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Transportation infrastructure development in a low-income country (Ghana)

A comparison with a developed country (Denmark) based on history, culture, climate and geography

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OBJECTIVE

One would immediately think that traffic infrastructure is developed uniformly around the world because the basic technology in vehicles and road construction are the same. However, this is not the case. This study shows major differences in traffic infrastructure development around the world and tries to explain how these differences resulted from historical conditions, culture, geography and climate.

Introduction

Why do countries develop in different ways? What gives the same technology different organizational frames? What are the roles of institutions, path dependency, technological change and evolutionary processes in shaping economic growth?

These are some of the central questions about policies in developing countries. I will examine the complex reasons for different developments through the lens of historical studies. As Schirmer et al. (2010) pointed out, there is a need for research on how to shape economic growth in developing countries. Research should make it possible to “unlock the complex reasons for differences in development, the factors behind economic disasters and the dynamics driving emerging success stories” (p. 3).

Three other authors—two from the World Bank in Washington, DC—said that economic historians might have useful and distinctive insights to offer (Woolcock, Szretter & Rao, 2011). Historians with other approaches could give insight into the causal mechanisms, contexts and complex processes of institutional change. The authors underlined three ways in which history matters for development policy; with its insistence on the methodological principles of respect for context, process and difference, history is a source of critical and reflective self-awareness, and it brings a particular kind of perspective to development problems. The authors also identified eight other issues. They concluded that “More intelligent and realistic policies would start from the premise that the receiving society and its historical momentum are much more powerful and important than the applied policies, and the latter only really have a chance to succeed if they can work with the flow and the momentum of the society’s history to encourage the desired kinds of selective adaptations” (p. 87).

On a more abstract theoretical level, the academic study of the social construction of technology (SCOT) emphasized the point of view that technological development should not only be seen as a process of invention by a producer and a passive adoption by consumers.

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This old diffusionistic approach should be replaced by an understanding of a broad row of social processes among different groups. Originally the SCOT tradition was based on studies of the design process and the users' acceptance (Bijker, Pinch & Hughes, 1984). The SCOT-oriented researchers continued their studies of technologies long after their stabilization. This study comparing transportation in Ghana and Denmark is such a study.

I will try to follow those recommendations, and my study will focus on the implementation of transportation systems. Well-functioning transportation systems play a fundamental role in a country's social and economic development.

To make the subject more concrete, I will use examples from studies of two different countries, Ghana¹ and Denmark. They are both rather representative of similar countries. The developed country is Denmark, a small country with 5.6 million inhabitants in the tempered climate in Northern Europe. Its history and development are similar to other Western countries. The developing country is Ghana, situated near the equator, with 23 million inhabitants and many similarities with other countries in tropic Africa and elsewhere.

Most research on the history of transportation has focused on Western societies. During field work in Ghana in 2013, I learned the context of the situation and conditions in developing countries. Based on this insight, I studied the history of this country. This paper has tried to assemble the puzzle of Ghana's transportation history using many articles and books.

The main focus will be on inland transportation in Ghana. Inland transportation is necessary for people to move from home to work. Transportation is also important for the import and export of goods and the movement of goods to inland markets and shops. The development in Denmark will be used to show similarities and differences. In Ghana the larger rivers have long been used for local transportation, but the system is limited by the existence of numerous rapids. In connection with the water power station around Volta, an inland waterway transportation system was developed on Lake Volta, the largest artificial reservoir in the world at that time. Transportation by air has been of minor importance until recently, and it still is used mostly for the international transport of people and goods.

In 1989, 80% of all freight went by road, 12% by rail and 7% by lake. In 2001, freight by roads increased its share as road traffic increased more than the two other transportation systems (Pedersen, 2001). A few years later, road transport accounted for approximately 95% of the freight and 97% of passenger traffic (African Development Bank Group, 2005). Therefore, this study will briefly mention railway development and not much about the water transportation, including that on the Volta River.

A special focus will be on the inhabitants and their living conditions. This study will discuss the inhabitants' relationship to the motorized transport system and emphasize security problems and safety issues.

Ghana - the overall development and situation

This section will examine an overall perspective of the history of transportation. The chapter is built on Pedersen (2001), Gould (1960) and Taaffe, Morrill and Gould (1963), and supplemented by information from other sources.

The transportation infrastructure in Ghana has grown through daily use. Where people cut down trees and made a path, permanent paths developed. In this way, a network arose that met the needs for the self-sufficient farming communities. Only a few trade routes existed over the Sahara—through these routes came the new Islamic culture and ideas for some empires north of the Ghana such as Mali and Songhay.

Many tribes made their communities in the area now called Ghana; today there are 70 or more different languages that demonstrate the mottled society in a rather dense populated area with bad travel connections. The first census in 1904 showed 1.7 million people living in Ghana, compared to the present 23 million. One of the largest tribes was the Ashanti, which organized several communities and conquered many neighboring people to establish a kingdom in the center of Ghana. The residence of the king came to Kumasi, now the second largest town in Ghana and a very important town for regional and international trade.

The colonial transport system started in the sixteenth century; by the eighteenth century some 40 small landing points had been established along the coast. European countries and companies traded with the local people who served as middlemen in the commerce between the interior and traders on the coast, among them the Fante with Cape Coast as their central location.

The European trade companies exported slaves, gold and some ivory—a tenth of the world's production of gold was delivered from Ghana. After 1869, Britain became the sole colonizer and the trade was concentrated in fewer ports. The British made the coastal states a colony in 1874, and the Ashanti surrendered in 1896, making the whole of Ghana a British Crown Colony.

In 1900, 81 % of the country's exports left from six ports, with imports nearly the same. Cape Coast was the most important port with its trails to the capital of the Ashanti kingdom, Kumasi. After the British moved their headquarters to Accra in 1877, the port in Accra flourished.

The Ashanti state became the strongest power of the tribes because of the gold in its area. It became an important trade partner and competitor for the British. The trade in agricultural products increased in importance after the slave trade was abolished. Palm oil, rubber and timber were exported in addition to the maize and cattle exported from the forts along the coast.

The climate was unhealthy and not many Europeans wanted to live in the area. In 1901, only 646 Europeans lived on the coast; therefore the African people kept their land. They did not face the same problems with European influence through large plantations and settlers that people in South Africa, Kenya and Rhodesia

faced.

For many years the British used the tracks for their transportation, including hammock bearing, but in 1894 they set up a roads department to build and maintain roads. In 1873, the British made a road for soldiers from Cape Coast to Kumasi, and it was improved and extended to the north. They also built a road from Accra north to the Akim Goldfields.

Railways were the focus from 1900 to 1920. As will be discussed in the next chapter, railways went from the port in the twin-town of Sekondi-Takoradi² and into the gold mine areas. A lot of new gold fields were found in the 1880s. The railway was the only way to industrialize the gold production with heavy equipment for steam power to handle lifts, pumps, mechanical drills and other tools. The new mines harmed the traditional African gold washing, but indigenous people could be employed at the mines instead. In spite of the Ashanti surrender, the railway engineers were in danger during the construction of the railway around 1900 (Luntinen, 1996). The first section of the railway was finished in 1901, and the railway continued up north, with a line to Kumasi built in 1907. An eastern line was started in 1909 from Accra that reached Kumasi in 1923.

