THE IMPACT OF ROAD NETWORK ON THE MARKETING OF AGRICULTURAL PRODUCE IN THE JAMAN NORTH DISTRICT, GHANA

By

Solomon Ansu

(B.SC. Mathematics and Computer Science)

A Thesis submitted to the Department of Construction Technology and Management,

Kwame Nkrumah University of Science and Technology, Kumasi

In partial fulfilment of the Requirements for the degree of

MASTER OF SCIENCE PROJECT MANAGEMENT

NOVEMBER, 2018

DECLARATION

I, Ansu Solomon, declare that this submission is my own work towards the attainment of the MSc and that, as far as my knowledge could serve me right, it contains no previously published material(s) by another person nor material(s) which has been accepted for the award of any other degree of the University, except instances where acknowledgement has been duly made in text.

ANSU SOLOMON (PG1147117)

Student

Signature

Date

Certified by:

DR. GODWIN ACQUAH

Supervisor

Signature

Date

Certified by:

PROF. BENARD KOFI BAIDEN

Head of Department

Signature

Date

ABSTRACT

This study was designed to assess the impact of road network on the marketing of agriculture in the Jaman North District of Ghana. The cross-section survey research design was adopted in this research work. Purposive sampling was used to select 4 rural communities while questionnaires were used to collect data from 200 farmer households by means of simple probability sampling technique. Data collection was based on primary sources with a 100 percent response rate. Descriptive statistics technique such as percentages, frequencies, means and chi square was used to highlight the socio-economic characteristics of the farmers in the study area. The SPSS package aided in the analysis of the data. The result revealed that almost all the respondents agreed that road networks play a vital role in marketing of agricultural produces. It also showed that road networks create market for agricultural produces so improving road condition allows for better access to a wider market and reduce losses and delays in moving the farm produce. Again, nature of road network affects the cost of transporting agricultural produce to the market centres and hence influences the prices of produce. Also, another impact of road network on the marketing of agricultural produce is that effective and efficient road network increases the availability of agricultural produce in the market. Most of the road networks linking the various communities to the main market were unpaved and immotorable during the rainy season. Farming in the district was characterized by farmers who owned small portions of farm size and used rudimentary methods of agriculture. The study revealed that, the type of road connecting the communities to the market had a significant relationship with the estimated travel time to Sampa, cost of transportation, where farmers sold their farm produce. It did not however find a statistically significant influence of road transport infrastructure on farm size of the farmers in Jaman North District. The study recommended that as Ghana is fighting to abolish extreme poverty and hunger which is one of the objectives of the Millennium Development Goals (MDG), the government should help in the construction of the road network connecting this communities so they can produce more and make food available in the market.

Keywords: Road network, Agriculture products

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURE

ACKNOWLEDGEMENT

Thank you God Almighty for the strength, knowledge and the wisdom to do this work. This dissertation would not have been possible without the support of many people and institutions. I owe my gratitude to my supervisor, Dr. Godwin Acquah, for his supporting guidance and the creative and pleasant working environment he established to enable me carry on. I am also grateful to all the people who helped me with the data collection.

I thank the anonymous referees for their useful suggestions

Thank you to everybody.

DEDICATION

This work is dedicated to my Lovely wife, Yeli Grace. Lots of Love to You

LIST OF ABBREVIATIONS

GSS   Ghana Statistical Service

MoFA   Ministry of Food and Agriculture

NDPC   National Development Planning Commission

CHAPTER ONE

INTRODUCTION

1.1 Background

The objective of the Millennium Development Goals (MDG's) is consolidated in the first: prevention of extreme poverty and hunger. Ghana's broad rural areas contain the nation's most noteworthy neediness convergences of extreme poverty and hunger. All things considered, they are the regions that offer the best potential for close term development, through expanded agricultural production and processing. Tapping these possibilities requires rural transport foundation satisfactorily kept up to allow agriculturists to get sources of info and data at sensible cost and pitch their yield at practical procedures to take care of their generation expense at traditional markets.

Transport is extensively important and crucial to the economic development of any state and more so developing countries like Ghana. Transport enhances movement of people and goods and facilitates national integration and development in general (Yeboah, 2015).

Transportation is considered a crucial factor in advancing agricultural productivity. It creates market for agricultural produce, enhances quality of life of the people, encourages association among geographical and economic regions and opened up new zones to financial core interest. An advanced transportation will give support to farmers to work harder in the rural areas for increased production, reduce spoilage and wastage (Ajiboye et al., 2009).

Since agriculture is essentially the backbone of rural economy, the development of agriculture is as well essential. To maximize agricultural development, transportation infrastructure is central. The question to ask, however is, to what extent does transportation

infrastructure influence agricultural development in the areas of food production, and marketing of produce? It has been indicated by several writers writing on the relationship between agriculture and transportation that increase in agricultural activities has increased the surge in demand for mobility in terms of passenger travel and movement of goods. Agricultural development cannot be effectively enhanced without an efficient transport network. Crossley et al. (2009) reports that transport operations are a basic component of agricultural input and produce supply chains and that transport can be the decisive factor for the success of a farm or business activity, or else the one constraint that makes costs prohibitive or renders a project economically non-viable.

Farming produce involves diverse food crops, money crops, tamed animals and poultry deliver and furthermore the decomposables, for instance, vegetables, tomatoes, pepper and normal items among others that are made altogether in rural settlement. Transport in rustic areas is generally depicted by low masses thickness, low level of financial exercises; long divisions between nodal centres, for instance, benefit focuses; the relative noteworthiness of transport factors inside monetary advancement arrangements augments as remoteness develops (Afolabi et. al, 2016).

The physical state of different rural-urban utilized in the transportation of cultivating produce in the examination zone is of sublime concern, joined with the despicable state of the roads in the region. Vehicle used to transport agricultural produce create along the courses interfacing the rural zones are typically not fit for such reason. The huge farm settlement in the zone are geographically scattered, there is need to interface this settlement

with the market center through a successful rural-urban transportation administrations will level the opening between movement site and customers (Afolabi et. al, 2016).

Jaman District was established by the LI 1376 of 1988. By the LI 1777 of 2004, the Jaman District was further subdivided into Jaman South and Jaman North districts (GSS, 2010). The Jaman North District is predominantly rural with agriculture the leading economic industry in the area. Major food crops including yam, plantain, cassava, cocoyam, pepper, and cash crops including cashew nut are grown for consumption and in commercial quantities. The district has a population of over 83,059 of which 39,883 representing 48 percent being males and 43,170 representing 52 percent being females per the 2010 population census. It is estimated that about 80% of farm produce is conveyed by head-portage from farms to villages mainly by women and children. There is high incidence of drudgery in transporting agricultural produce in the district.

1.2 Statement of the Problem

The Ministry of Finance and Economic Planning in their 2015 report stated that "the Jaman North district has a total road network of 310.50km with engineered roads of 195.50 km. The road network is good but with bad road condition. This makes transportation very poor. The Sampa-Drobo high way is tarred remaining Sampa-Dibebe trunk road under construction. Sampa town roads are still under construction". Poor transport infrastructure, high transport cost and missing links in the transport network pose a challenge for market integration. Transport prices in Africa are estimated to be twice as high as those of South and East Asia (Kandiero, 2009).

In many African countries, the agricultural sector is an important sector for economic growth. In Ghana, the agricultural sector contributes roughly 19% to the national GDP and reported a decline in growth rate of 0.6% in the 2017 (GSS, 2018). In rural areas, among the strategies often adapted to stimulate agricultural development is the provision of proper and adequate transport.

Crossley *et al.* (2009) state that transport is a basic component of the agricultural sector; it provides assurance for the supply of the agricultural inputs and facilitates the delivery of the farm outputs to the market. The marketing of agricultural produce depends heavily on availability of transportation. How to make the produce available at the market. Improvement of the rural roads and transport services are essential to ensure a price reduction for agricultural inputs, improvement of market access for agricultural produce, and improvement of access to agricultural extension services. In Ghana, rural roads and transport services are generally characterised by poor infrastructure, high transport cost and charges as well as a low-quality service (African Development Bank Group, 2013).

An inducing need to update the rural-urban methods for transporting agricultural produce from different delivering centers to urban territories to diminish neediness and hunger in the country and to meet the Millennium Development Goals (UNDP, 2010). This work hopes to study the impact of road networks on the showcasing of farming produce in the Jaman North locale of Ghana.

1.3 Objectives of the Study

1.3.1 AIM

The aim of this study is to assess the impact of road network on the marketing of farm produce in the Jaman North District of Ghana.

1.3.2 OBJECTIVES

Specific objectives to be considered include;

1. To identify the type and nature of road and agricultural produce in the district

2. To determine the relationship between transportation and the marketing of agricultural products

3. To identify the effect of transportation system infrastructure on the marketing of agricultural products; and

4. To determine the perception of people on the percussion of road network on the trade of agricultural produces.

1.4 Research Questions

1. What is the nature and type of roads and agricultural produce in the Jaman North District?

2. What is the relationship between transportation and marketing of agricultural product in the Jaman North District?

3. What is the effect of transportation system infrastructure on the trade of agricultural produce impact of road network on the marketing of agricultural produce in the district?

4. What are the perception of people on the impact of road network on the marketing of agricultural produce in the Jaman North District?

1.5 Significance of the Study

The study is of much importance in the sense that the beneficial and expanding input which agriculture can make to the economy and most largely to the tremendous impact of transportation infrastructure cannot be left out. This is mainly due to the fact that development and transport as well as agriculture are regarded as closely related since each of them influences the fortunes or the rate of growths of the other. In Ghana and that matter Jaman North District, road is the major and mostly used mode of transport for the flow and distribution of agricultural produce from various rural areas to the different urban areas of the state. The study will also serve as a reference guide for further research in this area especially in the era of population growth and looming food storage.

1.6 Concepts and Definitions

1.6.1 Household

A household was defined as a person or a gathering of people, who lived respectively in a similar compound and had a similar housework courses of action. As a rule, a household comprise of a man, his better half, children and some other relatives or a house help who might be living with them (GSS, 2010).

1.6.2 Head of Household

The household head was defined as a male or female member of the household recognised as such by the other household members. The head of household is generally the person who has economic and social responsibility for the household. All relationships are defined with reference to the head (GSS, 2010).

1.6.3 Agriculture

The research sought information on agricultural affairs, including the farming of crops or tree planting, animal husbandry or breeding of fish for sale or family intake. Information was also collected on the types of crops, their farms and number and type of livestock (GSS, 2010).

