



Road Maintenance Challenges: The Greatest Obstacle to Sustainable Development in South Sudan

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Abstract

Road infrastructure plays a crucial role in the sustainable development of any nation. It connects communities, facilitates trade, and enables essential service delivery. However, road maintenance is one of the most significant challenges hindering sustainable development in South Sudan. The poor roads hinder economic growth, access to essential services, and social cohesion and are in dire need of repair and upkeep. Thus, I developed this qualitative multiple-case study to explore challenges that hinder road maintenance in South Sudan. I collected data through document review and semi-structured interviews with four road engineers, and then thematically analyzed the gathered data. Three themes emerged as the most significant challenges facing road maintenance in South Sudan: a lack of functional road maintenance institutions, a lack of legal framework supporting road maintenance, and a lack of dedicated funds for the maintenance of roads. Key recommendations include making road construction and maintenance institutions function, establishing legal frameworks to support road construction and maintenance in the country, and establishing a Road Fund agency to provide the necessary resources to support road construction and maintenance in the country. The implications for positive social change include facilitating access to essential services such as education, healthcare, employment, and economic prosperity.

Keywords: *United Nations' sustainable development goals, South Sudan, road maintenance, zero hunger, no poverty, good health and well-being, quality education*

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Introduction

Road infrastructure plays a crucial role in the sustainable development of any nation (Opoku, 2019; Ruiz & Guevara, 2020). It connects communities, facilitates trade, and enables the delivery of essential services (Khandker et al., 2009; Morkūnas et al., 2015; Ruiz & Guevara, 2020). However, road maintenance is one of the most significant challenges hindering sustainable development in South Sudan (World Bank Group [WBG], 2022). The poor road conditions in South Sudan hinder economic growth, access to essential services, and social cohesion, and the roads are in dire need of repair and upkeep (Kaiser & Barstow, 2022). The

inadequate maintenance of roads in South Sudan has severe economic implications. First, it hampers trade and commerce, limiting market access for farmers and entrepreneurs (Kaiser & Barstow, 2022). The lack of well-maintained roads makes it difficult for agricultural produce and other goods to reach markets on time, resulting in increased transportation costs and reduced profitability (WBG, 2022). The poor condition of roads discourages foreign direct investment, as businesses require reliable transportation infrastructure to operate efficiently (WBG, 2018). This lack of investment stifles economic growth and perpetuates the cycle of poverty. Road maintenance is also essential for developing South Sudan's oil industry. The country heavily relies on oil revenues for its economic sustenance. However, due to the lack of well-maintained roads, transporting oil from extraction sites through an alternative route other than hired Sudanese pipelines to the markets becomes challenging (WBG, 2022). This lack of well-maintained roads affects the revenue generated from oil exports, limiting the potential for job creation and economic diversification (Ruiz & Guevara, 2020).

The inadequate maintenance of roads also hinders access to essential services such as healthcare and education (Opoku, 2019). In rural areas, where most of the population resides, poorly maintained roads make it difficult for medical personnel to reach remote clinics and hospitals (United Nations Development Programme [UNDP], 2022). This lack of access to healthcare services exacerbates health disparities and increases maternal and child mortality rates (Adepoju, 2021). Similarly, the poor condition of roads affects access to education. Many children in South Sudan have to walk long distances to reach schools, and the poor road conditions make this journey arduous and dangerous (UNDP, 2022). The transportation of educational materials and supplies becomes challenging, hindering the quality of education provided in remote areas (Adukia et al., 2020).

Road infrastructure is vital in fostering social cohesion and unity within a nation (Bachmann & Schouten, 2018). Well-maintained roads connect communities, enabling people from different regions to interact, exchange ideas, and build social bonds (Bachmann & Schouten, 2018). In South Sudan, where ethnic tensions and conflicts have plagued the nation, road maintenance can contribute to peacebuilding efforts by promoting dialogue and understanding among diverse communities (UNDP, 2022). The lack of road maintenance exacerbates the isolation of marginalized communities, perpetuating social inequalities (Bachmann & Schouten, 2018). These communities' limited access to markets, healthcare facilities, and educational institutions hinders their socio-economic development (WBG, 2018). By prioritizing road maintenance, South Sudan can work towards bridging these gaps and fostering sustainable development.