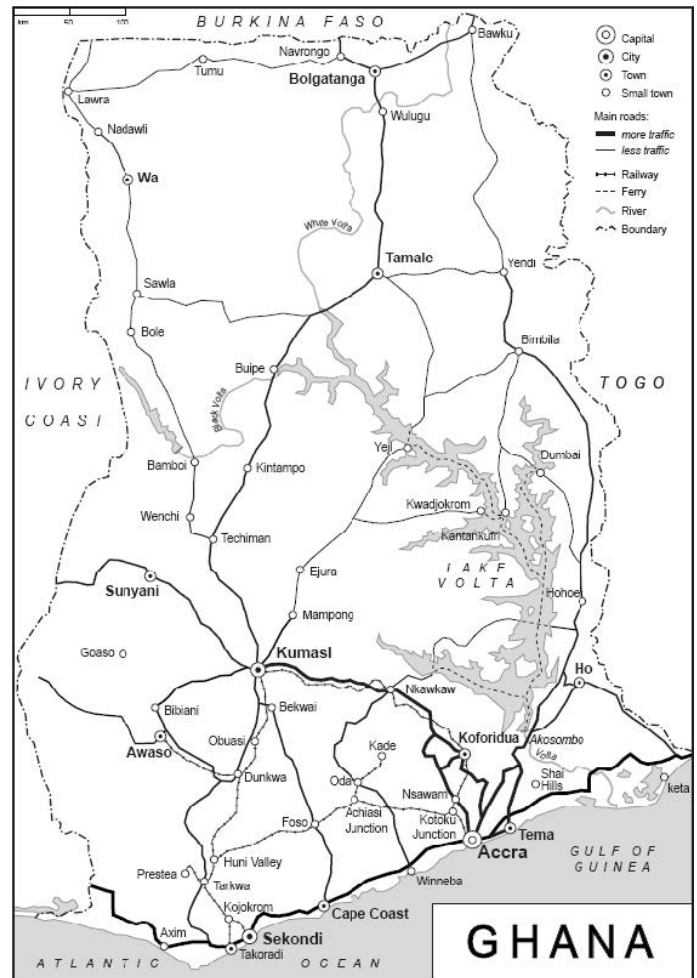
The western line was built by Europeans for Europeans for transportation to and from the gold mines, and two-thirds of the volume of the traffic was for this purpose with machinery and coal to the gold mines. There was initially no cocoa production in the area, but the railway made it convenient to start plantations and the cocoa freight had increased to 19,191 tons by 1915. The eastern line had only one-third of the total tonnage transported, but 41,000 tons of cocoa were shipped to Accra.

The lines made it possible for import companies to send goods into the markets in Ghana. The internal trade grew, too, with agricultural products for the mining areas. The road network continued to expand, but the roads became feeder roads for the railway.

In the 1920s, the fast expansion of the railway slowed down and the road system was improved, especially in the northern region. Some of those trunk roads went north into the French territories, opening the inter-regional trade. For instance, salt could now be exported by trucks instead of the traditional transportation by canoes on the Volta River. In 1928, Takoradi got a modern harbor that reduced the loading and turnaround times dramatically. The loading time of manganese went down from three weeks to three days.

The use of personal cars was still low in the interwar period, and most owners were white colonial officers and missionaries or natives working for them. To this came adventurous people on safari trips (Pirie, 2011). The drivers in the trucks, buses, and taxis were dominantly black people (Hart, 2011).

The importance of small harbors lessened in World War II because of the fear of attacks from German submarines. The larger harbors in Takoradi and Accra dominated, and the railway regained some of its lost power. Manganese was exported in large quantities and



bauxite became more important for the production of aluminum.

The railways remained important after the war and some improvements were made. The western line was still a bottleneck; therefore a new harbor in Tema was constructed in 1962 to serve the eastern part of the country. This was part of a big plan that included a large dam over the Volta River for a power plant. This created a new waterway on the dam and brought electricity to a number of large industries.

Road transportation continued to grow. It was estimated in 1951 that the turnover of the truck transportation was 4-6 times larger than the turnover of the railways. Food crops were transported to urban areas by trucks, while the mining industry and cocoa transportation (one-third of the freight revenue) were still transported by rail. Cocoa transportation was steered by the central organization, the West African Control Board, which gave the railway a favorable position.

In 1960 some truck roads were upgraded and new feeder roads were built, especially in the south where the building of roads had been suppressed to protect the railway. This area around the railway had missed the trunk roads and feeder roads, too. A lot of secondary roads were built, often by local initiatives.



A typical path through the rainforest. Photo around 1910.

The economy forced the politicians to stop building and maintaining roads in 1961. The situation worsened for many years, with its lowest point in 1983.

It has not been possible to obtain statistics about the road length for all years, while the available statistics are not reliable. Pedersen (2001, p. 12) said it may “be a matter of definition when a trail is a feeder road or just a food path”. It is estimated that the deterioration of the roads was larger than the investments in the roads between 1970 and around 1997, in spite of some large construction projects financed by foreign countries. Since then, the road network has expanded, but not enough to handle the rapidly growing traffic.

The railways covered only a little part of Ghana, and they were not a success in the long run. Its development was late compared to the railways in India, which started 40 years before. The railway in India is still very important and is modernized continuously.

In the end, Ghana’s railroad was a total disaster. A report following the military coup in 1979 said the railway doubled the number of staff since the end of the colonial era in 1957. Now 20 years later it had 15,524 employed - one for each 60 meters. The passenger and goods traffic decreased in the same period. In 1960, the wagon turn-over was 6.5 days, but became 62 days twenty years later. In international comparative measurement of efficiency, Ghana’s railroad was among the worst. Its wagons ran less than 100 tkm a year. The policy in the 1960s and 1970s was building new roads that were one-third cheaper than railways (Luntinen, 1996).

Railroads became stronger in many of the French-influenced countries around Ghana because of their longer lines and links with other countries. The railway from Gambia runs into Mali and from Ivory Coast the railway runs into Burkina Faso. There has been a lot of discussion about a railway network throughout West Africa. That has not been realized for economic reasons, but Ghana had a weak position in that cooperation because it had no railway to build on; the functioning

railway is running on non-convertible small gauge rails (Luntinen, 1996).

It is said that the railway is an European invention that was exported to Africa by colonialists. The African people were educated by the British in the necessary skills to handle a railway—discipline, punctuality and intelligence. The continent should be part of the general world culture. This teaching was forgotten in the political and economic decline of the 1960s and 1970s. When experts from the World Bank and other institutions went to Ghana again since the late 1980s, principles on sound business and technical operations were reintroduced in the railway business. Railway historian Pertti Luntinen (1996) explained the situation with two distinct different cultures where the instance of railways in Ghana was a one-sided affair. The railway was introduced and training of the local people followed. On the other hand, the Western railway people did not see any value in the local people. The local people learned very early to be rich through the new Western businesses. For instance saw they the chance to grow cocoa thanks to the new means of transportation. The locals used the railway in the same way as the colonial masters by exporting to the world market, but after the colonial tutors left, a growing staff and their trade unions could have the short-term satisfaction of getting a stable income without much effort. The “long-term necessity of saving, accounting, investing, management, and so on, were alien to African culture” (p. 173) is the judgment of the historian. First, with “expatriate talent or metropolitan tutorship” (e.g., the World Bank) the new generations of Ghanaians could learn that “Africa cannot remain dependent on aid and that it can only trust on its own efforts.” Such sounded the railway historian’s opinion; similar issues will be discussed later in the paper.

The export of wood from the woodlands of Southern Ghana brought a new trade on a larger scale. This trade became possible after World War II when the trucks could handle the large trees. This transportation could not function on a regular route, in contrast to the cocoa and mining industries. They should start in definitely new starting points when a new wood could be exploited. Many timber companies made their own roads to get to their resources. Therefore, most of the timber transportation did not go by railroad.

A little evidence about the political situation is necessary to understand the history of transportation. Ghana gained its independence from its foreign colonial power in 1957 as the first African country. It was a model for other African countries, but it was not easy to be independent without the knowledge from the colonial officers. The central planning policy did not function very well and corruption and a decline of price in the world market stopped the country’s progress in important export goods in many areas. In the early 1980s, many things did not function, including data gathering; there-

fore we do not know exactly the development or lack of development in those years. There has been a lot of progress since the 1980s. Some of the progress occurred because of help from foreign countries and private NGOs, increasing the influence of foreign institutions such as the World Bank and European Community with experts to handle the complex planning and operation of a modern society. Also, Ghana itself is trying to build up international institutions for efficient cooperation; for example, Ghana is a member of the Economic Community of West African States (ECOWAS) where 15 states try to improve the region. Among their tasks is raising transportation systems through standards and infrastructure.