1.7 Organization of the Study

This work was organized into five chapters. Chapter one was concerned with general introduction of the study. This included a statement of the research problem, objectives, significance and limitation of the study.

The Chapter two reviews literature related to the study. Here, various definitions from different scholars and writers was assessed.

Chapter three follows with the methodology. This entails the technique for data collection, data collection instrument or tool, population and sampling and data analysis.

Chapter four presents the analysis from the study. The chapter five presents a summary of the results, discussion and conclusion of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This portion reviews the literature study. It summarizes data obtained from similar researchers who have done similar work in the same field of study relating to the theme and features of this study. The major areas of agriculture and transport are also discussed.

2.2 Food and Agriculture in Ghana

Darfour and Kurt referred to MoFA (2007) published that farming was exceedingly honed on a minor scale level utilizing straightforward innovation in producing around 80% of the aggregate agricultural yield in Ghana. As indicated by the report, around 2.74 million family units are keeping animals or possess a farm. In connection to the 2000 statistics, 50.6% (4.2 million individuals) of the work force, were straightforwardly occupied with agribusiness. From the evaluation, around 90% of most farm lands were not up to 2 ha in size and for the most part rubber, oil palm, maize, coconut, rice and pineapples farms are very large.

Ordinarily, agriculture in Ghana relies upon rainfall, in spite of the fact that in 1999 an expected 6,000 farm ventures crosswise over Ghana utilized a few methods for water system. Reports demonstrate that, the average farm land irrigated in 2002 was around 11,000 ha with a surmised potential territory for water system of 500,000 ha. By and large, 60% of fish necessities are locally produced, 51% of Ghana's cereal needs are locally delivered, half of meat are locally delivered, and under 30% of agro-based markets raw materials are locally created. The economy of Ghana is controlled by the agriculture part, representing around 23% of the national Total national output (Gross domestic product) in

2012 (FAO and FAPDA, 2015). Agribusiness is as yet the biggest offer supporter of the Gross domestic product. Since 2000, there has been an aggregate of between 35.8% and 37% coming about to the Gross domestic product from agriculture. Agricultural development as indicated by the report by FFG (2014), there has been consistency in development and neediness decrease in the course of recent decades making Ghana a fruitful African nation. The yearly GDP has developed somewhere in the range of 4% and 8% over the previous years, and this every year development is expected to keep going for a considerable length of time to come. Poverty reducing, especially in the southern piece of Ghana has been spurred by agricultural development, and agriculture sector utilizes the most noteworthy number of individuals, and these individuals are prevalently little scale farmers that make sustenance and cash crops. Over the previous decade, Ghana's general poverty lowering rate has been from 52% to 28%. Despite the country's development in farming, Ghana still imports around 15% and 70% separately of maize and rice devoured. The rise in wages and developing urban development rate is foreseen to build the need of the two crops.

Contribution of Agriculture to the GDP of Ghana

Gross Domestic Product is the estimate of the total value of final goods and services produced in the country over a given period. The Agricultural sector is the second largest sector that contribute immensely after Service. The Agriculture sector enlarged from a growth rate of 3.0 percent in 2016 to 8.4 percent in 2017. Its share of GDP, however, slumped from 18.7 percent in 2016 to 18.3 percent in 2017 (Figure 2). Crops remains the largest activity with a share of 14.2 percent of GDP. GDP from Agriculture in Ghana increased to 8441 GHS Million in 2017 from 7790.18 GHS Million in 2016. GDP from

Agriculture in Ghana averaged 6699.52 GHS Million from 2006 until 2017, reaching an all-time high of 8441 GHS Million in 2017 and a record low of 5322 GHS Million in 2007.

Figure 2.1: Ghana GDP from Agriculture from 2008 - 2017
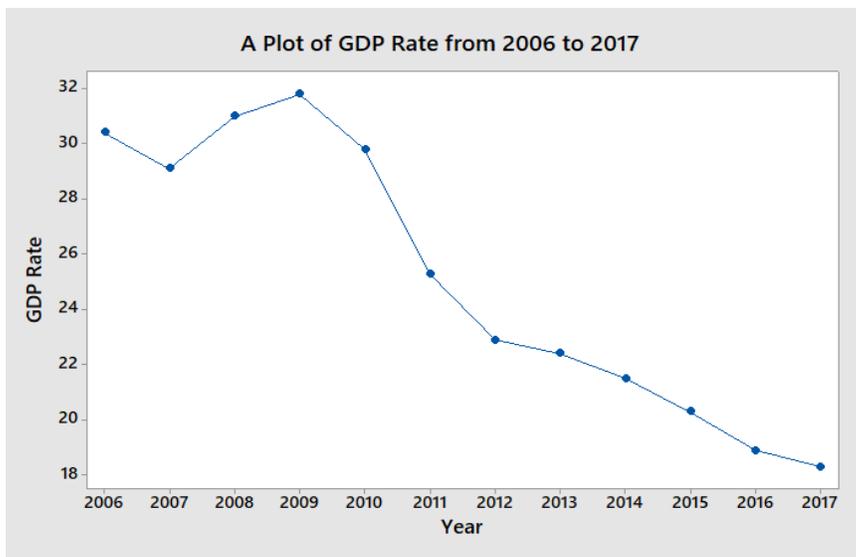
Figure 2.2: A Plot of GDP Rate from 2006 – 2017

According to Figure 2, the GDP rate increased from 2007 to 2009. Since then, the GDP rate has been declining.

2.3 Agriculture in the Jaman North District

Agriculture in modern term refers to the production of crops and animals for human consumption and industrial uses. In trying to find a working definition for the term, Helcom(2001) defined agriculture in three ways. These are; 1) the use of land for production of food, fodder, fibre, energy, medicine, etc and for grazing (landscape preservation). 2) Agriculture: The science or art of farming the soil, raising livestock, and growing and harvesting crops. 3) Agriculture: The science or business of growing plants and animals useful to man. It implies the growing of the soil, the production and harvesting of crops, the care and breeding of livestock.

According to Nchuchuwe & Adejuwon (2012), the definition of agriculture changes over time. They give a broad definition to agriculture as; "… the cultivation of plants and husbandry of animals, that is, the management of living things and ecosystems to produce goods and services for the people. Agriculture includes farming; ranching; aquaculture; apiculture; horticulture; viticulture; animal husbandry, including, but not limited to, the care and raising of livestock, equine, and fur-bearing animals; poultry husbandry and the production of poultry and poultry products; dairy production; the production of field crops, tobacco, fruits, vegetables, nursery stock, ornamental shrubs, ornamental trees, flowers, sod, or mushrooms; timber; pasturage; any combination of the foregoing; the processing, drying, storage, and marketing of agricultural products when those activities are conducted in conjunction with, but are secondary to, such husbandry or production."

Agriculture is the dominant economic activity in the district. It employs more than 70 percent of the total population within the labour force. Thus, it is the chief source of

livelihood for most of the people in the District. The major areas of agriculture in the district are crop farming and. The major crops cultivated in the District are yam, maize, cassava, rice, cocoyam and plantain. The commonest vegetables and spices also produced are pepper, groundnut, tomatoes and garden eggs with cashew nut being the main cash crop. (GSS, 2010).

*Crop farming***:** Farmers exercise mixed cropping and poly-cropping, others are vegetable farmers. There are tree fruit crop farmers where most of the farmers have acreages and hectares of cashew etc.

*Livestock farming***:** Some farmers apart from doing crop farming also have little livestock mainly for subsistence. There are few cattle farmers, poultry farmers, pig farmers and small ruminant farmers. In the district, most household rear local birds.

Table 2.1: Production Figures of some Major Crops

CROP	MAIZE	CASSAVA	YAM	COCOYAM	PLANTAIN
Area Cropped (Ha)	3,560	1,860	9,130	960	610
Yield (Mt/Ha)	2.00	14.44	15.00	7.05	7.93
Production (Mt)	7,120	26,858	136,950	6,768	4,837

Source: MoFA, 2010

Currently, the cashew nuts are processed and sold in large-scale. The crop has competitive merit and proven potential for food security, industrial growth and export.

2.4 Road Transport Infrastructure in Ghana

According to the National Development Planning Commission, transportation plays an important role in the economy of Ghana (NDPC, 2013). It expedites the haulage of goods, movement of people and the general integration of the rural and urban economies (Tanko, 2013). Rural communities are linked to social and economic amenities, including schools, health centers, and markets, and also enable government services like electricity and water to reach rural areas. The NDPC indicates that among the various modes of transportation, road is the principal means of transport in the country "accounting for over 95% of total transport supply". Giving the NDPC's indication, Ghana is highly dependent on road transport for all its transport needs.

Yeboah (2015) cited Jedwab and Moradi (2012) that they trace the history of roads in Ghana and made the assertion that roads only became a competitive transportation technology in Ghana in the late 1920s. The researchers reveal that most of the inland roads served as feeders to the railway and that many seaside roads were class 2 roads ("roads suitable for motor traffic but occasionally closed") that were utilized to ship cocoa beans from coastal producing areas to the coast. Roads were first complementary to the railway system as they were feeders to it. It is observed that roads were of poor quality until 1924 when the colonial government started the "Tarmet Program" which made roads appropriate to motor traffic during the year. Roads then became serious competitor for the railway and also opened new areas to cocoa cultivation (Hine et al., 1983). As it has been perceived even if no railway had been built, roads would have permitted the cocoa boom in Ghana (Hine et al., 1983).

This underlines the important role road infrastructure played and continues to play in the economic transformation of the country.

Road transport since independence in 1957 has changed substantially in terms of road policy framework and the physical infrastructure. The road transport is currently the dominant transport system in Ghana. The NDPC describes the current road situation in Ghana (as of 2012) and states that Ghana's road network comprises of 68,067 kilometres of roads and this is further broken as 12,400km (18.2%) of urban roads ,42,190 km (62%) of feeder roads and 13,477 km (19.8%) of trunk roads (NDPC, 2013). The road system connects all districts and regions, and also makes available access to a large number of settlements and is regarded adequate to meet the minimal prerequisites for sub-regional integration (NDPC, 2010). There is however rapid deterioration of the roads. Broad use of road transport in connection to other forms of transport and poor maintenance of roads has led to the early decline of the road structure (ibid). Only 42% of the road network is considered to be in good condition, 28% in fair condition and 30% in poor condition (NDPC, 2013). The NDPC observes that there is poor connectivity in rural areas, where only one fourth of rural population lives within 2km of an all-season road. The report shows that in 2012 only 33.5% of feeder roads were rehabilitated across the country (ibid). Continued expansion of the network is desired as well as giving priority to improving roads quality through the introduction of modern construction technology, better upkeep and regulation, and refining rural connectivity. It is imperative that the Road Transport Gap (RTG) is as a matter of urgency overcome through appropriate interventions by expanding the length, up-grading of road pavement and improved inter-connectivity of roads in all the three road sectors namely Highways, Urban and Feeder Roads across the country, (NDPC, 2010; Tanko, 2013). Table 2.2 below gives an

important overview of Ghana's road transport sector which suggests that comparatively the country is doing well but still has to do more with rural accessibility.