Literature Review

According to the Revised National Development Strategy for South Sudan (2021–2024) published by the United Nations Development Programme (UNDP), the country has been facing unprecedented impacts from climate change, including heavy downpours and flooding (UNDP, 2022). These climate-related challenges exacerbate the deterioration of roads and make maintenance even more crucial (UNDP, 2022). The World Bank highlights that the signing of the Revitalized Agreement on the Resolution of the Conflict in the Republic of South Sudan (R-ARCSS) in 2018 and the formation of a Transitional Government of National Unity have contributed to recovery and peacebuilding (WBG, 2023). However, road maintenance remains a significant challenge that should be addressed to support economic growth and ensure sustained development (Ruiz & Guevara, 2020). In assessing similar situations, research on infrastructure expansion challenges in Papua New Guinea reveals that increasing road networks can spur economic growth (Alamgir et al., 2019). This finding emphasizes the importance of investing in road maintenance to promote sustainable development.

Like many other countries, South Sudan is committed to achieving the Sustainable Development Goals (SDGs) set by the United Nations. These goals provide a comprehensive framework for addressing various social, economic, and environmental challenges to achieve sustainable development (Katila et al., 2019). The inaugural

SDG report of South Sudan highlights the importance of prioritizing the 17 SDGs and their enabling goals, which can lead to positive outcomes across different sectors (United Nations in South Sudan [UNSSD], 2023). Road maintenance is one of the key areas that needs attention in South Sudan's pursuit of sustainable development. As a landlocked country with vast rural areas, South Sudan must maintain a well-functioning road network to ensure access to essential services such as healthcare, education, and markets (Faye et al., 2004).

Inadequate road maintenance presents a significant obstacle to the attainment of several SDGs, including Goal 1 (No Poverty), Goal 2 (Zero Hunger), Goal 3 (Good Health and Well-being), and Goal 4 (Quality Education) (Katila et al., 2019). Insufficient road connectivity hinders the ability of remote communities to access economic opportunities and essential services (Banerjee et al., 2020; Cascetta et al., 2020; Kaiser & Barstow, 2022; Nautiyal & Sharma, 2021; Wang et al., 2020; Zhou et al., 2022). In South Sudan, agricultural production is crucial to household income and food security (WBG, 2023). However, the poor condition of roads impedes farmers' efficient transportation of produce and their access to markets (Khandker et al., 2009; Samanta, 2015; Wudad et al., 2021). Moreover, inadequate road infrastructure poses challenges for individuals in remote areas seeking timely access to healthcare facilities during emergencies or for routine medical care (Samanta, 2015). Additionally, the substandard state of roads directly impacts the provision of educational services, making it difficult for children to attend school (Adukia et al., 2020; Ruiz & Guevara, 2020). The absence of well-maintained roads creates hardships for children traveling long distances, often resulting in high dropout rates (Mahapa & Mashiri, 2001). Furthermore, the transportation of educational materials such as textbooks and teaching aids becomes arduous, limiting the availability of resources necessary for quality education (Mahapa & Mashiri, 2001). This situation not only obstructs the learning experience but also perpetuates educational disparities, as children in more accessible areas enjoy better opportunities for educational advancement (Kaiser & Barstow, 2022; Mahapa & Mashiri, 2001).

Improving road maintenance is crucial to overcoming these obstacles and achieving Goal 4 of quality education in South Sudan (Kaiser & Barstow, 2022; Mahapa & Mashiri, 2001). By investing in constructing and maintaining roads, the government can ensure that schools are easily accessible for all children, regardless of location. Additionally, well-maintained roads will facilitate the transportation of educational resources, enabling teachers to deliver comprehensive and up-to-date lessons. By addressing the road maintenance challenge, South Sudan could create an environment where quality education is accessible, laying the foundation for sustainable development and a brighter future for its citizens.

Problem Statement

Roads are crucial in connecting communities, facilitating trade, and providing access to essential services (Opoku, 2019; Ruiz & Guevara, 2020). However, these vital transportation networks in South Sudan face various obstacles that hinder their functionality and impede the country's overall progress (UNDP, 2022). Currently, out of 19,073 km of roads in South Sudan, only 2.1% are paved, and 52.3% of these paved roads have already deteriorated (UNDP, 2022). Failing to address the challenges associated with road maintenance will prevent achieving sustainable development goals (Opoku, 2019; Ruiz & Guevara, 2020). Therefore, it is vital to prioritize the resolution of road maintenance challenges to overcome this significant obstacle and open the way for sustainable development in South Sudan.