Urban public transportation experienced a downturn similar to the railway in the years after the independent. The providers were consolidated in the 1960s into a single state-owned enterprise, the Omnibus Services Authority, OSA, established in 1927. The company operated large and medium buses in large and smaller cities together with an inter-city bus operation. In the mid-1970s, the company ran into severe troubles and entered the classic spiral of deterioration with loss of capacity and market, ending in a bankrupted economy in 2000 (Finn, 2008). A successor, Metro Mass Transit (MMT), was established in 2003, with 65% private ownership (though some of the private companies are state owned). The need for transportation was gradually overtaken by tro-tros and today only a few hundred vehicles are operated by MMT on regular lines.

Over the past few decades, containerization and the logistical revolution transformed the shipping industry worldwide, but the new infrastructural requirements have not yet been introduced to Ghana, and only a few percent of the containers arriving in Ghana continue inland. An explanation for this could be that the labor costs are low and therefore the costs of loading and unloading trucks are still of little importance (Pedersen, 2005). Many of the export goods such as manganese, gold, and wood, to some extent, are not suitable for containers, and they are transported as bulk (Hilling, 1973).

The traffic in Ghana is also different to high-income countries. Many problems only exist in developing countries or the problems are really small in the rich countries. A study from Nigeria showed some of the problems the professional truck drivers have. Respondents said harassment from the police or other officials was the worst problem for their work, traffic delays were the second worst and armed robbery the third. Robberies might not be as bad in Ghana as they are in Nigeria, but the problems causing a turn-around could be the same: 42% are returning because of bad roads and 35% because of a vehicle breakdown. In general it is easier to move cargo from Europe to the coast of Africa than it is to move it to the hinterland (Ubogu, Ariyo & Mamman, 2009).

One of the most important new technologies is the cell phone. Today, nearly everyone in Ghana has access to a telephone, while only a few years ago wired tele-

phones were out of reach for most rural dwellers. This had an enormous impact on transportation because now farmers can sell their goods without the earlier problem of contacting transportation services. This advantage can give the farmers better prices (Porter, 2014).

In short – the overall development for Denmark

Denmark is a small country situated in the temperate climate of northern Europe. It is an island nation, which is an advantage from a transport angle because throughout history, sailing has been easy—the sea has gathered a society while land prevented transport. Most of the largest towns in Denmark are located at trade harbors.

The climate in Denmark is dominated by a large difference between summer and winter. The winters are especially harsh, which has had a huge influence on the building on a culture where planning and mutual aid were central parts to secure shelter, cloths, storage of firewood and food.

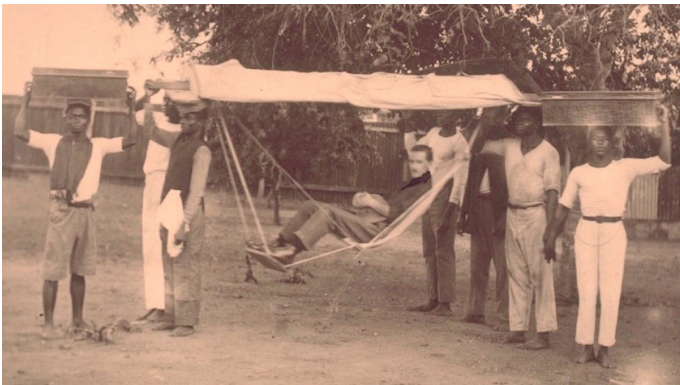
The climate for road and railway construction is rather convenient. No heavy rains to destroy a road and with a lot of gravel in the soil to build constructions with a fair drain.



The British military used head portering for its transport up to 1920. Photo around 1900.

The country has been a unity for thousands of years, with a homogenous culture and language. A monarchy with a unifying king was in place for more than 1,000 years.

There has been a strong state since approximately 1600, with an increasing bureaucracy to handle the bookkeeping, administer land and handle discrepancies. A local administration based on uniform rules was established around 1800; gradually it became based on a democratic engagement of the general population. By the early 1900s, the political system was a functioning democracy on all levels.



A missionair ready to a travel through the bush in a modern type of hammock. Around 1925.

Paths were established by the first settlements. Thanks to the domestication of cows and horses, there was a need for roads for farming vehicles. Originally the roads were only ruts in uncultivated land, but gradually roads were built at critical places at swamps and streams. When settlements spread into the hinterland, roads were built by the locals, who built and maintained the roads. In the 1700s, the national central power took over planning for trunk roads all over Denmark to help the administration and the military. The building of roads was organized through standards for measures and quality; it was decentralized in 1865.

Railways came rather early with the first established in 1847³ and interwoven with regional routes in the following decades. In the 1900s local routes came to the network, but many of them were closed when motorized vehicles took over local transportation. This railway network created a structure of settlements with station towns as local centers for gathering the farm products for export, for example.

When motorized vehicles were introduced around 1900, they could use existing roads. Tarring was introduced in the 1920s and since then the use of motor cars of all kind was integrated into society.

Climate, geography and road administration

Two important factors have made the traditional transport system in this area of Africa: the climate and nature/geography.

First, Ghana has a climate with a very intensive rainy season. In areas with a savanna climate in Sub-Saharan Africa, there is a distinct rainy season like in the monsoon regions. In Ghana, the rainy season is the main period of vegetation growth, but it is also the time for heavy floods. While the temperature is nearly the same year around, approximately 24-27 C, the rainfalls in Ghana decrease in some months. In Kumasi, May and June have the heaviest rainfall with respective 184 and 234 mm of water and a similar amount in September and October with respective 173 and 201 mm. In contrast, December and January have only 32 and 20 mm.⁴

This results in a lot of temporary floods that make large hollows in the soil. All non-enforced roads are damaged after such rainfalls, and they become further damaged by traffic that makes ruts. When the road is dried out the soil becomes very hard, like sun-dried bricks. The road building process for most roads in Ghana is only a scraping by a grader.

In Africa, as in parts of Asia, the soil is very often the laterite formed in the hot climate. It is red in color thanks to its high content of iron oxides. It can be a fruitful place for crops, but it presents problems for transportation because the high proportion of clay becomes very slippery when wet. In the rainy season it may be difficult for contemporary four-wheel drive vehicles to avoid slipping off.⁵ Under repeated loads, a laterite road can get a ridged or washboard configuration with 30 cm between the peaks (Jordan, 1978).

Another factor has reduced the need for large roads. The existence of the tsetse fly has affected the transport system as well. The fly lives in the woodlands of Sub-Saharan Africa, and horses, donkeys, etc., are affected by the bite of the fly. Therefore those animals are only kept if the need for them is very high (Dickson, 1961).⁶

In the northern districts, horses were important for chiefs because they were the basis of their political and military power. They were used for festivals and for patrolling the territorial boundaries of their respective areas. The use of horses did not spread in northern Ghana, maybe because the chiefs refused to allow anybody else to buy horses (Ntewusu 2011).

Traditional farming in the fruitful southern Ghana and similar countries has never called for horses to draw the ploughs. Even today, traditional farming in Ghana is based on a farming system where special crops are kept where the soil is optimal for just that crop. Often this is done through slash-and-burn agriculture. One family possesses a small piece of land. Together, this eliminates the mono-crops farming we know from all industrialized countries.

In 1877, the colonial capital of the British government moved from Cape Coast to Accra because of the drier climate, eliminating problems with the tsetse fly. In Accra, horses were used mostly for transportation by northerners coming to Accra from the savannah societies where the tsetse fly did not live (Ntewusu, 2011). There were some attempts to introduce horse driving outside Accra, but they were in vain. In 1885, a government-owned mule transported an officer 24 km from Ac-

cra, but the mule died of sleeping sickness back home. The Basel Mission imported bullock for driving carts but failed. An officer imported four oxen from Madeira as draught animals but they died within a year. Therefore horse-drawn carriages were not seen outside Accra (Dickson, 1961).