Table 2.2: Ghana's road indicators benchmarked against Africa's low and middle income countries

Unit	Low-Income Countries	Ghana	Middle-Income Countries
Paved road density km/1000 km2 of arable land	86.6	**158.1**	507.4
Unpaved road density km/1000 km2 of arable land	504.7	**804.0**	1038.3
GIS rural accessibility % of rural population within 2 km of all-season road	21.7	**24.0**	59.9
Paved road traffic Average annual daily traffic	1049.6	**1314.0**	2786.0
Unpaved road traffic Average annual daily traffic	62.6	**40.4**	12.0
Paved network condition % in good or fair condition	80.0	**75.0**	79.0
Unpaved network condition % in good or fair condition	57.6	**74.0**	58.3

Source: (Gwilliam and others (2009) derived from Foster and Pushak (2011)

2.5 Rural transport system

Poor road availability in the rural areas prevents those areas their basic needs. It depends on the ease of movement and distance. Access might be enhanced by wider movement and improved location to services (piped water and health facilities). Human transportation is the most basic means, which involves people walking between locations or points and carrying things themselves.

These (walking and carrying) are cheap, and highly efficient for shorter, difficult terrains and sizeable loads.

The other side includes large amount of goods which are usually done using heavy duty trucks, buses, automobiles and other means of carrying heavy duty goods quickly over a longer distance (Afolabi et al., 2016). Rural transportation relies mainly on favourable infrastructure and their associated maintenance and traffic management system. These include track, path, trail, access or feeder roads, secondary roads and primary truck roads. They may vary in quality, depending on weather, season, construction and maintenance and some means of transport require certain infrastructure standards to operate effectively.

There is so much evolving between rural and urban transportation in nations around the world for social and economic endeavours. There is much time available when we have enhanced rural transport. (Afolabi et al., 2016). There is greater significance in rural transportation, it fastens farm input delivery and the services of extension workers, reducing extreme rural to urban migration. Irrespective of all these, it is very ironical that many rural communities in Ghana still lack good road and consequently find it difficult to transport their goods.

As indicated by Filani (1993), one of the real requirements of productive working of a territory is the office for the development of individuals, merchandise and ventures rapidly and financially. The advancement of rural transportation has spatial and temporal measurements.

Adesanya (2000) had seen that, rustic travel and transport in most rural zones still occur with lots of troubles along these lines intensifying and declining the issue of country

efficiency and provincial destitution. The capacity of agricultural and forest freight to absorb mechanized transport cost fluctuates according to the purpose and type of agricultural production. In view of the previous reasons, head portage moves generous piece of the nation's country rural agricultural commodities. Bicycles, hand drawn/push carts, pick-up van and adapted vehicles are the dominant modes of public transport in the rural areas (Akintola, 2007).

2.6 Road Networks and Condition

A road is a piece of land, smoothed, cleared, or generally arranged to permit simple travel, interfacing at least two nodes (Keskinen, 2007). Road has been defined in broad terms as "a formed path or track suitable for use by all forms of non guided vehicular transport" (Salas, 2006). It is recognized that road can be built in various stages, beginning from the soil itself (a simple path) and then passing on to gravel, concrete or pavement. Roads are orchestrated in a chain of command of various classifications with various attributes in light of the significance and the capacity of a road (World Development Report, 2008). The different functions and characteristics such as road width, construction and paving material, bring out the various categories (U.S. Department of Transportation, 1987). Roads are categorized generally into three levels (NDPC, 2010). Category one has been identified as comprising high ways, national, main or primary roads that connect strategic nodes like cities and regional capitals. Class two roads are departmental, commonplace, local or optional roads that interface areas with the nation and are feeder courses that provide the main links between expressways, national, fundamental or essential streets. The third class involves

metropolitan, local and tertiary streets including urban and rural roads that interface towns inside one territory or give fundamental access of rural areas (NDPC, 2010).

Road transport, the most widely used mode of transportation, can loosely be divided into infrastructure, vehicles, and operations. The vehicles for the most part ride on the networks while the tasks manage the control of the system (Keskinen, 2007). Siddiqui and Pant (2008, p.779) write that an efficient transport system is not only required for economic development but is also important to achieve the objective of economic integration among countries. The U. S. Chamber of Commerce (2010) defines "transportation infrastructure" as the underlying structures that support the delivery of inputs to places of production, goods and services to customers, and customers to marketplaces. For Xie and Levinson (2008), road infrastructure represents the supply side of transportation system. Pavement and road surface condition they identified as a critical indicator to the quality of road infrastructure in terms of providing a smooth and reliable driving environment on roads. To Keskinen, road infrastructure is „a set of roads (*linkages*) which are organised as a network connecting all areas inhabited and exploited by human beings". Salas (2006) further indicates that adequate provision and maintenance of road infrastructure in terms of the physical condition of the road surface is critical for a good service quality. Analyzing the definitions above it can be summarized that road transport infrastructure constitute systems and facilities that are necessary for delivery of people, goods and services from one place to another. This include road surface (pavement or graveled), road length (coverage or connectivity), road width (narrow or wide), bridges, and road furniture (drains and signage).

2.7 Transportation and Road Network in Jaman North District

According to Ade (2004) "Transportation is the means by which goods and people are carried from one place to another". With transportation, raw materials are brought to the factory for processing, while the finished goods are delivered to the wholesalers, retailers and the final consumers. Imagine how distribution of agricultural products and business activities would look like without transportation system, which enables long distance to be reached in a short time. Distribution of agricultural products between town, state and nations is made easy and smooth because of transportation system. Ade's view is that the importance of transportation in distribution of agricultural products, business activities and other activities that affect human beings cannot be over emphasized.

Odedoku, et al (2002) define transportation as a means of moving goods from their place of production to their place of consumption "Improvement in transportation accounts largely for the improved inter-relationship and inter-dependence between the people in the country." It is now easy to transport goods from places of abundance to places of scarcity.

Ajayi (2003) defines transportation as "the movement of people, goods and animals from one place to another". Ajayi is of the view that goods and services are moved from production area to places of consumption.

Similarly, Eyiyere (2005) views transportation as "a means by which people and goods are carried from one place to another." The earliest means of transportation was foot. People trekked from one place to another carrying their loads either on their heads or their shoulders. Animals were also used as a means of transportation. Such animals as ass, camel,

etc. were used as means of transportation. However, great technological advancement has been made overtime in all forms of transportation.

Ahukannah, et al (1995) define transportation as an activity that involves the movement of goods from the manufacturer to the consumer. It is inconceivable what the state of affairs would be without transportation. Farmers could not be able to market their products; stores would be closed down because they would not be able to obtain merchandise to sell, and factories would close down because they would not be able to get raw material or distribute finished products. Thus, we see that transportation is essential to the development and expansion of commerce.

The Ministry of Finance and Economic Planning in their 2015 report stated that "the Jaman North district has a total road network of 310.50km with engineered roads of 195.50 km. The road network is good but with bad road condition. This makes transportation very poor. The Sampa-Drobo high way is tarred remaining Sampa-Dibebe trunk road under construction. Sampa town roads are still under construction". The Ghana Statistical Service report also indicated that the District has total road network of about 330 kilometres (km) made up of 265km of feeder roads and 65km of highways. The road network in the district lives much to be desired making transportation very uncomfortable, time consuming and costly (GSS, 2010).

The very few tarred roads are in the urban areas. Most of these ones, it is difficult for one to describe it as either tarred or feeder as the deteriorated surface and potholes reveal. In other parts of the district there are quite a number of communities far away from a road. The people use farm tracks and footpaths and others walk very long distances to get to an „active

road". This suggests the enormous difficulties residents especially rural communities endure with transportation and haulage of goods. Road network of the Jaman North District comprise of high ways that link the district to Berekum Municipal and Jaman South (which are tarred road), and a number of secondary and minor (feeder) roads connecting rural access roads and tracks to the district capital and other major towns and linking different agriculture areas and market centers to each other. The greater part of roads are unpaved, either gravel or earth roads, or these roads are more powerless against harm caused by substantial downpours, soil disintegration and movement of overwhelming, over-burden vehicles. This is likely to have adverse influence on the main economic activities of the people particularly agriculture in the district.

2.8 The Effect of Road Networks on the Transportation of Agricultural Produces

Road conditions are an important factor in determining transport costs and prices. Hine and Ellis (2001) in comparing transport price to road roughness in Zambia, illustrated that transport price was twice as high on a poor-quality earth road in comparison to transport price on a good-quality gravel road. A survey conducted in Tanzania found that, over a 50km section of road, an increase in roughness of 50% would increase truck charges by 16% and increase pickup (light duty truck) charges by about twice as much (Ninnin, 1997 as cited in Hine & Ellis, 2001). The situation becomes worse during the wet season. In Madagascar for example, the passenger fare for taxis, commonly known as "taxisbrousses", is 70% higher on poor-quality roads during the wet season than during the dry season (Ninnin, 1997 as cited in Hine & Ellis, 2001).

Several studies suggest that one of the significant constraints for agricultural development in rural areas is the poor condition of rural infrastructure. Chakwizira *et al.* (2010) point out that one of the key constraints to sustainable agricultural and rural development is the poor state of the basic rural infrastructures, including transport and irrigation infrastructure. The poor road condition also affects the transport price of agricultural products.

Ikejiofor and Ali (2014) conducted a study in Nigeria and concluded that improved road condition is one of the catalysts for better marketing of agricultural products. They pointed out that improved road condition allows for better access to a wider market and reduce losses and delays in moving the farm produce. If the agricultural produce reaches the market in time, in good quality and at low transport price, the situation will attract more money for the producers (Ikejiofor & Ali, 2014). Another study conducted in Nigeria by Akangbe *et al.* (2013) indicated that over 70% of the study's participants confirmed that the poor road condition and road seasonality were the reasons for the high transport prices of agricultural produce. In the same study, road conditions and the remoteness of the area were mentioned as reasons which deny farmers access to the various agriculture-related goods and services. Roughly 78% of the respondents reported not to have access to markets, agricultural extension services, agricultural inputs, agricultural credit and the usage of modern farming techniques and equipment (Akangbe *et al.*, 2013).

