INOSR ARTS AND MANAGEMENT 10(1):42-50, 2024 ©INOSR PUBLICATIONS International Network Organization for Scientific Research https://doi.org/10.59298/INOSRAM/2024/101.4250 ISSN: 2705-1668 INOSRAM 101.4250

Investigating how Road Development Enhances Agricultural Production in Bubandi Sub County of Bundibugyo District, Uganda

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ABSTRACT

This study investigated the intertwine between road development and agricultural production in Bubandi Sub County of Bundibugyo District, Uganda. Findings revealed that the poor road network in the district is caused by steep slopes, difficulties in compensating project affected residents, government delays in providing cash, and weather variations. This poor road network equally threatens food security. This is because road development increases the agricultural productive capacity of poor households, lowers input and transportation costs, creats a market for agricultural produce, improved regional interaction, opens up new economic areas, and facilitates the flow of goods, especially agricultural produce, from rural to urban areas. Based on this finding, the study calls for the Uganda National Roads Authority (UNRA) to build all-weather loose surface roads to connect economically beneficial areas and provinces. The government should directly incentivize and oversee farmers to grow the sub county's agriculture. This is because most farmers lack agricultural incentives to inspire and boost their output. The government should build standardised highways and extend rural electrification, to encourage post-harvest handling technologies. Finally, the government should increase infrastructure and agricultural extension budgets in rural areas.

Keywords: Agricultural output, Agricultural production, Feeder roads, Road development, Standard of living.

INTRODUCTION

Road networks power all international operations, without which some enterprises might shut down. The global road network helps all sectors run smoothly. Feeder roads have also helped countries share resources for global economic progress. Roads assist poor countries access agricultural products[1]. Roads improve poverty reduction, information, health, and education demand and access. This, perhaps, is the reason why Bhati^[2] recommended an efficient road network, marketing, and other support mechanisms for farmers to improve their incomes and local economic development. In many African countries, agriculture drives economic growth [3]. Thrall, Bever and Burdon[4] said that agriculture has evolved throughout thousands of years due to diverse climates, cultures, and technologies. This important lifeline is often underfunded, and over 40% of the system is poor or average. Road users spend approximately \$1,000 annually on wasted time and

to the rehabilitation backlog 57. fuel due Maurya⁶ reports that India has the secondlargest road network. About 1.14 lakh kilometres are National Highways. National Highways make up 2% of the country's road network but transport 40% of traffic. India's highway network has 0.66 km of roads per square kilometre, close to the US (0.65)but far higher than China's (0.16) and Brazil's (0.20). Shrestha[7] examined the key market mechanisms by which improved connectivity translated into economic gains for agricultural households in Nepal (South Asia) and found that a 1% decrease in road distance raises the market price of an agricultural plot from 0.1% to 0.25%. India is one of the fastestgrowing economies and is entering an era where infrastructure will drive economic growth [8]. The government has taken steps to speed up infrastructure development in recent years. Due to some of these initiatives, India's Global Competitive Ranking of the World Economic Forum for

infrastructure development rose from 87th in 2015 to 63rd in 2018 [9]. Najman, Gachassin and Raballand [10] found that feeder roads in most developing nations are inadequate and substantially poorer than in developed countries. Agriculture productivity boosts economic growth and reduces poverty in and out of agriculture. Such productivity rise requires adequate rural infrastructure, a functioning home market, appropriate institutions, and acceptable technology. Olagunju[11] found that road mobility has both good and negative effects on agricultural development. However, poor road conditions raised agricultural produce transportation costs, lowering rural farmers' revenue in Africa. Despite Africa's having huge agricultural potential due to its abundant land and water, the sector has one of the worst transport networks in the developing world, which limits its economic potential 12]. In Madagascar, Malawi, Mozambique, and Niger, road network asset value exceeds 30% of GDP, indicating a major maintenance issue. Although the main trunk roads