At the same time in Ghana, the roads often did not exist. There was a system of historical trade routes, but they were only forest tracks used by merchants and slave traders (Jedwab & Moradi, 2011). Transportation was done by walking people carrying their cargo on their head. Even the British supported the maintenance of those trails (Gould, 1960), and the villages along the main trade routes were encouraged to keep them open. Hammock tracks were made so the officers could travel around their districts between administrative centers and more important villages. There might have been local cooperation on those tracks and a local willingness to make a collective effort to build roads as mentioned by Boni (1999) Ghana had no institutions or traditions for democratic engagement in road building.

Today the roads in Ghana are managed by three road agencies. The Ghana Highway Authority (GHA) was established in 1974 and is responsible for the trunk roads. The Department of Feeder Roads (DFR) was established in 1981 to be responsible for the rural roads. Around 50% of the network is in maintainable condition. The head office is in Accra and there are regional and district offices. The Department of Urban Roads (DUR) is responsible for city roads in urban areas. When the Road Fund was established in 1985, the policies said agencies should receive their money in the ratio of 50:30:20 respectively, but this ratio is not very stable (World Bank, n.d.).

The road network was in a very good condition at the time of independence in 1957. The road budgets declined in the 1960s and the maintenance suffered. In the 1970s the roads were breaking faster than they could be maintained. In 1982, the Ministry of Roads and Highways was established to handle the matters. It did not solve the problem with the lack of money, and a reconstruction of the ministry in 1996 to Ministry of Roads and Transport made for better administration.

Organizational initiatives were taken to make better plans for construction and maintenance. One of the initiatives was the establishment of the Ghana Road Fund in 1985 to provide a secure source of funding for road maintenance. The revenue was derived from a fuel levy on petrol (that became the dominant income on 90 % of the income), from road, bridge and ferry tolls and vehicle examination fees. Since 1998, further income has come from transit fees. For its first few years, the fund had huge problems with its economy where less than 35% the required funding came in. Most of the problems occurred because the fund lacked effective oversight over its budget, it got no feedback from agencies on the use of funds, it had no monitoring and revenues collected in the regions were delayed and some of those funds "lost their way" into the consolidated fund. A restructuring in 1995 should help the Fund for instance with a



Transport of barrels with palm oil. Photo around 1915.

board where 8 of the 13 members came from the private business sector.⁷

The administration of the road fund has improved, but there are still problems. A report from Ghana Audit Service (2012) details some of those problems. Cooperation and coordination were in a bad shape; therefore a genuine report could not be made when the necessary information was not accessible. The report could tell about severe problems where the private toll booths (road toll collections were privatized in 2005) underpaid the tolls collected. Private oil marketing companies and even state-owned institutions did not pay the fee. The agreement with collection to private operators went back to the official administration again from 2009. The Road Fund tried to prosecute to get its money back but the attorney's office did not act. Money disappeared by other instances. One toll booth had three robbery attacks in 2010, but the police did not take action. Many drivers did not pay the toll; for example, three toll booths there were severe pot holes and the drivers used them as excuse for refusing to pay.

This shows some of the many problems in a developing country with a lack of efficient administration. There are similar problems on the other side of the system—the local construction and maintenance institutions.

In short – the situation in Denmark

When we compare Ghana with Denmark and similar countries, the development was totally different. Horses have been used for several thousands of years and have since been an important part of the development of intensive farming. Horses used in front of the plough could be used in front of a carriage, too. Therefore it was natural to have broad roads suited for carriages.

The climate in Denmark is not as extreme and there is not rain like in Ghana. The rain in Denmark falls



The railway short after the opening of the track between the harbor Sekundi and Kumasi in 1904..

year-round and November is the wettest month with 79 mm rain. Well drained roads can be used nearly all year.

It was necessary to make agreements and rules about roads that wind through a landscape owned by different people. Natural grown agreements about road building and the following maintenance were written throughout history. From some of the first written national legislative texts we see the formulation of how people should handle the road.

Later, the government began to regulate how people should maintain the roads when snowfall hindered the transport by carriages and there was too little snow for sledges. Every farm was to deliver one or more men to join the work.

In parallel, an administrative system based on local democracy was built. Gradually the local farmers and inhabitants influenced this administration and the civil officials employed to handle this system. Though many roads were initiated by the need from the governing king to handle military and similar transport, the maintenance was often locally based. All in all, Denmark had a well-functioning system for maintaining and building roads around 1900, just before motorization demanded better roads.

The decentralized responsibility was total until the 1940s when a national office for motorways was established. The state took more responsibility for the increasingly important road sector, and today the state is responsible for the motorways and trunk ways while the local administrations handle the local rural and urban roads. Historically, the local authorities have collected taxes and some of that money was used for construction and maintenance. With the motorized vehicles, society got a new burden, but it brought new money into the system through a tax on vehicle registration from 1921 and on petrol from 1927. This revenue was self-regulating: more cars and more traffic made a larger wear and tear on the roads, and while the income was regulated,

the money followed the need. The money was distributed to the different road authorities after specific shares.

Railway transport

Since 1873, the British administration wanted to have railways, but economic and technological large projects could not be started before 1900. The governor, William E. Maxell (1895-1897), had experience in the Malay States where the railroad had easy access to areas with tin mining. The model of “mining first” was copied in Ghana. Naturally the British wanted fast access to the capital of the Ashante people, Kumasi, for military reasons to dispatch troops quickly after the British annexed the Ashante Kingdom in 1896.

The construction of a narrow gauge railway began in 1898 and the line between the harbor in the twintown Sekondi-Takoradi and the gold mine in Tarkwa opened in 1901. The construction work continued and the connection with the large town Kumasi opened in 1904. In 1911, a side connection to a manganese mine in Prestea opened (Gould, 1960; Jedwab & Moradi, 2012).

A new line was planned to go from Accra and Kuma-



Loading cocoa in railway waggons around 1935..

si, and this eastern route was started in 1909. It was extended several times to the north, but serious flooding and the world war delayed the finishing of the railway to Kumasi, which did not happen until 1923.

Later, the railway was expanded with more lines. The most important was a line between Accra and Takoradi to give the line the shape of an “A.” This line was started in 1927 and finished in 1956; a few years later it was outdated because of the construction of a new harbor in Tema 25 km east of Accra that eventually became the largest harbor in the country.

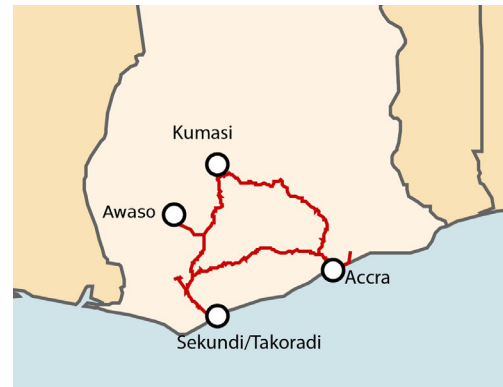
The arguments for the Eastern railway were export of palm oil, rubber, and cocoa and a connection to gold mines in the area. In reality, cocoa became the dominant export, and in 1911 Ghana became the world’s largest exporter. This large production (100,000 tons in 1925) made Ghana the richest country in the area.

In theory, a railway is the best system for long distance transportation, especially bulk cargo that can be moved fast and safe. However, the railway system has been under decline. There has been a drop in service quality and the number of wagons caused by ineffective management, inadequate investments and competition from the road sector. The railways transported 3,500,000 tons of goods and 6,000,000 passengers in the late 1960s, but it declined fast. Fifteen years later in 1984, railroads only transported 374,000 tons of goods and 2,180,000 passengers (Jedwab and Moradi, 2011).