Yaro *et al.* (2014) argued that in an area where accessibility was good, access to farm inputs was 5.9% more than in an area with poor accessibility. Kiprono and Matsumoto (2014) using longitudinal data from 2004 to 2012 in Kenya indicated an increase in the use of maize hybrid seeds, chemical fertilisers and maize productivity in areas with better road

access. Hine and Ellis (2001) argued that if the transport cost is equivalent to 30% of the farm-gate price, a 20% reduction in the transport cost fully passed to the farmers will result in a 6% increase in farm-gate price. They also point out that if the agricultural production elasticity is +1 (it normally ranges from 0 to 1.5) then the agricultural outputs are estimated to rise by 6%.

Hine *et al*. (1983) conducted a study in Ghana and found that poor accessibility may adversely affect agriculture through the inability to obtain finance. Two related reasons explained the inability to obtain loans i.e. (i) physical measurement of the field/farm (a necessary part of the finance application process) was difficulty due to remoteness; and (ii) the difficulty and higher cost of making follow-up trips for the loan progress. He also indicate that villages located further from major markets experienced lower farm-gate prices due to higher transport charges.

This shows that the condition of the road affects the transport cost of vehicles transporting goods and passengers as well as the price charged by the transport operators. Transport costs and prices, and the level of accessibility of a rural area, also play a significant role in the development of agricultural sector.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section centers on the examination strategies utilized in gathering information for the study. The section covers the research design, study populace, information accumulation system and the strategy received in investigating the information gathered. Moreover, the profile of the investigation region is additionally considered in this part.

3.2 Profile of the study area

3.2.1 Location and Size

Jaman North District was created out of the then Jaman south District in 2004 under the Legislative Instrument (LI) 1779 of 2004. The Assembly exists to adequately mobilize assets to lead advancement to enhance the living states of the general population through advancement of horticulture, great administration and improvement of the human capital base.

The district is located between latitude 7'40" N and 8' 27"N, and longitude 2'30"W and 2' 60" W. The district is physically situated toward the North-Western part of the Brong Ahafo Region. It shares boundaries with Tain District to the North-East, Jaman South District to the South-West and Berekum District to the South-East. It is bordered on the East to the La Cote d'Ivoire. The district capital, Sampa is located about 119km from Sunyani the regional capital while it is 504 km from Accra, the national capital (GSS, 2010).

3.2.2 Demographic characteristics

The number of inhabitants in Jaman North, as indicated by the 2010 Populace and Housing Census, is 83,059 representing 3.6 percent of the area's populace. Males establish 48.1 percent and females represent 51.9 percent. The proportion of the population living in urban localities (52.5%) is slightly higher than that living in rural localities (47.5) of the district (GSS, 2010).

In terms of economic activities, Agriculture is the dominant economic activity in the district. It employs more than 70 percent of the total population within the labour force. Thus, it is the real wellspring of employment for majority of individuals in the Locale. The real areas of agribusiness in the region are crop farming and domesticated animals raising (GSS, 2010).
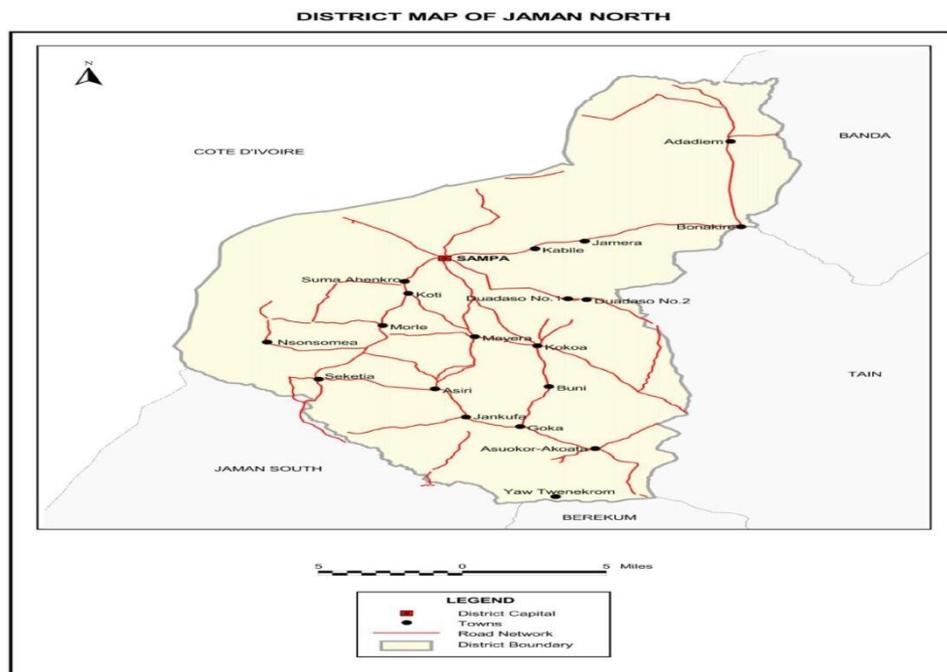
Figure 3.1 Demographic characteristics
Source: Ghana Statistical Service (GSS)

3.2.3 Social infrastructure

Power supply is continuously enhancing in the district. Out of the 7 area council capitals, five, are associated with the national grid and all towns and villages along the Sampa-Drobo trunk road enjoy power. Other communities that have electricity are Asuokor and Jankufa. The district has a total number of 144 schools comprising of 84 primary schools, 54 Junior High Schools and 6 Secondary Schools (comprising public (4) and private (2) schools). There are 11 private Junior High Schools and 19 private primary schools and 65 public primary whiles the public Junior High School are 43 in number. (GSS, 2010).

3.2.4 Transportation

The district has total road network of around 330 kilometres(km) made up of 265km of feeder roads and 65km of highways. The road network in the district lives much to be desired making transportation very uncomfortable, time consuming and costly (GSS, 2010).

3.2.5 Agriculture

About 81.7 percent of households in the district are engaged in agriculture. In the rural localities, as high as 91.4 percent of households are agricultural households while in the urban localities, 73.1 percent are into agriculture. Most (99.0%) of the agricultural households in the district are involved in crop farming. Poultry (chicken) is the dominant animal (58.1 percent of all animals) kept by the higher proportion (39.0%) of households in the district (GSS, 2010).

3.2.6 Vegetation and Climate

Existing in the wet semi-tropical region, the area encounters a mean yearly rainfall extending between 120mm to 178mm. The district enjoys a bi-modular rainfall designs with the real one happening between April to July and the minor one between September to October yearly. Relative moistness is by and large high, ranging between 70 to 80 percent amid the rainy season. The long stretch of August for the most part encounters a short dry season with the significant one happening between November to March. Normal yearly temperature is around 260 Celsius.

The vegetation of the district is described by two main ecological zones. The real vegetation is the forest comprising of generally scattered short trees and grasses/bushes. This covers the greater part of the total land area of the district. This part of the land is suitable for the cultivation of cashew, yam, cassava, rice, beans and groundnut. The semi-deciduous forests likewise comprises of secondary forest that is appropriate for the development of plantain, cocoyam, cassava and yam. It is around there that significant timber species, for example, Odum, Wawa, Mahogany and Teak harvested in the district are found (GSS, 2010).

3.4 Study population

Polit and Hungler (1999) characterize a population as the totality of all subjects that fit in with an arrangement of details, including the whole gathering of people that is interest to the researcher and to whom the research results can be summed up. For this study, the population of interest comprised the list of all rural communities in the Jaman North District.

3.5 Sample Size and Sampling Method

LoBiondo-Wood and Haber (1998) describe a sample as a portion or a subset of the research population selected to participate in a study, representing the research population. The researcher used purposive sampling technique in selecting four rural communities for the study. These communities are Duadaso No.1, Bonakire, Jamera and Buko. Purposive sampling involves selecting units that are known to be typical with respect to certain characteristics, rather than selecting the units randomly. A quota of 50 households was selected from each of the four communities aforementioned and put together to form a total sample of 200 households. This sample size was chosen because of the cost and time constraint.

3.6 Data Collection Methods

The main data collection method employed was personal interview. This method was chosen because though it is expensive, it yields more accurate responses and high returns from the field. Again, majority of the respondents were not literates. Research assistants were hired and trained as interviewers for this purpose. They did not do it alone but together with the researcher. Household heads were interviewed by the help of a structured questionnaire.

3.7 Data collection Instrument

Structured questionnaire (interview schedule/guide) was developed and used to collect data from a sample of household heads (farmers) selected from the sampled four communities. The interview schedule was chosen because it made it possible to obtain information from most of the respondents who were illiterate and offered high response rate. Data collected

includes produce prices, nature of roads linking the community and market centres, access to markets, household farm size, level of household income and agricultural produce.

3.8 Data Analysis and Presentation

The data analysis includes diminishing the raw data into a reasonable size, creating summaries and applying factual references. Subsequently, the accompanying advances were considered to break down the data for the study. The data was altered to identify and amend conceivable errors and exclusions that are probably going to happen, to guarantee consistency crosswise over respondents. The data was then coded to empower the respondents to be gathered into limited number of categories. Data gathered was then analyzed using Statistical Package for Social Science (SPSS) Version 21. Descriptive statistics (frequency and percentages) were used to summarize the data gathered from the respondents. Summaries of data analyzed were presented using tables and graphs. The Pearson Chi-Square was also employed in the analysis. It is a tool used in estimating the statistical significance of associations between variables. The chi-square was used to determine whether or not two attributes were associated. The chi-square was not used as a measure of the degree of relationship or the form of relationship between two attributes but to determine the significance of such relationship. Also, factors analyses was employed to assess the effect of road network on agriculture produce.

Ethical Consideration

Approval will be obtained from;

   i. Ethics Review Committee of Kwame Nkrumah University of Science and Technology

  ii. Consent of all the respondents will be sought before including them in the research.

 iii. Also, the rights of the respondents will be explained to them and they will be assured of confidentiality and anonymity.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

In this chapter of the study, the analysis of the data is presented and it begins with basic statistical analysis (descriptive statistics). The software used in the analysis is SPSS version 21. The analysis was done primarily in both quantitative terms. The summaries of analyses were presented using tools and techniques of analysis such as tables, graphs, the chi square, frequency and percentages. The chapter assesses the implications of the empirical findings for the existing literature on transportation influence on agriculture

4.2 Demographic Characteristics of respondents

Table 4.1 present the socio-demographic characteristics of the respondents considered in this study. In all, one hundred respondents were considered.