Over 4 million miles of public roads in the US transport people and commodities daily, according to the U.S. However, with vehicle miles travelled exceeding 3.2 trillion in 2019, an 18% increase from 2000, these roads must survive increased traffic. Unfortunately, 43%2 of these public roads are in poor or mediocre condition due to wear and tear, a proportion that has been unchanged for years [17]. Îndian road infrastructure has many obstacles, including competing demands, limited budgetary assistance, contracting companies in financial hardship, lack of feedback, and bidding process issues. The system is overburdened by pending payments against routine bills, arbitration panel rulings, and adjustments made after approvals [18]. In Africa, Bouraima et al. [19] found that procurement methods are the most difficult part of road maintenance, whereas road materials are the easiest. Nairobi is most affected by these elements, while Nakuru is least. The Fort Portal-Lamia project route runs through steep mountain slopes in most of Bundibugyo District. Such areas have bi-modal rainfall. First rains are short in March-May, then longer in August-December. Altitude substantially affects annual rainfall, which ranges from 800 to 1600 mm. Fuel allocations and civil works funds are mismatched, which hinders road construction. With

Level of agricultural production in Bubandi Sub County, Bundibugyo District Uganda exported 34,176 metric tonnes of dry cocoa beans in 2019, earning \$77.548 million. Agriculture still dominates the economy, per UBOS (2017). A 2014 census revealed 5.8 million agricultural households. Over 69% of households farmed subsistence. About 65% of workers were

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are in decent shape, road conditions are still poor compared to other emerging regions [13]. Most Kenyan roadways have maintenance issues 147. Tanzanian rural roads and transport services are poor, expensive, and low-quality [15]. The 2,100KM road network in Kampala City, Uganda, is 30% paved and 70% unpaved or earth roads. Most asphalt roads are over 20 years old and need repair or replacement. This explains the prevalence of potholes and road degradation. Road traffic has worsened the problem by increasing wear and tear. Uganda has poor physical infrastructure and public services since all physical infrastructure is inadequate. Road networks make many villages inaccessible to automobiles [16]. Some of the Ugandan highways have overgrown grass on the shoulders, broken culvert crossings, guardrails, and carriageways. It is in this light that the present study investigates how road development enhances agricultural production in Bubandi Sub County of Bundibugyo district, Uganda.

Factors hindering road development

few providers and little capacity compared to demand, local authorities have trouble hiring equipment from the open market. Rainy weather worsens the issue [20]. According to Hewett and Montgomery [21], developing country local governments struggle to pay the development, operation, and upkeep of public spaces like roads, parks, malls, and urban basic services. For some municipal governments, raising sufficient resources from inside is difficult. Rapid and chaotic urbanisation and climate change-related natural disasters are posing even greater problems to most developing country municipal governments. In Kampala City (Uganda), KCCA is bound by budget constraints and has 8,500 square metres of potholes throughout five divisions by December 2022. Pothole work began in December 2022 with available funding. KCCA filled potholes in five divisions' roads. KCCA receives only UGX 26 Billion to maintain roads, but needing 75-100 Billion annually. Bundibugyo district only rehabilitated four roads in Mbatya, Kirumya, and Bulyamba under the road budget, leaving 24 roads and bridges in poor condition. All types of disasters occur in Bundibugyo. Its high risk requires a mindset change in disaster strategy and risk mitigation $\lceil 22 \rceil$.

subsistence farmers. Agriculture-led prosperity revolutionised many Asian and Latin American economies, while most African states have not yet had an agricultural revolution [23]. According to Bahiigwa, Rigby and Woodhouse [24], Uganda prioritises agriculture to increase rural incomes and

reduce poverty. Uganda is largely agricultural, with a climate and soils suitable for many crops, yet average total factor productivity growth in agriculture has been negative for two decades. Uganda's population has grown 3.3% while agricultural output has grown 2% per year over the past five years [25]. Ugandan agriculture confronts multiple issues at several levels of the commodity value chain, including low production and

Adequate road infrastructure (locally and connecting regions to economic hubs) can help developing country enterprises gain from trade liberalization's improved access to intermediate inputs. Road construction is essential to the agriculture sector because it ensures input supply and market delivery. This indicates that improving rural roads and transport services is necessary to lower agricultural input prices and increase market access for agricultural produce [27]. Road mobility aids agricultural development, in the words of Wudad et al[28]. It is the main way to move agricultural produce from farms to markets and metropolitan areas. Agriculture is key to rural food production in developed nations. Hard and soft infrastructure investments are needed for agriculture to reach its market potential 29]. Kiprono & Matsumoto [30] found that road infrastructure investment in South-Western Kenya increased rural smallholder farmers' agricultural productivity and market involvement. According to Amare, Asfah and Shiferaw [31], increased access to all seasonal roadways boosts fertiliser use, aggregate farm output, and rural marketable surplus, which accelerates food production. A wide