In spite of several great plans for rehabilitating the railway system, the situation is not improved much since 1983. The trade unions have been fighting against large reductions in the number of employees and discussion has arisen about privatization because of political pressure from the World Bank. On the other hand, this has resulted in a national discussion about the role of the railways; they were established as a legacy of colonialism for colonial purposes. Privatization would give foreign-owned companies a new influence, resulting in a re-colonization (Dinye, 2012).

The Ghanaian railway has been in a decline and inappropriate short lines were stopped. In 2005, Ghana had 4 km of railroad track per 1000 sq km compared with 49 km per 1000 sq. km (World Bank, 2010 and CIA World Factbook). Since then more lines have gone out of business and only a part of the Takoradi-Kumasi line is functioning mainly to transport goods. Around 2012, eight loaded trains a day came to this harbor with mineral exports—two trains with bauxite from Awaso and six trains with manganese ore from Nsuta. To this transportation come some commuter rail services around Accra (Dinye 2012), especially the Accra-Tema connection.

The present president, John Dramani Mahama, announced the reconstruction of Ghana’s virtually moribund railway at a press conference in 2014. There are questions about whether the eastern line, in its harbor in Takoradi, could be tied with the northern inland country, Burkina Faso, and a line to Yendi where iron ore deposits are of interest for foreign countries. Chinese companies are interested in implementing the



lines—several contracts have been signed—but many contracts have been made through the years without any consequences.⁸

In short – the situation in Denmark

The first railway was established in 1847 from Copenhagen. In 1856 the railway went over the island Sealand to the ferry to the next important island for inland transportation. In few decades, Denmark was woven into a tight network of railways owned by the state or local authorities. The rail gauge was the normal width, which meant an international connection was a reality with the railway to Germany in the late 1800s and ferry connections to Sweden in 1892.

The railway has had its ups and downs, with a large decline caused by road transportation. It functions well both with long distance transportation of goods and local and regional transport of people. There are more than 2,100 km of rails in a country with 5 million inhabitants.

Bicycles and motorbikes

Driving on bikes is mostly a matter for the male part of the population. According Porter et al. (2010), women would not drive themselves even if they got a bicycle for free; they would give the bicycle to their husband or a son because they did not learn to ride a bicycle as a child. Small girls did not learn to drive because of their cultural situation; they were supposed to help the women in the kitchen. According a survey by Ghana Statistical Service (2012), 92% of the bicycles in a household are owned by males while 3% of the bicycles were owned by both males and females. Only 5% of the bicycles were owned by females themselves.

A study about African cities shows that bicycles are seldom used in the big towns but more common in medium-sized cities (Pendakur, 2005). Most people cannot afford to own a bicycle because they cost about four times the monthly minimum wage. Even when a family owns a bicycle it is not used because of the dangers from the uncontrolled traffic in a big town.

Several studies have shown (cited in Pedersen, 2005) that the number of bicycles stagnated for many years because they were considered luxury sports goods or

children's toys. Although expensive, the number of bicycles has increased since the 1990s. A survey of some local communities (Amoako-Sakyi & Owusu, 2011) found that 30% of households own a bicycle, with the children using the bicycle the most. Sixty-nine percent of the children used a bicycle at least once a week with the boys as the dominant sex at 84% against 55% of the girls. Only 8% used the bicycle every day and only 1% used the bicycles to commute to school. Unfortunately we cannot know whether this number is valid for the whole population. The time use survey did not ask or publish this question. My own experiences with the Ghanaian roads gave me the impression that a very low share of people use bicycles.

This paper also discusses the problems with the use of pushcarts in rural areas. Those carts and other primitive goods-carrying vehicles have more success in larger towns. The explanation can be that they are expensive to invest money in when they are only used in a little in

tion. The good roads in the countryside and the very flat landscape led to the widespread use of bicycles there as well.

Today are approximately 20% of all working people in Denmark use bicycles to travel to and from the workplace.⁹ Special bike paths exist in all larger cities through the largest connection roads.

Denmark also has a very large share of motorbikes. Until 1920 there were more motorcycles than cars. When the real motorization of the Danish society happened in the 1950s, the motorcycle and the moped were very important vehicles. The numbers lessened concurrently with the acquiring of cars in the 1960s and 1970s, even though they still have a rather large share. Teenagers often have a light moped before they are old enough to buy a car.

Motorized road transport

Originally the British administration promoted the motorized road transport. The Secretary of State, Joseph Chamberlin, wrote in a confidential dispatch to the governor of Gold Coast (Ghana) in 1900, "It must be advisable to employ a motor car as an experiment on the roads near Accra or Cape Coast" (Ntewusu, 2011, p. 149). Governor Matthew Nathan followed the advice and bought a car in 1902. Its price was £543. Even in Great Britain, which had a long tradition of building steam vehicles, this car was imported from France, one of the leading countries for vehicles at that time. The car was steam-driven through a fire made by paraffin (Heap, 1990). This kind of vehicle was chosen probably because other prominent people had similar cars. For instance, the Persian shah bought one two years before.¹⁰ This car was not a success and after many problems it was sold for five pounds in 1908.

In 1910 there were only about twelve motor vehicles in the country, but this changed when trucks became an important addition to the railroads because trucks could deliver goods to and from the railway stations. Polly Hill (1963) described how the migrant cocoa farmers became small local capitalists through their farms and depended on the new motorized vehicle. She described their importance using the terms "pre-lorry-age" and "lorry-age." There were trucks in the business as early as 1910, but her judgment of their importance gave her the opinion that the lorry age started in 1918. This is probably because the technology was improved by the new light Ford T and its ability to drive on ragged roads along with improvements to the roads and the construction of bridges near the farms. In the lorry age, farmers could exploit ever-larger areas of the forest for the production of cocoa.

The evidence that 1918 began a new age also can be seen in Zambia. Carriers were used by the British military until after World War I when the military began to use very functional light Ford T cars. Those cars could drive longer distances than the approximately 25 km the native carriers could walk. It seems that the road condition year around and an efficient service system



Two missionaries in Cape Coast around 1903..

the farming business while they can be used every day in an urban environment (Pedersen, 2005).

Motorbikes are not very common in Ghana compared to the close-situated Nigeria (Porter et al. 20071) or Uganda, for example (Lopes, 2009), not to mention Vietnam where 95% of the motorized vehicles are motorbikes. In this and many other countries, motorbikes have a huge importance not only for transporting people but also for the commercial transportation of goods or people.

In short – the situation in Denmark

Bicycles have always been used a lot in Denmark as a means of daily transportation. Denmark is one of the countries in the world with the highest share of people using bicycles. Good roads in the towns were a precondition

The first car in Ghana was a French steam car built by Gardner-Serpollet in 1902. The passenger at right is the governor Matthew Nathan.



behind the cars was necessary before such a revolutionary step in the military transport could be taken (Gewald, 2009).

Even when more reliable cars came to Accra, the British administration gave the railway heavy priority in its transport policy. As mentioned in the chapter about railways, the British administration spent a lot of money on the railway they had chosen to be the primary mode of transport. The construction of roads was only done through the initiatives of the British administration except for a few privately owned roads for timber transport; the building of new roads was a very low priority.

Around 1913, because the bad roads created a lot of wear and tear on the trucks driving in Accra. These trucks could only last for three years, and had an annual cost of repairs as high as 25% of the initial value of the lorry (Ntewusu, 2011).

A special vehicle became very important in Ghana for many decades—the mammy wagon. In West Africa, a mammy wagon is a small open-sided bus or light truck used to transport passengers or goods,¹¹ and it became the dominant vehicle in the countryside for a long period. Most mammy wagons consisted of locally made wooden bodies built on an imported truck chassis. They were widely used to haul farmers and their products to the markets (Kaplan, 1971). In 1952, 70% of the then 11,000 commercial vehicles were mammy wagons (Gould, 1960). Some of them had fairly regular runs while others took the tours they could get. In those years the need for transport was so high that the drivers could have a fair rate for their driving. The Motor Drivers' Union was into the negotiations on the level of the truck rates. The entry into the business was rather easy but the new competitors had little effect on the rate structure.