Purpose of the Study

This qualitative multiple-case study aimed to explore challenges that hinder road maintenance in South Sudan—a critical issue that poses a significant obstacle to sustainable development in the country. By conducting an in-depth exploration of these challenges, this study sheds light on the underlying factors

contributing to the poor state of road infrastructure in South Sudan and the subsequent implications for economic growth, social development, and overall sustainability.

Through the utilization of qualitative research methods, including interviews and document analysis, this study seeks to gain a comprehensive understanding of the multifaceted challenges faced by road maintenance authorities in South Sudan. This research identified common patterns and unique circumstances that hinder effective road maintenance practices by examining multiple cases. The findings of this study will provide valuable insights into the root causes of these challenges, allowing policymakers, stakeholders, and development practitioners to devise targeted strategies and interventions to overcome these obstacles and promote sustainable development in South Sudan.

Research Question

What are the challenges that hinder road maintenance in South Sudan?

Methodology

To understand the challenges of road maintenance and its impact on sustainable development in South Sudan, I employed a comprehensive methodology. I began by reviewing the Revised National Development Strategy (R-NDS) for South Sudan 2021–2024, which outlines the country's aspirations to transition from dependence on humanitarian aid to a development path (UNDP, 2022). This document provided valuable insights into the government's priorities and strategies for achieving sustainable development goals. Additionally, I reviewed the Southern Sudan Road Maintenance Project implemented by the World Bank Group (WBG, 2018). This project aimed to improve road infrastructure and maintenance practices in South Sudan. By studying its objectives, challenges faced, and outcomes achieved, I gained a deeper understanding of the complexities involved in road maintenance and its impact on sustainable development.

Furthermore, I analyzed data from the World Bank's South Sudan Overview (WBG, 2023). This data provided valuable information on the country's development progress, reforms to support stability and long-term outcomes, and critical milestones in peace agreements. Finally, I conducted semi-structured interviews with four road engineers (one engineer from Africa Resource Corporation [ARC], the leading company that constructs and maintains roads in South Sudan, two engineers from subcontractors of the ARC, and one experienced senior engineer from the South Sudan Ministry of Roads and Bridges). The data were audio recorded, transcribed, and analyzed thematically.

By combining these sources of information, I gathered a comprehensive understanding of road maintenance challenges in South Sudan and their implications for sustainable development. This methodology allowed me to examine national strategies and international initiatives to address road maintenance challenges in South Sudan.

Results

Three themes emerged from data analysis obtained from document reviews and semi-structured interviews of experienced senior road engineers from ARC, the ARC subcontracted companies, and the South Sudan Ministry of Road and Bridges. Thematic analysis revealed a lack of functional road maintenance institutions, a lack of legal framework supporting road maintenance, and a lack of dedicated funds for the maintenance of roads as the most significant challenges facing road maintenance in South Sudan.

Documents Review

The document review analysis revealed that the primary objective of the South Sudan government is to establish critical infrastructure for sustainable development, including roads, and to strengthen the institutions responsible for maintaining public infrastructure at the national, state, and local levels. Supporting community infrastructure such as roads and investing in institutional strengthening, will significantly improve essential service delivery to the most vulnerable populations. This investment will address the immediate needs of these communities and foster social cohesion, which is vital for the overall development and progress of the country. South Sudan seeks to enhance its infrastructure to compete economically with neighboring nations strategically. One area identified for infrastructural improvement is the expansion of the road network, as it serves as a catalyst for accelerated growth and plays a pivotal role in nation-building and attaining sustainable peace.

Because infrastructure development is an integral component of social progress, the development of roads will facilitate access to essential services such as healthcare and education while promoting social cohesion and mobility. Additionally, the construction of roads will unlock South Sudan's potential for tourism and further contribute to nation-building. It is worth noting that without proper road infrastructure, eradicating preventable diseases will continue to present challenges. Furthermore, roads play a crucial role in ensuring security and safety, particularly for women and girls, by allowing law enforcement institutions to respond promptly to calls for help. To enhance infrastructure development, it is imperative to establish efficient and well-funded road maintenance institutions while also enacting and implementing a legal framework that supports their operations. By ensuring the availability of essential services to all individuals, regardless of their socio-economic status, the government of South Sudan can foster a more inclusive society where everyone is provided with equal opportunities to prosper and contribute to the nation's progress.

Interviews

The following sections represent the responses of all four interview participants supporting each theme mentioned above.

Theme 1: Lack of Functional Road Maintenance Institution

(P1) There is also a lack of equipment, especially from the government. You cannot do it when you do not have the equipment. Some ministries in other countries have equipment to respond to any deteriorated road. However, in the case of South Sudan, they do not have such.