According to Table 4.1 below, a sample 200 respondents were chosen from four different communities namely Duadaso no.1, Bonakire, Jamera and Buko. Majority of the respondents (34.5%) have an average household size between 7 to 10 people. 32.5% also have household size of 4 to 6 people. Those with household size greater than 10 forms 20% while those with household size below 4 people forms 13%.

Also, 16.5% of the respondents have been farming for less than 5 years while 7.5% have been farming for more than 20 years. Majority of the respondents (76%) have been farming for between 5 and 20 years.

Table 4.1: Socio-demographic Characteristics of Respondents

Characteristic	Frequency	Percentage
Community		
Duadaso No. 1	50	25.0
Bonakire	50	25.0
Jamera	50	25.0
Buko	50	25.0
Household Size		
Below 4 people	26	13.0
4 – 6 people	65	32.5
7 – 10 people	69	34.5
More than 10 people	40	20.0
Farming Experience		
Under 5 years	33	16.5
5 - 10 years	76	38.0
10 - 15 years	37	18.5
16 – 20 years	39	19.5
Above 20 years	15	7.5

Source: Field survey, 2018

4.3 Agricultural Activities

Table 4.2: Agricultural activities at the Jaman North District

Characteristic	Frequency	Percentage
Type of Agriculture		
Subsistence only	70	35.0
Commercial only	15	7.5
Both	115	57.5
Household Farm Size		
Less than 3 acres	26	12.0
3 – 5 acres	80	40.0
6 – 10 acres	66	33.0
More than 10 acres	28	14.0
Major Crops		
Yam only	61	30.5
Cashew only	26	13.0
Both	113	56.5
Estimated Crop Yield		
Less than 500kg	20	10.0
500 – 900kg	38	19.0
1000 – 1400kg	77	38.5
1500 – 1900kg	47	23.5
2000kg and above	18	9.0

Source: Field survey, 2018

According to Table 4.2, more than half (57.5%) of the respondents are engaged in both commercial and subsistence farming. 35% of the respondents are engaged in subsistence farming only while 7.5% are engaged in only commercial farming.

Again, majority of the respondents (40.0%) have an average household farm size of 3 to 5 acres. Approximately one out of every ten respondents have an average farm size less than 3 acres. Almost half (47.0%) of the total respondents have farm size more than 5 acres.

The major crops produced in the Jaman North Districts are yam and cashew. More than half (56.5%) of the respondents grow both yam and cashew. 30.5% and 13.0% grows yam only and cashew only respectively.

Also, 7 out of 10 of the respondents produce 1000kg or more yields while 21.0% produce crop yields less than 1000kg.

Table 4.3: Choice of crop to cultivate

Choice of Crop	Frequency	Percentage
Yes	18	9.0
No	182	91.0

Source: Field survey, 2018

From Table 4.3, 91% of the respondents indicated that their choice of crop to cultivate is independent of the road network connecting their farm and the market center. 9% of the respondents indicated that their choice of crop to cultivate is influenced by the road network connecting to their farm and market and the main reasons was that it makes accessibility to farm produce easy hence easing in the marketing of the produce.
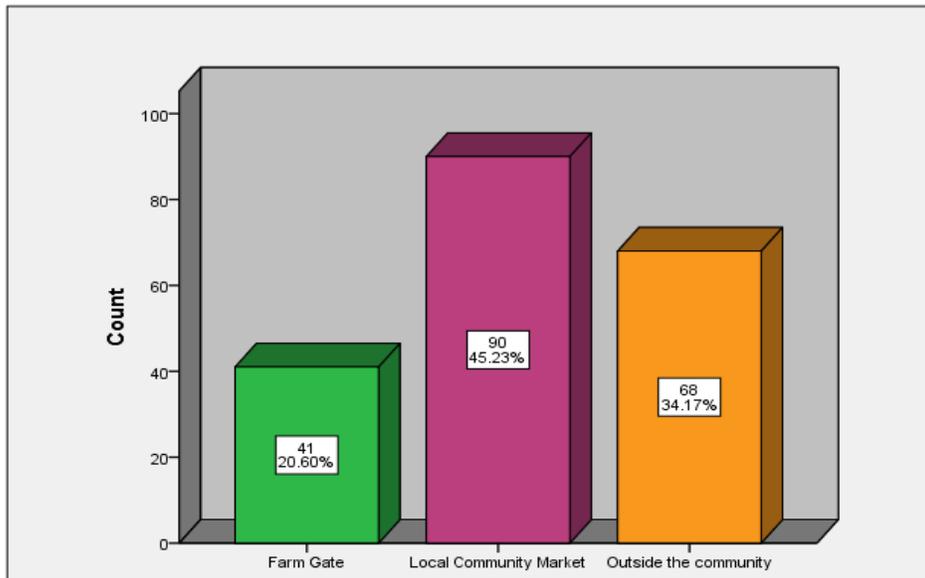
Figure 4.1: Sales of Farm Produce

Source: Field survey, 2018

Figure 4.1 depicts where farmers often sell their produce. Approximately one-fifth of the respondents sell their produce at farm gate. 45.23 % also sell their produce at the local community market while 34.17% takes their produce to outside the community to sell.

4.4 Road Network, Agricultural Production and Transport Services

Table 4.4: Road connecting to respondents' farm

	Responses		Percentage of Cases
	N	Percentage	
Footpath	146	37.1	73.0
Farm Truck	154	39.1	77.0
Feeder Road	36	9.1	18.0
Paved	2	0.5	1.0
Compacted earth	56	14.2	28.0
Total	394	100.0	197.0

Source: Field survey, 2018

According to Table 4.4, 73% of the respondents have footpath connecting their farms. 77% have farm truck connecting their farms while 28% have compacted earth road linking their farm. Also, 18% have feeder roads linking their farm.
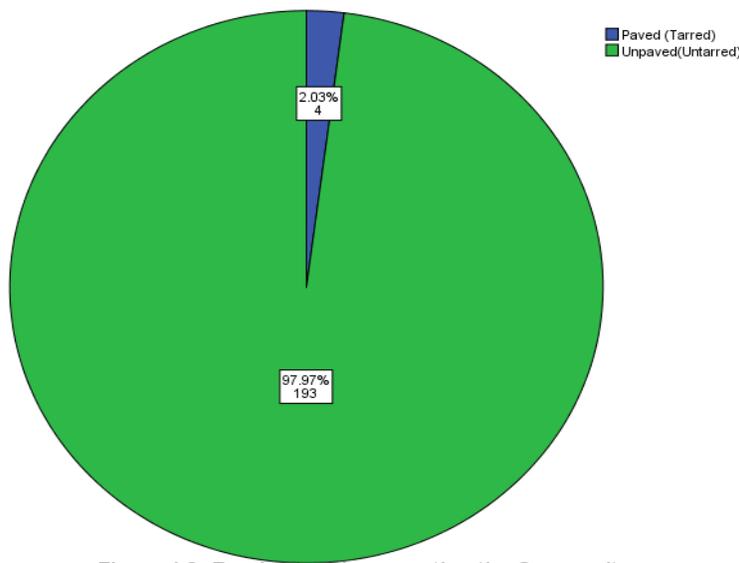
Figure 4.2: Road Network Connecting the Community

Source: Field survey, 2018

Figure 4.2 depicts the road network connecting the community of the respondents. 97.97% indicated that the road network connecting their community is an unpaved (untarred) roads.
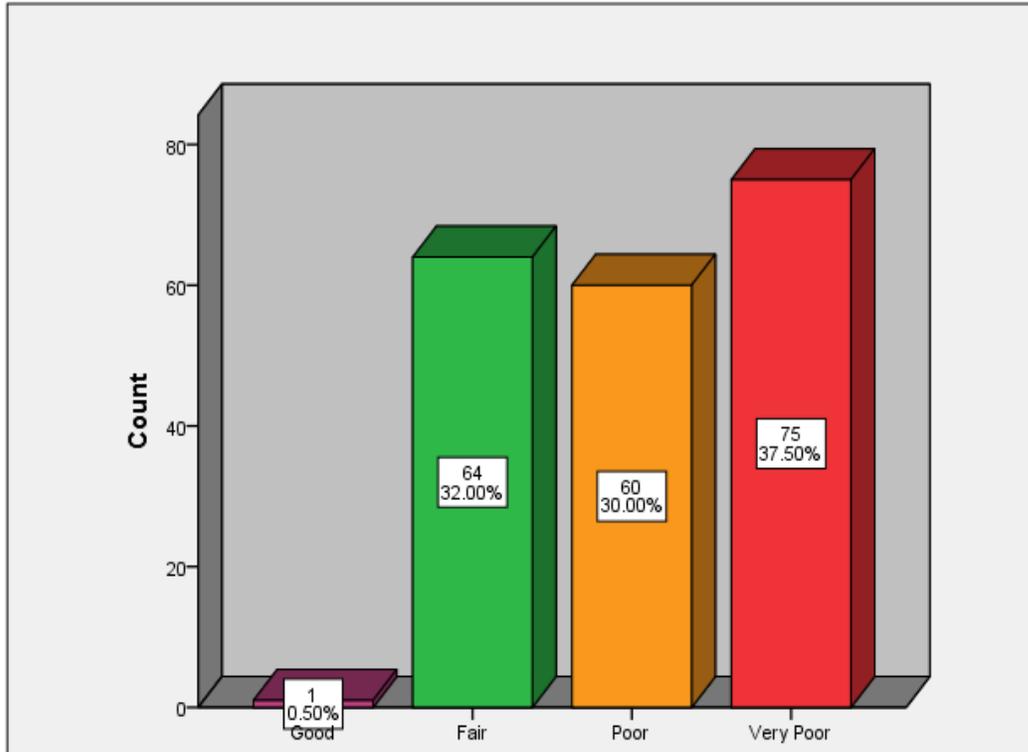
Figure 4.3: Physical Condition of Road

Source: Field survey, 2018

Concerning the physical condition of the road connecting the communities, 32.0% of the respondents indicated that it is fair while more than two-third said it is poor or very poor. This result is in line with the Ministry of Finance and Economic Planning (2015) report which indicated that "the road network is good but with bad road condition. This makes transportation very poor".