In the early 1970s there were mammy wagons of different sizes. The most popular mammy wagons were

built on truck chassis, but minibuses and Landrovers were rebuilt with an enlarged bed on the back with seats along the two sides and across the front of the bed while the back served as a door (Jordan, 1978). The trucks could have high slats around the bed and a ridge pole for a tarpaulin in the rainy season. The largest trucks for long distance trips usually had four people in the crew. The driver had one of the three seats in the cab. Another seat was occupied by his assistant who helped him with non-driving tasks such as putting water in the radiator, guiding the truck through tight places, etc. Two loaders on the back belonged to the crew. On the smaller mammy wagons, there were only two members of the crew, driver and a helper on the back.

In the 1970s mammy wagons in many African countries were often built on a chassis from a Bedford TJ truck. A truck chassis is well suited to the Ghanaian roads with its rather stable construction and its very height that allowed it to drive on very jagged roads. With its simple design and the engine situated in front of the driver, was it very easy to repair. The Bedford truck was manufactured during World War II. After the war the trucks were imported from England through U.A.C. Africa Motors, but in 1959 the trucks began to be assembled in Ghana (Lewis, 1998). A new version was introduced in 1968 based on the experiences from the original truck in models up to 7 tons (Bech, 2009).

The number of mammy wagons has been falling through the past decades. The better quality of at least some trunk roads removed the need for vehicles built on a high chassis together with a desire for a more comfortable driving.

Jordan (1978), in his description of mammy wagon drivers, observed the system of transport from a lorry park. Large cities have places named Central Lorry Park and Transport Station and similar while smaller towns had no names and were situated near a gas pumping station. The service for women and children



Half ton Daimler trucks at the Basel Mission Trading Company collection place in Dodowa north of Accra around 1910..

selling food and similar goods is the only service on the open place. The park is not organized in any way. None of the vehicles has a fixed place but are randomly parked around. The truck assistants shout the destination of their vehicles several times a minute. When passengers have located their vehicle they can sign on and reserve their seat by sitting in it. Partially filled trucks can wait for more passengers, lasting many hours outside the peak-hours, probably in a sunbaked vehicle and in danger to lose his place if he is going away on an errand.

In many of the African countries, the supply of transport services has been characterized by a significant decline of public transport companies (Pendakur, 2005). In many cities people could wait 30 to 45 minutes for a bus that could take up to 1-2 hours just to travel 10 km. Also, the mass transit companies had very high fare levels. Instead raised micro-enterprises transport companies with mini-busses, collective taxis and many other types their share. In Dakar in Senegal was their share of transport increased from 18 % of the public transportation in 1980 to 78 % in 1998.

The public transport company in Ghana, Metro Mass Transit, had a similar enormous downturn. A centralized system organized like a socialist management model has shown its inefficiency. There has been poor management and a lot of problems with the economy and maintenance. The timetables could not be followed and the prices have been too high for most Ghanaians. The company still exists but now as a 55% privately owned company based on the transportation of wealthier people that can afford to pay the high price to have air conditioned comfort.

The policies of many other African states were influenced by the Soviet Union's top down management of public affairs and a monopoly thanks to restrictions to competition from private companies. The breakdown of

public services has made the politicians more liberal, allowing the self-grown and former illegal transport system with tro-tros, a development seen in other African countries. They are very adaptive for the need of transportation and new lines can be tried if a new entrepreneur will try to go into business. Angola Lopes (2009) said that this transport system satisfies 45% of the transportation demands in Luanda, and his writing presets some of the effort the government has put into regulating the area. This registration process is rather complicated, and around only 1,000 of the total 5,000 minibuses was legal in 2004. In 2005, Finn (2008) has estimated that about 12,000 tro-tros were active in Greater Accra with the half operating daily and the rest working for private hire or not functioning.

The transport system with minibuses is known around the world (Lopes, 2009 [Angola]; Finn, 2008 [Ghana, Georgia and Kazakhstan]). The minibus is called a tro-tro in Ghana and the route is shown by a primitive cardboard sign in the windshield. There are no fixed timetables but the driver normally decides when the car should start its journey and when it should stop on the road to collect people at the roadside. The car leaves when it is full or when the driver thinks it is better to collect people standing on the road waiting for a car. On the vehicle is a conductor that collects the fare. He (I have never seen a female driver or conductor) is sitting at the sliding door so he can easily hop out to help the travelers with their goods, put it in the luggage trunk or hide it around the traveler's seat. The tro-tro has a defined route and a fixed fare for the distance, but before the traveler is entering the car from a stop there could be a negotiation about the fare if the traveler did not travel to the end destination of the car's route. In a silent moment the conductor collect the money for the trip.

Anarchistic transport systems based on a free trade have grown in Ghana. At least for some of the transport needs, the transportation of goods and passengers are made through transport deals in the lorry parks. All towns have that kind of place where drivers offer their service for regional or interregional transport. Accra should have more than 100 of those smaller or larger stations (Ntemusu, 2011). In 2008, one of the largest parks had around 400 vehicles. The passenger vehicles were a mix of small to large busses. The smallest are personal cars, most are 12-seater busses and there are larger busses.

The parks are typically located near by a harbor, railway station, a market or a similar place where traveling people or traders are gathering. The trade union GPRTU plays an important role in managing lorry parks all over the country. The organization got its political alignment with the dominant political faction in the 1980s and they are now organizing more than 80% of the tro-tro sector and are active in taxi and shared taxi provisions, too (Finn, 2008). The ground is generally owned by the local government. Its infrastructure is rather primitive, often with only a plain, unpaved field perhaps with a small building with offices. There are seldom warehouses for storage space or loading equipment. Non-members of the union can use the station as well but they have to pay a larger fee (Pedersen, 2005).

The lorry park manager is a kind of broker that issues waybills for the freight, collects the tax for the government and tries to enforce the governmental transport rates. Similar systems to reduce price competition operate in many African countries. The drivers are served in turn, but they often wait for days and weeks before they get a new job. Overcapacity in those time periods would not give a strong decline in the prices because the lorry park manager tried to keep the governmental rate but a reduction to a certain level exists due to undercut.

Larger fleet owners try to have contracts with parastatals and private companies that are willing to spend 10-15 % more above the government rates. They seek to deliver a more reliable service through ownership of newer vehicles and with their own maintain garage. It is told that those large contracts often are based on kickbacks.

The trucking business is more inefficient than other developing countries in Asia like Pakistan and Indonesia. Very few trucks in the small companies drive more than 50,000 km a year and by the mid-1990s the average distance was probably even only 25,000 km or less. The degree of return load is very low; therefore the effective km could be only 15,000 km a year. Most drivers do not know how many kilometers they have been running because their speedometer mostly did not function.

The seasonal driving for the agriculture sector is one explanation for the low efficiency. The cocoa evacuation only operates six months a year. Normally there is only one driver on a truck and he clearly cannot give a full exploitation of the truck. The maximum speed is low because of the bad roads, and driving in the night is very uncommon because of the severe risk of accidents.

Nighttime driving was not allowed until 2000 because of the bad roads.

The rate for long-distance transportation was halved from 1987 to 2000 from 6.9 US cents per tkm to 3.4 US cents per tkm for the official governmental rate. Larger and more efficient trucks could explain the decrease but more trucks could be another explanation.