(P2) The Ministry of Roads and Bridges is supposed to drive these contractors. They should go and do serious supervision whenever a project is being executed. However, instead of carrying out that subsequent or serious supervision, they go and look and do the inspection without really looking into it, or maybe testing, or carrying out the testing of the soils, or maybe checking whether the layers and the compaction are to the standard required by the Ministry.

(P3) So, when the government invests in such equipment, it will encourage the government to contract local contractors to come up and give a hand in road maintenance.

(P4) We do not have road authority as functional, mandated to maintain roads. On the other hand, Ministry does not have a broad maintenance department. Suppose they were to use what we call a force account. So generally, in South Sudan, no institutional resemblance will maintain roads, so talking about road maintenance without an institution that will maintain roads is self-defeating.

Theme 2: Lack of Legal Framework Supporting Road Maintenance

(P1) We can also encourage the private sector to get involved because, usually, the government cannot do everything. Government cannot do it alone. The private sector can come here to take up part of this road maintenance system and either collect the road tolls.

(P2) I know that road maintenance in South Sudan is only done by one company, the ARC. It is a company that does road maintenance in every part of South Sudan. So and it does not mean that only maintenance is the one that they do, but also even the actual construction of the roads is done by them as the main contractor.

(P3) So, because of monopoly, it is a challenge; it is like ARC has been contracted to do road construction and maintenance simultaneously. ARC always has challenges in meeting the time set. So, if only one contractor exists, there is always that challenge because of the monopoly.

(P4) Enact legal instruments that would support some maintenance of roads, especially performance-based contracts, so we can get donors and empower our private sector in the country to have people in the private sector that can work. We do not need to monopolize projects in the hands of a few individuals with political interests because, when they become too politically controlled, they fail to perform the function. The country will fail to get value for money.

Theme 3: Lack of Dedicated Funds for Road Maintenance

(P1) First, there is a lack of funding. Lack of funding has been an issue, especially for the concerned ministries. Like the Ministry of Road and Bridges. So, without a sustainable funding source. It becomes a problem to maintain the roads because road maintenance is expensive. It must happen yearly, after a certain period, maybe after, say, after 5 years, after 3 years, so funding has been one of those, and it is still one of those.

(P2) Most of the real work is done by people who are not paid enough to the extent that they can excel. So due to the low wages they [are] paid, they don't do quality work and there is a big challenge. Nevertheless, if at all, maybe those people are paying enough, they can do that work to the required standard.

(P3) The Ministry of Roads and Bridges lacks most of the machinery due to insufficient money to procure the needed equipment; their lab is poorly equipped.

(P4) In South Sudan, we do not have a dedicated fund for the maintenance of roads, so generally speaking, you cannot expect to maintain roads in South Sudan when you do not have dedicated funds for that purpose.

Discussions

Road maintenance is challenging in South Sudan mainly because the country lacks functional road maintenance institutions. It is important to note that the current road maintenance situation in South Sudan is quite challenging, with various factors contributing to the difficulties faced. First, under the Ministry of Roads and Bridges (MoRB), the Road Authority (RA) is mandated to maintain roads but is not fully functional. Therefore, no authority can do necessary tasks for road maintenance efficiently. Additionally, the MoRB, responsible for overseeing road infrastructure, cannot handle the required tasks effectively. As a result, South Sudan needs functional road maintenance institutions to ensure timely road maintenance. Khan et al. (2010) argue that timely maintenance is vital in keeping a road in good structure, reducing operating costs associated with vehicle repair and maintenance, minimizing the pavement deterioration rate, and effectively ensuring road users' safety. Therefore, South Sudan should establish and strengthen its road maintenance institutions to address these challenges.

Significantly, lack of equipment has been identified as a major factor contributing to the inactivity of the RA and the MoRB in South Sudan. The absence of proper equipment creates a formidable obstacle for the government to effectively address road maintenance issues. Unlike other countries where ministries have designated equipment for repairing deteriorated roads, South Sudan finds itself in a challenging situation where such equipment is non-existent. However, if the government invested in top-of-the-line road maintenance equipment, such as graders, rollers, and asphalt pavers, it could significantly improve the quality of the roads and catalyze the engagement of local contractors in providing much-needed assistance in road maintenance activities (Adepoju, 2021).