The researcher applied a cross-sectional survey in order to allow collection of information, opinions and perceptions of the respondents about the variables under study. the targeted population for the study was 85 Community Development Officers,

productivity, low value addition to agricultural produce, lack of reliable market access, and insufficient skilled agricultural labour force, according MAAIF (2013).to Uganda's farm production is low, like many sub-Saharan African countries. Farms produce equivalent crops many times less than research stations. Farmers provide 13-33% of research station crops [26].

Relationship between road development and agricultural production

unclassified network of rails serves rural areas in varied degrees beyond primary and secondary. The lowest rural accessibility in the developing countries is under 40% of rural Africans living within two km of an all-season road. Evidence suggests that geographic isolation is preventing significant parts of African continent from attaining their agricultural potential [32]. Well-developed highways help businesses reach clients and deliver items to demand. Good roads would ensure people have enough food and supplies for daily activities [33]. The goals of local government in Nigeria are to provide opportunities to practise democracy, basic services for citizens at the local level, join local citizens to solve community problems and needs that cannot be solved by individuals alone, and become the nearest government to local citizens at all levels of need[34]. Shrestha[7] examined the key market mechanisms through which improved connectivity translated into economic gains for agricultural households in Nepal and found that a decrease in the distance to a road contributes to the commercialization of agriculture and increases fertiliser use, lowering fertiliser unit costs.

METHODOLOGY **Research design**

Commercial Officers, Agricultural Extension Workers, Local Council members, and rural farmers from two parishes in Bubandi Sub County, Bundibugyo District.

Sampling technique

During the conduct of this study, rural farmers and Local Council members were selected by use of simple random sampling technique. Additionally,

purposive sampling technique was used to select Community Development Officers, commercial officer and Agricultural Extension workers.

Sample size

Commercial Officer, Agricultural Extension Workers, Local Council, Committee Members and rural farmers from two parishes in Bubandi Sub County, Bundibugyo District. The sample size was

A sample size of 70 respondents was used in the study and this entailed Community Development Officers, determined based on Krejcie & Morgan (1970) recommendations in determining sample size. The target population and sample size are summarized in the table below.

Table 1: Target population, sample size and sampling techniques

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Category	Target population	Sample size	Sampling technique
Community Development Officer	02	2	Purposivesampling
Commercial Officer	01	01	
Agricultural Extension Officer	02	02	
Local Council I Members	15	10	Simple-random sampling
Rural Household farmers	65	55	
Total	85	70	Not applicable

Ethical consideration

The researcher sought for consent from the participants before administering data collection instruments. All the participants had the willingness to accept to take part in the study or not. Additionally, the researcher treated the information collected from the respondents with maximum level of confidentiality. Data collection sources were formulated in a manner that excluded names of the study participants. Additionally, participant's information was also held confidential. The sources of data were also fully acknowledged and or included in the references.

RESULTS

Table 2: Respondents' responses on factors hindering road development in Bubandi Sub County			
Responses	Frequency	Percentage	
Steep mountain slopes	19	24	
Challenges in compensation of project affected persons	16	20	
Government delays in releasing funds	8	10	
Changes in weather patterns	11	14	
Poor quality of work by contractors	5	6	
Delays in procurement	8	10	
Embezzlement and corruption	13	16	
Total	80	100	

Source: Field survey, 2023

Responses from the respondents show that 19 (24%) of respondents indicated steep mountain slopes as the key factor hindering road development in Bubandi Sub-County, 16 (20%) indicated challenges in compensating project affected persons, 8 (10%) indicated government delays in releasing funds, 11

(14%) indicated changes in weather patterns, especially the rainy season, 5 (6%) indicated poor contractor work, 8 (10%) delayed procurement, and 13 (16%) embezzlement and corruption among government officials.