Most motorized vehicles in Ghana are second-hand cars from Europe. The import to the countries in West Africa started in the 1980s with 10,000 cars a year to more than 500,000 a year around 2000, presenting a value of more than US\$1 billion. The first imports were made by European tourists, development specialists or young African students in Europe, and the cars were driven through the Sahara or as additional freight on regular cargo ships. Today the business is more professional with shipping lines in regular trade between Europe and Africa. Only a few shipping companies handle the vessels that operate on the Hamburg-Amsterdam-Antwerp-Le Havre route where the cars are loaded



Touring in the bushland around 1930.

on the special roll-on/roll-off ships where a few thousand cars can be loaded (Beuving, 2009). In Africa the ships typically sail a route to some of the eight most important harbors from which they are redistributed into the land. After the harbors in Senegal and Côte d'Ivoire, the ships arrive in Tema, Ghana, before they continue to Togo, Benin, Cameroon and D.R. Congo.

This second hand trade is developed in an area where most governments have adopted a neo-liberal development policy according the Bretton Woods agreements. The removed trade barriers and other deregulation set the background for this second-hand car boom. This import system completely changed the car fleet in the countries. Before there was an import system where the new cars came from a few companies, but now many new brands came to Africa, including brands from Germany and Japan. The cars are in good shape after African standards, although a large part is so damaged that they could not be resold to poorer European countries. Those cars are sold for rather small money on a European price level. For the Ghanaians, the price is high and



A lorry park in the 1930s.

only the most necessary repairs are made. The cars are not repainted and nearly all vans still have their original advertisements for the plumber, baker or whatever company originally owned the van written in German, Danish, Dutch or another foreign language. This story is illustrated by the story of the German ambulance car 7/83-2 that became the tro-tro Dr. JESUS (Beisel & Schneider, 2012). The ambulance was identified in Germany and its history told. It was severely damaged and after a lighter renovation it was sailed to Ghana. This is an example of “technology transfer.”

The only new painting on a vehicle is often a symbolic sentence and perhaps an additional drawing. The cars were not decorated with the same opulence as those in Pakistan or India. As can be read elsewhere in this paper, traffic accidents are a serious threat to travelers. While most accidents are caused by human or material failure, many people believe that accidents are caused by spiritual forces. Therefore travelers will want protection from God and similar powers (Klaeger, 2009). Private cars often have streamers announcing the religious community of which the owner is member. Commercial trucks, especially from the many one-man owned transportation companies, often have more personal hand-made inscriptions. According to van der Geest (2009), they can be interpreted through anthropological glasses. The driver/owner expresses his worries in those inscriptions, and the future in the hands of others. Those inscriptions can, according to van der Geest, be placed on a continuum ranging from defensive to offensive ways of contending with the dangers of witchcraft and bad luck. For Lewis (1998), the inscriptions on mammy trucks are a sign of individualism, but he found that they reflect “a trial-ridden society and the near fatalistic resignation to such trials that seems to be all too typical in Accra, Cape Coast and other urban centres” (p. 166). Lewis collected text, and in his collection are many texts with Christian themes such as “Blood of Jesus,” “Christ is

the answer” and “Guy Jesus.” Some texts are more profane or nonsense such as “This rock,” “The wages” and “Time changes.” The Muslims have a similar pattern to use symbols on their trucks (Schulze, 2012).

There have been efforts to stop the import of over-aged cars to reduce air pollution in the towns and reduce traffic accidents. In 1998 the Ghanaian government banned all imported cars older than 10 years. The policy was not popular and the government was forced to change the law five years later to a less restrictive one (Sulemana, 2012).

It is not only the used vehicles that are imported. Tires are purchased after they have had their best time. According to a survey more than 64% of all tires are purchased used (Grid-Goal-Besuma Associate, 2008).

The minibus was introduced earlier in Ghana than in Zimbabwe and Botswana, for instance. Accident statistics from Zimbabwe and Botswana showed that more roll-over accidents with pick-ups/4WDs happened after 1995 than in Ghana. Those vehicles were very similar to the Ghanaian mammy wagon where the passengers were unprotected in a roll-over. There were not many mammy wagons in Ghana; therefore the roll-over accidents were very few (Gorell, 1997).

The demand for truck transportation is highly seasonal, with some peaks. When the agricultural products are ready for transportation, they have to be moved within a short period. This happened often in remote areas with bad roads and few vehicles. For many years the sector had some parastatals to handle the peripheral areas where private transport companies would make a bad business together with contracts with large transporter (Pedersen, 2005).

In the mid-1980s, more than one-third of the trucks were owned by the government. They were operated by public companies or governmental transportation companies. Many companies wanted to have their own vehicles because they did not have to depend on another

er company's potentially vehicles that might be broken because of bad maintenance or lack of spare parts (Pedersen, 2005).

After the trade liberalization that arose after the change of politics in 1983 after pressure from the World Bank, spare parts could be imported at high prices. The liberalization made it possible to import second-hand cars. Both factors did not improve the reliability problem. In the mid-1990s, 50% of the car fleet was older than 10 years and 10% were more than 22 years old. Although it became forbidden to import cars older than ten years in the early 2000s, the imported cars are still of a low quality, not as old anymore but perhaps damaged instead (Pedersen, 2005).

Many of the owners of the second-hand cars hire drivers. Even though they only own one or a few cars it is difficult to control the driving; therefore the owners often get a fixed rent from the driver and after a number of years the vehicle would belong to the driver (Pedersen, 2005). The scale of this kind of agreement has been reduced thanks to inflation and high interest rates. Instead the drivers are paid by an often very low monthly wage supplemented with a wage per diem when they are driving. Because of this payment system are the drivers interested in capturing freight and be on the road to earn more money. Today's road transport market is rather liberal. There is almost no regulation of the truck transportation and transport is accessible to anybody that is willing to pay the fee. Only the spot market is operated by the transport unions.

Commercial trucking is a totally free business. In 1989, a three percent tax was introduced to be paid on the freight rate. This rate can be set freely by the Ministry of Transport, which publishes the transport rates the unions use. Unions play a large role because of the lack of governmental regulation. Two trade unions, the Ghana Private Road Transport Union (GPRTU) and Ghana Cooperative Transport Union (GCTU), are organizing both owners and drivers. Three trade associations organize only vehicle owners—the Ghana Road Haulage Association (GRHA), Ghana National Transport Owners Association (GNTOA) and Progressive Transport Owners Association (PTOA). GRHA only organizes truck owners while the other two cover passenger transportation, too (Pedersen, 2005).

Men own the majority of private vehicles (Ghana Statistical Service, 2012). Eighty percent of private cars are owned by men and only 12% by women; 8% of the cars are owned by both a man and a woman. Motorbikes are even more a male vehicle with 94% male ownership.

Unfortunately it is difficult to get precise information about the number and distribution by type of the vehicles. As Pedersen (2001) said, the road transportation sector has been unregulated to an extreme degree. There is a statistic on new registered vehicles from the buying of new license plates, but since then there is no system for a deregistration. Therefore is it impossible to know how many of the registered vehicles there are on the road or how many of them have been scrapped. Although there has been a law for a regular test for cars to

prove their roadworthiness (twice a year for commercial vehicles and once a year for private vehicles), this test has been evaded more and more, especially by trucks. A report from 1996 indicated an evasion rate as high as 65%. It looks like the number of vehicles was reduced during the 1970s and early 1980s when the income from trade of the country's two major exports, gold and cocoa, went down while the price of crude oil rose sharply.

The number of vehicles in Africa is still relatively low compared to high-income countries. According a WHO report (cited in Bhatti et al., 2010), African countries have 46 cars per 1,000 inhabitants while European countries have 569 cars per 1,000 inhabitants and the U.S. has 665 cars. The annual kilometers traveled per vehicle is 18,533 km in Africa, a little less in Europe (13,520 km), but more in America 23,399 km.



Mammy wagons are vehicles for combined transport of goods and persons. The first was the ordinary bus service between Sekondi and Accra.

The other is build on a Bedford truck chassis as the most in the years after 1945.

Remark the inscription: "Fear Tomorrow".



A lively and rather caotic lorry park. This is near the big market in Kumasi.

In short – the situation in Denmark

Motorized transport came to Denmark before 1900. Steam powered vehicles like in Great Britain did not succeed in Denmark, but the vehicles with combustion engines came early. Some were built by Danes as the Hammelcar from 1887-1889.

