and the rising cost of living, crime and corruption were mentioned as the government's priority.

In 2025, the President of South Africa explained that there is a new consensus to take South Africa forward which pays more emphasis to the economy in addressing urgent challenges needed by the country. This would be achieved through the involvement of the private sector which should play a significant role in investment for unleashing the dynamism of the economy. An operation Vulindlela meaning *open the way* shall implement far-reaching economic reforms to place the South African economy on a new growth trajectory. These reforms will ensure a stable and secure energy supply, clean and safe drinking water, efficient freight transport for the goods to reach global markets, and cheaper data costs for all South Africans (SONA, 2025).

Conclusion

Load shedding presents a significant challenge to South Africa's agricultural sector and food security. Disruptions to agricultural operations, rising production costs, and declining investment in the sector pose serious threats to the country's food supply and economic stability. Addressing these issues requires comprehensive policy reform integrated planning, and substantial investment in energy infrastructure, renewable energy, and support for farmers. This study argues that the eventual resolution of load shedding should lead to price reductions and normalization, especially in the agricultural sector, which will help stabilize food prices and ensure food security. Restoring reasonable pricing and improving infrastructure will be essential steps toward improving the quality of life for South Africans and safeguarding the agricultural sector's contribution to the economy.

By focusing on these key areas, South Africa can build a more resilient agricultural sector capable of withstanding energy disruptions and contributing to national food security in the long term. The study has revealed that load shedding has a significant impact on the agricultural production, and food security affecting the economy negatively, causing both farmers and consumers to suffer. It is confirmed that there are strategies that can combat the challenges that can serve as solutions. The study has recommended policy interventions which could potentially enhance agricultural resilience which some already underway as expounded in the paragraph above. The study has managed to fulfil the research objectives by examining the impact of load shedding on agricultural production and assessing the economic effects on food security, evaluating the adaptation strategies on the challenges faced in the agricultural sector, and also exploring the policy interventions for enhancing agricultural resilience.

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Author Contributions: By author. Author has read and agreed to the published the final version of the manuscript.
Institutional Review Board Statement: Ethical review and approval were waived for this study, due to that the research does not deal with vulnerable groups or sensitive issues.
Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy.
Conflicts of Interest: The author declares no conflict of interest.

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