The lack of a legal framework supporting road maintenance in South Sudan poses the most significant challenge to administering and managing contracts in this sector. This absence of regulation has resulted in a monopoly held by the ARC, the sole provider of road maintenance throughout South Sudan. The ARC, however, faces numerous challenges in meeting the set timelines for completing its projects. The problem with having only one contractor is the inherent issue of monopoly, which hampers competition and can lead to inefficiencies (Blyth, 2007; Xiaojuan, 2002). There is a pressing need to establish legal instruments that would support the maintenance of roads to address monopoly. By establishing legal frameworks, not only would South Sudan be able to attract donors to invest in road maintenance, but it would also empower the private sector within the country (Świtła, 2023). Establishing a legal framework would open opportunities for multiple entities to participate in road maintenance, thereby eliminating the monopoly of projects by a few individuals with political interests.

The lack of independent legal instruments to support road maintenance measures poses a significant challenge. Ideally, the RA should operate independently under the supervision of the MoRB department of road maintenance. Regrettably, however, such an authority does not exist. Consequently, the MoRB often struggles to fulfill its contractual obligations due to the Ministry of Finance's failure to adhere to appropriation laws, which grant other government institutions the legal rights to utilize their budgets as planned. This absence of a legal framework hampers the ability to effectively maintain roads, as institutions lack the necessary empowerment and support (Świtła, 2023).

The lack of dedicated funds for the maintenance of roads is a matter of great concern that has far-reaching consequences. The MoRB cannot purchase the necessary equipment, hire and retain skilled contractors, and improve the laboratory facilities for road maintenance and improvement. The crux of the issue lies in the insufficient funding allocated to the MoRB. Maintaining roads becomes exceedingly challenging without a sustainable funding source, as road maintenance is a costly endeavor that demands regular attention (Ngezahayo et al., 2019). This chronic lack of funding impacts the infrastructure and adversely affects the dedicated personnel working tirelessly to ensure the upkeep of the roads (Ngezahayo et al., 2019). Most of these hardworking individuals are not compensated adequately, hindering their ability to excel.

Consequently, this salary deficiency compromises the quality of the work being done and presents a significant challenge. Without a dedicated fund, it becomes nearly impossible to expect the effective and timely maintenance of roads throughout the country (Ngezahayo et al., 2019). This situation highlights the importance of establishing a dedicated funding mechanism to ensure the proper upkeep and improvement of South Sudan's road network.

Policymakers and stakeholders in South Sudan have the opportunity to make significant strides in achieving multiple SDGs by recognizing the crucial relationship between road maintenance and sustainable development. By prioritizing road maintenance as an integral part of their sustainable development agenda, they can address infrastructure challenges and contribute to economic growth and poverty reduction (Dolan et al., 2006; Kaiser & Barstow, 2022). Ensuring adequate allocation of resources to tackle road maintenance challenges is of utmost importance. This allocation is essential to guarantee safe and reliable transportation, improve access to education and healthcare, and foster trade and economic opportunities (Kaiser & Barstow,

2022). Policymakers and stakeholders in South Sudan should acknowledge this interconnection and collaborate to allocate the necessary resources and implement effective strategies for road maintenance.

Recommendations

Regarding sustainable development in South Sudan, road maintenance is one of the most significant challenges. Three main recommendations should be implemented to address this issue. First, it is essential to make road construction and maintenance institutions function. These institutions will make the construction and maintenance of roads more efficient and cost-effective. Secondly, there is a need to establish legal frameworks to support road construction and maintenance in the country. These frameworks will help manage contracts, ensure that appropriation law is respected, and manage donor funding schemes. Finally, there is a need to establish a road fund agency to provide the necessary resources to support road construction and maintenance in the country. By implementing these three recommendations, South Sudan can effectively tackle road maintenance challenges and ensure sustainable development.

This study had a limitation. Given that only data from South Sudan was used, the findings cannot be generalized to Africa as a whole. Thus, further research covering different African nations is needed to compare the results reported here to those obtained in other countries.

Conclusion

Road maintenance stands among the most significant challenges to sustainable development in South Sudan. Despite the country's immense potential for growth and progress, the poor condition of its road infrastructure hinders economic activities, limits access to essential services, and perpetuates poverty. Without significant investment and commitment from the government, South Sudan will continue to struggle to achieve its development objectives. Road maintenance should become a priority, as it improves connectivity and catalyzes overall development in agriculture, education, healthcare, and trade. By investing in road infrastructure and implementing effective maintenance strategies, South Sudan can unlock its full potential and pave the way towards a more prosperous future for its people.

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