Figure 1: Respondents' responses on the level of agricultural production in Bubandi Sub County

Figure 1 shows Chat 15 (21%) evaluated **1**gricultural **15** agr201tural pro25ctivity w30low, while517 (24%) production in Bubandi Sub County, Bundibugyo said it was very district as very high, while 8 (12%) said it was high. Also, 30 (43%) said Bubandi Sub County's





Source: Field Data, 2023 46

low.

After being asked about the relationship between road development and agricultural production in Bubandi Sub County, Bundibugyo District, 46% strongly agreed and 24% agreed. 17% of respondents disagreed and 13% strongly disagreed that road development affected agricultural production in Bubandi Sub County, Bundibugyo District. Since most respondents agreed and a few disagreed, these data suggested that road

Findings reveal that road development increased the productive capacity of poor households, lowered input and transportation costs, created a market for agricultural produce, improved regional interaction, opened up new economic areas, and facilitated the flow of goods, especially agricultural produce, from rural to urban areas. Since roads connect farmers to supply and output markets and allow them to negotiate higher prices, they were crucial to agricultural development. The results further showed that economic or physical factors inhibited road development in Bubandi Sub County, Bundibugyo District, notwithstanding certain social influences. Steep slopes, difficulties compensating project victims, government delays in funding, and weather fluctuations were among them. The study also found that central government funding delays and community access road maintenance expenses impeded road development in the study area. Findings equally revealed that there is a gap between fuel allocations and civil works budgets, which hinders road construction. With few providers and little capacity compared to demand, local authorities have trouble hiring equipment from the open market. Rainy weather worsens the issue. These findings agree with Dijk [35] who said local governments in developing countries struggle to fund the construction, operation, and maintenance of public spaces like roads, parks, malls, and urban basic services. Findings revealed that some rural

Poor road network that militates against sufficient agricultural outputs are caused by steep slopes, difficulties compensating project victims, government delays in funding, and weather fluctuations. This is equally compounded by the

Based on these findings the study calls for the Uganda National Roads Authority (UNRA) to build all-weather loose surface roads to connect economically beneficial areas and provinces. The government should directly incentivize and oversee farmers to grow the sub county's agriculture. This is because most farmers lack agricultural incentives to development and agricultural production in Bubandi Sub County, Bundibugyo District were strongly linked. However, interviews revealed that smallholder famers still struggle to carry cocoa and vanilla to collection depots in Bundibugyo District, where cocoa has been the principal export product since 1994–95, when much of the local coffee crop was destroyed by wilt disease.

DISCUSSION

farmers practiced subsistence agriculture instead of commercial. These findings are in line with Ugandan National Agricultural Project [36] (2013), when they observed that Ugandan agriculture faces several challenges at various stages of the commodity value chain, including low production and productivity, low value addition to agricultural produce, lack of reliable market access, and insufficient skilled agricultural labour force. Majority of the respondents agreed that road development and agricultural production in Bubandi Sub County, Bundibugyo District were strongly linked. Road development increased the productive capacity of poor households, lowered input and transportation costs, created a market for agricultural produce, improved regional interaction, opened up new economic areas, and facilitated the flow of goods, especially agricultural produce, from rural to urban areas. The findings are in line with Krygsman [3] who found that road construction is essential to the agricultural industry since it ensures input supply and market delivery. Thus, rural roads and transport services must be improved to lower agricultural input prices, increase market access for agricultural produce, and improve agricultural extension services. The findings are equally in line with Olagunju[11] when he observed that road mobility aids agricultural development, and it is the main way to move agricultural produce from farms to markets and metropolitan areas.

CONCLUSION

central government funding delays and community access road maintenance, and the gap between fuel allocations and civil works budgets, which hinders road construction.

Recommendations

inspire and boost their output. The government should build standardised highways and extend rural electrification, to encourage post-harvest handling technologies. Finally, the government should increase infrastructure and agricultural extension budgets in rural areas.

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CITE AS: Arinaitwe Shibar, Turyahabwe Deneth, Tugume Azalius, Atuhairwe Godiriva and Stella Teddy Kanyesigye (2024). Investigating how Road Development Enhances Agricultural Production in Bubandi SubCounty of Bundibugyo District, Uganda. INOSR ARTS AND MANAGEMENT 10(1):42-50. https://doi.org/10.59298/INOSRAM/2024/101.4250