Table 4.5: Medium respondents use to transport farm produce from the farm to their home

	Responses		Percentage of Cases
	N	Percentage	
Head Porterage	111	25.6	55.5
Bicycle / Motor	148	34.1	74.0
Tricycle	136	31.3	68.0
Wheel Barrow	19	4.4	9.5
Car	20	4.6	10.0
Total	434	100.0	217.0

Source: Field survey, 2018

Table 4.5 show the analysis of responses on medium respondents use to transport farm produce from their farms to their homes. The results show that 55.5% of the respondents carry their produce home. 74.0% of the respondents transport their produces home using bicycle or motor. 68% uses Tricycle (Aboboyaa) while 9.5% use wheelbarrow.

Table 4.6: Medium respondents use to transport farm produce to the market

	Responses		Percentage of Cases
	N	Percentage	
Public Transport	56	10.9	28.0
Bicycle /Motor	153	29.7	76.5
Tricycle (Aboboyaa)	128	24.8	64.0
Taxis	47	9.1	23.5
Kia/Truck	76	14.7	38.0
Head Porterage	56	10.9	28.0
Total	516	100.0	258.0

Source: Field survey, 2018

Table 4.6 show the analysis of responses on medium respondents use to transport farm produce from their farms and homes to the market center. The results show that 28%% of the respondents' boards public transport to take their produce to the market. 76.5% of the

38

respondents' transport their produces home using bicycle or motor while 64% uses Tricycle (Aboboyaa). 38% uses Kia/Truck to carry their produce to the market centre. Also, 28% indicated that they carry them on their head. This is much associated with the respondents who sells their produce in the local community market.

Figure 4.4: Estimated Farm Income per Year in Cedis
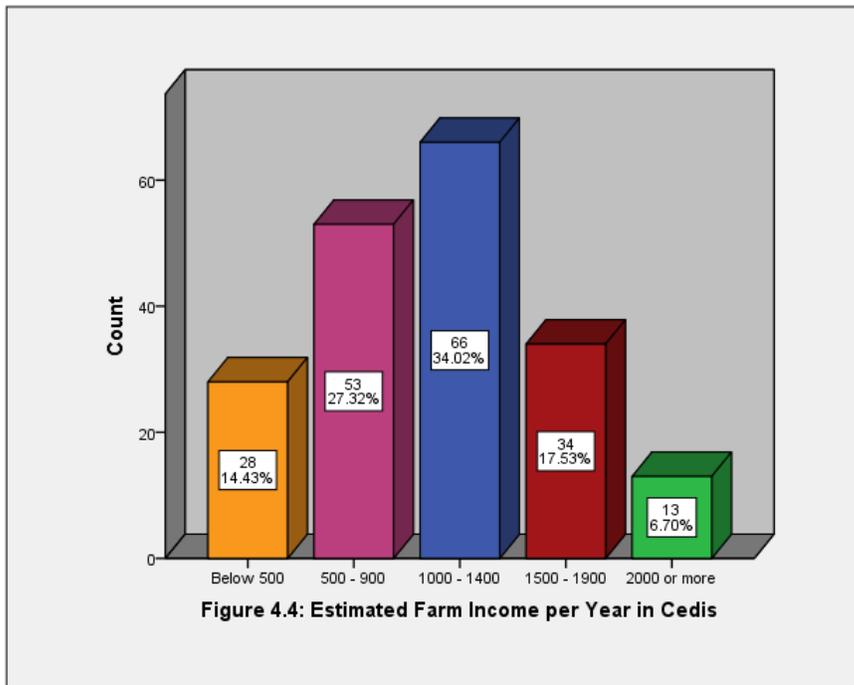
Figure 4.4: Estimate Farm Income Per Year In Cedis

Source: Field survey, 2018

Figure 4.4 elaborates on the respondents' estimated farm income per year in Cedis. The result shows that 14.43% of the respondents estimated farm income falls below ₵500.00. This is mostly associated with the subsistence farmers. Also, 27.32% earns on the average between ₵500.00 and ₵1000.00. Majority of them (34.02%) earns between ₵1000.00 and ₵1400.00. Again, 24.23% of the respondents on the average earns ₵1500.00 and above as income from the sales of their produces.

Table 4.7: Crosstabulation of Physical condition of road against Type of Agric production, Major crops produced and Sales point.

	Physical condition of Road				Total
Type of Agric Production	Good	Fair	Poor	Very Poor	
Subsistence	0	30	29	11	70
Commercial	0	6	5	4	15
Both	1	28	26	60	115
Total	1	64	60	75	200
Major Crops Produced					
Yam only	0	25	23	13	61
Cashew only	0	12	10	4	26
Both	1	27	27	58	113
Total	1	64	60	75	200
Sales point					
Farm gate	0	16	19	6	41
Local community market	1	28	26	35	90
Outside the community	0	20	15	33	68
Total	1	64	60	74	199

Source: Field survey, 2018

The hypothesis stated below was the general hypothesis used to test the relationship between physical condition of road and the other variables (Type of Agriculture, Major crops produced and Where to Sell the produces): aside this, individual hypothesis were stated for each variable.

H_0: *variables are independent*

H_1: *variables are not independent*

The table below shows the Pearson Chi-Square values from the cross tabulation in Table 4.7 for Type of Agriculture, Major crops produced and the sales point of farm produces after the cross tabulation with physical condition of road.

Table 4.8: Pearson Chi-Square value for selected variables

Pearson Chi-Square for Variables	Chi-Square Test		
	Value	df	Asymp. Sig. (2-sided)
Type of Agriculture	26.852[a]	6	.000
Major crops produced	22.904[a]	6	.000
Sales Point	15.122[a]	6	.019

According to the Table 4.1, the type of agriculture production of the households, major crops produced by the household and sales point of agricultural produce is not independent on the physical condition of the road network in the area.

Table 4.9: Symmetric Measures

Variables	Cramer's V Value	Approx. Sig.
Type of Agriculture	0.259	.000
Major crops produced	0.239	.001
Sales of Agric produce	0.195	.019

The strength of dependency measured using the Cramer's V indicates that the strength of association between type of agricultural production of the household and physical nature of road is 25.9%. This implies that there is some level of relationship between the type of agricultural production of the household and physical nature of road. In the effect size as stated by Cohen (1988), there is approximately medium effect (0.30). The effect size reveals the difference in data regardless of the sample size and it demonstrates practical or meaningful differences rather than simply statistical differences. The strength of association between major crops produced and physical nature of road is 23.9% and that of sales point of agricultural produce is 19.5% with approximately medium effect size.

4.5 Perception of the impact of road network and marketing of agricultural produce

Table 4.10: Respondent's Perception of the impact of road network and marketing of agricultural produce

Statement	Agreed		Neutral		Disagreed	
	N	%	N	%	N	%
Road networks play a vital role in marketing of agricultural produces	194	97.0	6	3.0		
Road networks create market for agricultural produces	187	93.5	12	6.0	1	0.5
Road networks play a vital role in reducing spoilage and wastage of agricultural produces	186	93.0	14	7.0		
Bad roads lead to the rise in the cost of agricultural produces	179	89.5	20	10.0	1	0.5
Effective and efficient road network increases the availability of agricultural produce in the market	167	83.5	28	14.0	1	0.5
The road networks here are reliable in marketing of our farm produce	83	41.5	25	12.5	92	46.0
Poor transportation facilities affect the effective marketing of agricultural produces	165	83.3	31	15.7	2	1.0
Nature of road networks influences the prices of agricultural produces	174	87.0	25	12.5	1	0.5
Nature of road network affects the cost of transporting agricultural produce to the market centers	180	90.0	19	9.5	1	0.5

Source: Field survey, 2018

Table 4.10 presents the analysis on the perception on the impact of road network and marketing of agricultural produce. Almost all the respondents agreed that road networks play a vital role in marketing of agricultural produces (97.0%). They also indicated that road networks create market for agricultural produces (93.5%). Again, 93.0% agreed that road networks play a vital role in reducing spoilage and wastage of agricultural produces. These findings are in line with Ikejiofor and Ali (2014) who concluded that improved road condition is one of the catalysts for better marketing of agricultural products. They also

pointed out that improved road condition allows for better access to a wider market and reduce losses and delays in moving the farm produce.

Nature of road network affects the cost of transporting agricultural produce to the market centers had a 90.0% response rate agreeing. 87.0% also agreed that nature of road networks influences the prices of agricultural produces. These also confirm what Akangbe *et al.* (2013) pointed out that poor road condition and road seasonality were the reasons for the high transport prices of agricultural produce. Also, Hine and Ellis (2001) illustrated that transport price was twice as high on a poor-quality earth road in comparison to transport price on a good-quality gravel road. Furthermore, 89.5% of the respondents agreed that bad roads lead to the rise in the cost of agricultural produces. According to Ikejiofor and Ali, if the agricultural produce reaches the market at a high transport price, the situation will affect the sales price of the produces (Ikejiofor & Ali, 2014).

Another impact of road network on the marketing of agricultural produce is that effective and efficient road network increases the availability of agricultural produce in the market (83.5%). In light of this, majority of the respondents (46.0%) disagreed that the road networks in the Jaman North District are reliable in marketing of their farm produce.

4.6 Effect of Road Network on the marketing of agricultural produces

In this section of the study, perception on the impact of road network on marketing of agricultural produce was explored through the exploratory factor analysis.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) measures the ratio of the squared correlation between variables to the squared partial correlation. For an appropriate

data, the value should exceed 0.6. Bartlett's test tests if the R-matrix is an identity matrix (matrix with only 1's in the diagonal and 0's off-diagonal). The test results are presented in Table 4.12.

Table 4.11: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.817
Bartlett's Test of Sphericity	Approx. Chi-square	453.260
	P-value	0.000

From Table 4.12, the KMO value is 0.817, and the Bartlett's test is significant ($p - value = 0.000$). This is indicative that factor analysis used was appropriate. In order to know the number of factors to retain in the analysis, parallel analysis was performed through the Scree plot of Eigenvalue associated with the number of components (factors). This is presented in Figure 4.5.
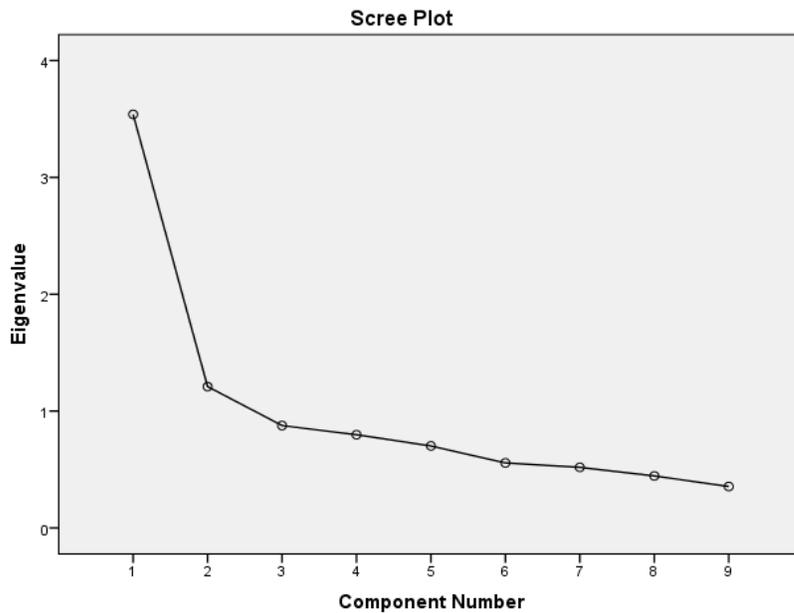
Figure 4.5: The Scree plot

From Figure 4.5, the optimal number of factors to retain lies between 2 to 3 factors. In this study, 2 factors (components) was considered since they have eigen values greater than one. These explained about 52.8% of the impact of road network on the marketing of agricultural produce. This is further shown in Table 4.13.

Table 4.12: Total Variance Explained

Component	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	3.539	39.327	39.327
2	1.210	13.442	52.768

Table 4.13 present the factors retained in the factor analysis that is believed to influence the turnover in this study. Here, each component (factor) is made up of a number of variables denoted by X_i that were used in assessing the causes of turnover.

Table 4.13: Component Matrix

Variable	Components	
	1	2
X_1	.722	
X_2	.660	
X_3		.900
X_4		.797
X_5	.510	
X_6		-.544
X_7	.593	
X_8	.694	
X_9	.624	

The variables are defined as follows:

$X_1 =$ Road networks play a vital role in marketing of agricultural produces

$X_2 =$ Road networks create market for agricultural produces

$X_3 =$ Road networks play a vital role in reducing spoilage and wastage of agricultural produces

$X_4 =$ Bad roads lead to the rise in the cost of agricultural produces

$X_5 =$ Effective and efficient road network increases the availability of agricultural produce in the market

$X_6 =$ The road networks here are reliable in marketing of our farm produce

$X_7 =$ Poor transportation facilities affect the effective marketing of agricultural produces

$X_8 =$ Nature of road networks influences the prices of agricultural produces

$X_9 =$ Nature of road network affects the cost of transporting agricultural produce to the market centers.

From Table 4.14, factor one (F1) constitutes of the variables X_1, X_2, X_5, X_7, X_8 and X_9. These variables loaded greatly in this component. Thus, this factor addresses movements of agricultural produces. Thus, this factor will be referred to the ACCESSIBILITY. Transporting of agricultural produce to the market center is very key. If the road networks are good, agricultural produces become assessible in the markets. Factor two (F2) also constitute of the variables X_3, X_4, and X_7. This factor shall be called COST. That is the nature of road network brings cost in the marketing of agricultural produces. If road networks are good, transportation becomes easy hence it reduces spoilage and wastage of agricultural produce.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter gives a summary of the research findings, conclusions drawn from the findings and recommendations which are in conformity with the findings as well as the conclusion of the research.

5.2 Summary of Findings

The work used a sample of 200 respondents who were chosen from four different communities namely Duadaso no.1, Bonakire, Jamera and Buko. There were more households with an average household size between 7 to 10 people. One-fifth of the respondents had household size greater than 10. Majority of the respondents have been farming for between 5 years and 20. One-tenth of the respondents have been farming for more than 20 years.

Again, more than half of the respondents are engaged in both commercial and subsistence farming while the other engage in only one type of agriculture; either commercial only or subsistence farming only. Also, majority of the respondents have an average household farm size of 3 to 5 acres. Almost half (47.0%) of the total respondents have farm size more than 5 acres. The analysis revealed that the major crops produced in the Jaman North Districts are yam and cashew with more than half of the respondents growing both of them.

On the average, 7 out of 10 of the respondents produce an average of 1000kg or more crop yields. Almost all the respondents indicated that their choice of crop for production is

independent on the road network connecting the community but the very few who indicated that their choice of crop to cultivate is influenced by the road network connecting to their farm and market gave the reasons that it makes accessibility to farm produce easy hence easing in the marketing of the produce. Majority of the respondents revealed that they earn an average of ₵1000.00 to ₵1400.00 from the sales of their produce.

The analysis also showed that majority of the farmers sells their produce at the farm gate and the local community market with very few who takes their produce outside the community. This was due to the nature of the road connecting the community and the cost involved in transporting farm produce. The major road linking the farms of most of the farmers are footpaths and farm truck with very few which are linked with feeder roads. Aside this, the result also revealed that the major road connecting this communities are untarred and they are in a poor state.

It was also revealed that majority of the respondents use bicycles/motor, tricycle (aboboyaa) to convey their farm produce to their home. Others who don't have and can't afford also do so by carrying them on their head. Very few of the respondents use cars and wheelbarrow. Again, the result showed that the very few who sell their farm produce outside the community do so by using public transport, kia/truck and taxis. For those who sell at the community market usually uses motor, tricycle and others head porterage.

Furthermore, it was observed that the type of agriculture production of the households, major crops produced by the household and sales point of agricultural produce is affected by the physical condition of the road network in the area.

The result revealed that almost all the respondents agreed that road networks play a vital role in marketing of agricultural produces. It also showed that road networks create market for agricultural produces so is improved road condition allows for better access to a wider market and reduce losses and delays in moving the farm produce. Again, nature of road network affects the cost of transporting agricultural produce to the market centres and hence influences the prices of produce. Also, another impact of road network on the marketing of agricultural produce is that effective and efficient road network increases the availability of agricultural produce in the market.

Lastly, the major effect of road network on the marketing of agricultural produce as revealed by the analysis has to do with accessibility and cost.

5.3 Conclusion

From the study, we can conclude that majority of the farmers in the Jaman North District are into both commercial and subsistence farming with yam and cashew as the major crop produced.

We can also conclude that the major road connecting most of the communities in the Jaman North District are untarred. Most of the farmers have to walk longer distance on footpath and farm truck to get to their farms. This also makes it difficult in transporting their farm produces. As a result, majority sell their produce at farm gates and others on the local community market.

We can again conclude that the type of agriculture production of the households, major crops produced by the household and sales point of agricultural produce is affected by the physical condition of the road network in the area.

Also, we conclude that road networks play a vital role in marketing of agricultural produces. It also creates market for agricultural produces, improved road condition allows for better access to a wider market and reduce losses and delays in moving the farm produce. Likewise, nature of road network affects the cost of transporting agricultural produce to the market centres and hence influences the prices of produce.

Lastly, the major effect of road network on the marketing of agricultural produce has to do with accessibility and cost.

5.4 Recommendations

5.4.1 Develop road network infrastructure in the Jaman North district

Based on the above summary and conclusions, it is recommended that as Ghana is fighting to abolish extreme poverty and hunger which is one of the objectives of the Millennium Development Goals (MDG), the government should help in the construction of the road network connecting this communities so they can produce more and make food available in the market.

5.4.2 Encourage modern methods of agriculture through proper sensitization

It is further recommended that, a sensitization program on the use of modern methods of agriculture will enable farmers to use better and modernized farming practices. The agricultural extension service in the district must be equipped with adequate budgetary allocation from the government.

5.4.3 Improve Market Facilities

A conscious effort of progress in the market infrastructure in these rural areas will also reduce the plight that farmers have to go through to transport their agricultural products to the central market in Sampa. The district assembly should provide facilities to create an environment for the traders in the markets. These facilities must come in the form of good market squares, access roads drainage system and well-structured market stalls for the traders.

5.5 Limitation of the Study

One major restriction of the study is inadequate time which did not permit the searcher to cover a larger population. Financial Capital constraint was another restrictive factor since the searcher had to travel several distances in the district and printing of materials for the research. Also, large numbers of the respondents were illiterates and therefore questionnaires had to be interpreted to them which caused delays in their administration.

REFERENCES

Ade, T. (2004). *Divine Commerce.* Ibadan: Divine Press Nigeria Ltd.

Adesanya A (2000) Transportation Development in Nigeria in 2010 Ibadan: Nigerian Institute of Social and Economic Research (NISER).

Afolabi, O. J., Ademiluyi. I. A., Oyetubo, A. O. (2016) Analysis of Rural Transportation of Agricultural Produce in Ijebu North Local Government Area of Ogun State Nigeria. *International Journal of Economics & Management Sciences* 6: 394. doi: 10.4172/2162-6359.1000394

African Development Bank Group(2013). *Tanzania transport sector review*. Transport & ICT Department

Ajiboye, A. O. and Afolayan, O. (2009). The impact of transportation on agricultural production in a developing country: a case of kolanut production in Nigeria. *International Journal of Agricultural Economics & Rural Development.* 2 (2):2009, 49-57

Akangbe, J.A., Oloruntoba, O.O., Achem, B. & Komolafe, S.E. (2013). An Appraisal of Transportation Facilities Effects on Agricultural Development in Moro Local Government Area, Kwara Estate, Nigeria. *Ethiopian Journal of Environmental Studies and Management*. 6(2):191–200.

Akintola SR (2007) Coping with infrastructural deprivation through collective action among rural people in Nigeria. Nomadic Journal of African Studies 16: 30-46.

Chakwizira, J., Nhemachena, C. & Mashiri, M. (2010). Connecting transport, agriculture and rural development: Experiences from Mhlontlo local municipality integrated

infrastructure atlas. In *Proceedings of the 29th Southern African Transport Conference (SATC)*. 209–223.

Crossley, P., Chamen, T and Kienzle, J. (2009), Rural Transport and Traction Enterprises for Improved Livelihoods, diversification booklet 10.

Darfour, B. and Kurt, A.R. (2016). Agriculture and Food Security in Ghana. ASABE 2016 Annual International Meeting Paper.   htp://lib.dr.iastate.edu/abe_eng_conf

FAO, & FAPDA. (2015). Country fact sheet on food and agriculture policy trends: Socio economic context and role of agriculture. March 2015. www.fao.org/economic/fapda or www.fao.org/economic/fapda/tool

FFG. (2014). Feed the Future Ghana. Country Statistics 2014. Online Version:http://www.feedthefuture.gov/country/ghana.

Filani MO (1993) Transport and Rural Development in Nigeria. Journal of Transport Geography.

Ghana Statistical Service (2010). 2010 Population and Housing Census, District Analytical Report, Jaman North. Accra, Ghana. Accessed on 19/07/2013, www.statsghana.gov.gh/gdp.html

Hine, J.L. & Ellis, S.D. 2001. *Agricultural marketing and access to transport services*. Rural transport knowledge base. [Online], Available: http://www.transportlinks.org/rtkb/English/Module 4/4_3a Agricultural Marketing.pdf.

Hine, J.L., Riverson, J.D.N. & Kwakye, E.A. (1983). *Accessibility and agricultural development in the Ashanti region of Ghana*. Crowthorne, Berkshire: Transport and road research laboratory.

Ikejiofor, I.G. & Ali, A. (2014). The Effects of Road Transport Characteristics on the Marketing of Agricultural Produce in Nsukka LGA, Enugu State, Southeastern Nigeria. *Innovare Journal of Social Sciences*. 2(1):2–5.

Jedwab, Remi and Moradi, Alexander (2012). Revolutionizing transport: modern infrastructure, agriculture and development in Ghana. In: Modern and Comparative seminar, London School of Economics and Political Science. Retrieved on October 31st 2013 from http://eprints.lse.ac.uk/42263/

Keskinen, Antero (2007). Mapping Road Infrastructure in Developing Countries: Applying Remote Sensing and GIS – The Case of the Taita Hills, Kenya. Accessed on 31/10/2013from http://helda.helsinki.fi/bitstream/handle/10138/29037/mappingr.pdf

Kiprono, P. & Matsumoto, T. (2014). Roads and farming : The effect of infrastructure improvement on agricultural input use, farm productivity and market participation in Kenya. In *CSAE conference 2014: Economic development in Africa, The University of Oxford*.

LoBiondo-Wood, G., & Haber, J. (1998). Nursing research: Methods and critical appraisal for evidence-based practice. Elsevier Health Sciences.

Ministry of Finance and Economic Planning (2015). The 2014 Budget Statement and Economic Policy, Government of Ghana, Accra, Ghana. Accessed on 19/07/2018, www.mofep.gov.gh

MoFA. (2007). Ministry of Food and Agriculture: Food and Agriculture Sector Development Policy (FASDEP II), August 2007

MoFA. (2010). Ministry of Food and Agriculture: Jaman North. http://mofa.gov.gh/site

National Development Planning Commission (NDPC) (2010). Medium-Term National Development Policy Framework: Ghana Shared Growth and Development Agenda (GSGDA), 2010-2013 Volume I: Policy Framework, Government of Ghana, Accra. Retrieved on 23/11/2013 from www.ndpc.gov.gh/

National Development Planning Commission (NDPC) (2013) Implementation of the Ghana Shared Growth and Development Agenda (GSGDA), 2010-2013: 2012 Annual Progress Report, Government of Ghana, Assembly Press, Accra.

Odedoku, M. O., Udakogu P. C., & Ogoji CON. (2002). *New Approach to Commerce.* Ibadan: Evans Brothers Nigeria Ltd

Polit, D. F., & Hungler, B. P. (1999). Nursing research: principles and methods. Phildelphia: JB Lippincott Company.

Salas, C. J. (2006). Assessing the Spatial Relationship between Public Road Infrastructure and the Socio-Economic Indicators of Urban Poverty in Southern Lima, Peru. International Institute for Geo-Information Science and Earth Observation, Enschede, The Neitherlands. Accessed on 20/09/2013 from www.itc.nl/library/papers_2006/msc/upla/carvallo_salas.pdf

Siddiqui, R. and Krishna, P. P. (2008). "Quantifying the Impact of Development of the Transport Sector in Pakistan [withComments]", Papers and Proceedings PARTS I andII Twenty-third Annual General Meeting and Conference of the Pakistan Society of Development Economists Islamabad, *The Pakistan Development Review*, 46 (4) 779-802.

Tanko, B. (2013). The role and impact of road infrastructure on poverty reduction. Accessed on 18/07/2018 from www.ghanaweb.com

U. S. Chamber of Commerce (2010). *Transportation Performance Index: Complete Technical Report. Let's Rebuild America*. Retrieved on 31/10/2013 from http://www.uschamber.com/sites/default/files/lra/files/LRA_Transp_Index_Technical_Report_100919.pdf

UNDP (2010) Fast Facts on the MDGs

World Bank (2008). *World Development Report*: *Bringing agriculture to the market,* page 119-120, Washington DC. Accessed on 30/10/2013 from http://www.worldbank.ord/

Xie, F. and Levinson, D. (2008). The Use of Road Infrastructure Data for Urban Transportation Planning: Issues and Opportunities. American Society of Civil Engineers, Reston, Virginia.

Yaro, M.A., Okon, A.E. & Bisong, D.B. 2014. The Impact of Rural Transportation on Agricultural Development in Boki Local Government Area, Southern Nigeria. *Journal of Management and Sustainability*. 4(4):125–133.

Yeboah, S (2015). Influence of Condition of Road Transport Infrastructure on Rural Agricultural Development in the Jaman South District. Thesis submitted to the school of graduate studies; KNUST, June 2015.

APPENDIX 1: SURVEY QUESTIONNAIRE FOR FARMERS

I am **SOLOMON ANSU** *an* **MSc. (Project Management)** *student undertaking a research on* **assessing the impact of road network on the marketing of farm produce in the Jaman North District of Ghana**. *I would be very grateful if you could provide appropriate responses to the questions below. The information you provide will be used for solely academic work and will be treated with utmost confidentiality it deserves.*

Serial No.   ………

Date: ………………………………….

Please provide appropriate code in the box provided.

SECTION A

Background Information

1. Name of Community

        Duadaso No. 1   …………………...………….1

        Bonakire   ………………………………… 2

        Jamera   ……...…………….…………….... 3

        Buko   …………...………..……………..… 4

2. Household Size

        Below 4 …………………………………1

        4 – 6   ……..………………………..…2

        7 – 10   ……...……………………….…3

        More than 10 …..…………………….…4

Tertiary ……………………………………… 5

Other (Specify)………………………………...6

3. For how long have you been farming?

Less than 5 years.…………………………1

5 – 10 years ………………………………..2

11 – 15 years ……………………………….3

16 – 20 years ...…………………………….4

Above 20 years .……………………………5

SECTION B

Agricultural Activities

4. Type of Agricultural production of the household

Subsistence …………….………………….1

Commercial …………………………….…2

Both ………..………….…………………3

5. Household farm size in acres

Less than 3 acres.…………………………1

3 – 5 acres …………………………….…..2

6 – 10 acres ……………………………….3

Above 10 acres .……………………..……….4

6. What major crop(s) do you cultivate?

Yam only……………………………..1

Cashew only……………………………..2

Both…………………………………………...3

7. Is your choice of crop to cultivate influenced by the road network connecting your farm and market?

Yes: ………………………………………..1

No: ……………………………………… 2

8. If your answer to Q7 is Yes, in what way or how?

……………………………………………………………………………………………………

……………………………………………………………………………………………………

……………………………………………………………………………………………………

9. What is your estimated total crop yield per year in kilograms?

Less than 500 ……….……………..…1

500 – 900……………………………...2

1000 – 1400……………………………3

1500 – 1900 ...…………………………4

Above 2000 …...………………………5

10. How many are you able to sell out of your estimated total crop yield per year?

………………kg

11. Where do you often sell your produce?

Farm gate .………..………………1

Local community market ……...….….2

Outside the community …………………3

12. What is the average distance from your home to the farm in kilometers?

………………km

13. What is the average distance from your farm to the nearest main road in kilometers?

………………km

14. What is the average distance from your farm to the major market center in kilometers?

………………km

SECTION C

Road Networks, Agriculture production and transport service

Please kindly tick the appropriate box provided

15. What road connects to your farm? *Tick all that apply*

Footpath	1
Farm truck	2
Feeder road	3
Paved (tiled) road	4
compacted earth road	5

16. What road connects the community to the nearest city/town?

Paved (tarred) …………………………..1

Unpaved (untarreded)………………………. 2

17. What is the physical condition of the road surface connecting your community?

Good ……………………………….…1

Fair ……………………………….……..2

Poor …………………….………………3

Very Poor……………...………..………4

18. What means do you transport your farm produce from the farm to the house? *Tick all that apply*

Head porterage	1
Bicycle/Motor cycle	2
Tricycle (Aboboyaa)	3
Wheel barrow	4
Car	5

19. What means do you transport your farm produce from the farm/house to the market centre? *Tick all that apply*

Public transport	1
Bicycle/Motor cycle	2
Tricycle (Aboboyaa)	3
Taxis	4
Kia/Truck	5
Head porterage	6

Others (specify) …………………………

20. How much does it cost to transport a unit bag of farm produce to the market?

GH₵ ……………………………….

21. What is your estimated farm income per year in cedis (GH₵)? Below 500 [ ]

500-900 [ ] 1000-1400 [ ] 1500-1900 [ ] 2000 or more [ ]

22. How do you perceive the cost of transportation?

Below 600 …………………………1

600 - 1000 …………………..…..2

1100 - 1500 …………………...……3

1600 - 2000………………..……..4

Above 2000 ……………………...……5

SECTION D

Perception of the impact of road network and the marketing of agricultural produces

Indicate on a scale of 1 - 5, your level of agreement or disagreement to the following statements on the perception on the impact of road network on the on the marketing of agricultural produces. *Please tick the appropriate box provided.*

Item	1	2	3	4	5
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
23. Road networks play a vital role in marketing of agricultural produces					
24. Road networks create market for agricultural produces					
25. Road networks play a vital role in reducing spoilage and wastage of agricultural produces					
26. Bad roads lead to the rise in the cost of agricultural produces					
27. Effective and efficient road network increases the availability of agricultural produce in the market					
28. The road networks here are reliable in marketing of our farm produce					
29. Poor transportation facilities affect the effective marketing of agricultural produces					
30. Nature of road networks influences the prices of agricultural produces					
31. Nature of road network affects the cost of transporting agricultural produce to the market centers					
32. Perception of quality of road network					