Denmark's development followed the other high-income countries in Europe. After 1910, the car became useful for transportation in the large cities. With better roads and vehicle construction, vehicles were used daily in the countryside, too. The Ford T model was especially popular and the light car could be constructed with a body to a truck or bus.

The many new lines in the beginning of the 1920s forced the government to regulate those businesses. In 1923, the government introduced a regulation for bus driving. Vehicles on a regular timetable were forced to have a concession given by the local authorities. By this the competition could be regulated and the inhabitants could have regular transport possibilities. At the same time, the local authorities often owned the local railway and the desire to protect the railways was behind the introduction of the regulations that have existed since then.

Truck driving became regulated a few years later, in 1927. Driving on fixed routes could give the same competition to the railways and those trucks were regulated by their numbers as well. The same system as for the buses was introduced and accepted by all the municipalities the haulage company wanted to drive through. Trade companies or industries were still allowed to drive their own trucks. For many years a truck owner could hire his truck with a driver out to everybody; later this arrangement was regulated too.

The public transport system is functioning well. There are several underground lines in the Copenhagen area. In all cities bus lines are driving on very tight

schedules and in the countryside are a lot of bus lines connecting the small towns with the larger cities and transporting children to schools and high schools.

The roads

For many years, the roads in Ghana were simple pathways a few feet wide that were suitable for walking people. Throughout history there have been some important roads or pathway trails. Around 1850 there were 10 or more of those important roads radiating from the capital of the Ashanti Kingdom, Kumasi (Jedwab & Moradi, 2011). Four of them were the principal routes with connection to the coast.

The British administration and before them the Dutch administration were not interested in road building and no money was spent on it. The vegetation had such rapid growth that made it difficult to keep many roads in a good shape because they had to be cleared of growing or falling trees.

The bad roads made it difficult for a civil administration to do its job. For example, a large body of people existed in the 1800s that usually plundered traders even though they had been employed to help the traders (Dickson, 1961).

In the late 1800s there came a larger awareness about the improvement of road construction when the British overtook the administration of Ghana as a colony. The roads were widened to allow at least the use of hammocks. The old tracks were widened into two meters wide according a discussion in the Legislative Council of Ghana in 1870. The British believed the natives did not want good roads because an enemy could use the good road in time of war (Dickson, 1961). It is obvious that the administrators themselves wanted convenient travel, and together with the increased width they wanted straighter courses. In the daily administration, the Brit-

ish divided the roads into important and less important roads. The important south-north routes were placed under the administration of the Roads Ordinance and were maintained regularly. The secondary roads were only cleared periodically and only occasionally money was paid to the chiefs (Boni, 1999).

In 1890, a new governor and inspector of trade roads was appointed. Even after improving some roads, the administration was placed under the director of Public Works. New roads were built with a rather large width (3.7 m); even the standard in Togoland (then under Germany) had a standard of 5 m. The policy in the British and German areas were different. The British tried to use the Road Ordinance of 1894 to have bush paths cleaned quarterly by the chiefs who should have ten shillings per mile per quarter. In Togoland the German administration was more efficient; it compelled people with threats of heavy fines to work and not always with a pay (Dickson, 1961).

When Governor Nathan took over the administration in 1900, he advocated for roads good enough for motor cars and traction engines. Between 1902 and 1914, several roads were constructed or reconstructed to suit motor traffic. Unfortunately the heavy trucks used by private companies ruined the roads quicker than it was possible to keep them fit. The trucks spoiled the roads while they were wet. The laterite surface turned muddy and the trucks ploughed through the mud. In 1907, a law stated that cars over 6 tons could not be granted a license. The weight of vehicles was therefore regulated and pneumatic tires were demanded. When the light Ford A model was introduced, it was perfect for the roads and the number of registered cars rose in few years from 10 in 1910 to 532 in 1919 and 2040 in 1920 (Ntewusu, 2011).

Now it became possible for trucks to drive on even but not smooth roads and their low weight did not destroy the road like the heavy trucks (Pedersen, 2005). The building of roads began after World War I to ensure the transport of cocoa including feeder roads to the large towns at the railway lines. Local people were interested in road building and many feeder roads were built without the aid of the colonial government. It was not unusual for villagers to help the road engineers with the physical work if they could have a road near their village. Figures from the building of the Kumasi-Ejura road explain why. After the road was opened the farmers realized a 100-300 percent increase in their profit in the 1925-1926 cocoa seasons.

In the Ashanti region there were only 644 km of district roads, but they were not passable during the rainy season. This changed after the war. In the years 1914 to 1925, approximately 240 km of new roads were built every year.

In the Eastern Region, the building of motor roads increased after the war. The 260 km of roads in 1914 were expanded to more than 2,000 km by 1925. Hereafter, the new construction declined and instead the roads were improved through re-aligning, regarding and consolidating. In the railway area it was a policy that roads

were not allowed to compete with the railway. That is why the road from Accra and Kumasi was not completed until 1958 (Gould, 1960).

The building of roads in northern Ghana did not compete with railway lines, and the savanna geography with a few forests made it easier to build. As a result, the road system around 1920 was better in the northern region where the town of Tamale became the administrative center.

The building of the Great Northern Road is said to be important. It started in Kumasi and ended in the then-small village, Tamale, now the third largest town in Ghana. Its 378 km connected the railway city Kumasi to the north. The construction started around 1907 and was probably rather primitive based partly on non-paid locals forced by their chiefs (Ntewusu, 2014). The road was finished around 1920, if we can say that a road that



This tro-tro has been the standard transport vehicle for several decades. They are second-hand cars from Europe that can get a new life in Ghana.

was not tarred and likely muddy was “finished.” From a ferry connection at the road we know the statistics for the traffic. In 1926, 104 cars and 1487 trucks with 727 trailers drove northbound. The traffic was not heavy compared to today. Five vehicles a day driving north is not much and even when traffic increased to 13 vehicles a day in the peak year 1930, traffic was still limited. However, these numbers were proportionally large compared to the earlier transport by porters (Soeters, 2012).¹²

The roads were not perfect for motorized vehicles where the dusty roads were destroyed by the fast driving cars. There was a need for a new construction method to get a hard surface on the roads. Concrete road building was too costly, as was the tarmac system used in the U.K. The solution was devising a form of tarred and metalled roads under the name of “tarmet.” In the 1920s, the construction of both feeder and trunk roads was expanding and the improved surface of the road re-



One of the first tarred roads in Ghana for cars and trucks (Mampong).

sulted in a reduction of the expenditure to the half for the hauling with trucks (Gould, 1960). The more efficient truck transportation reduced the transportation season from seven to three months. The need for storage and drying capacity was significant reduced.

In 1935 the quality of the roads was rather low. According to the administration of the colony, the total length of motorable roads was about 10,000 km. Of this, 3,114 km were maintained by the Public Works department where only 661 km were of a good quality with a tarmet treatment. Eighty-four km were tar-sprayed gravel and 2,390 km were gravel roads.

The progress in building roads for motorized traffic went very slowly. The development in the 1930s, 1940s and 1950s was limited. In some of the less central areas of Ghana, the roads declined from first to second class roads (that are not for use in some times of the year). The Sefwi areas had hammock-roads still for many years. In the 1960s the villagers' efforts came together with economic interests in exporting the local timber and a network of roads was established between most villages. The first tarred road was built in the 1990s (Boni, 1999).

The roads were divided into three categories. No. 1 roads were perfect, No. 2 roads were fine but they were occasionally closed. The rain softened the roads during the rainy season and the roads had to be closed until they were dried out and hardened again. No. 3 roads were not to use in the rainy season. In 1985, the Ghana Road Fund was established as nearly the only source of road maintenance. The fund was paid through fuel levies, tolls and vehicle inspection fees. The organization did not function, and after years of a problematic performance, the organization was restructured in 1997. The official policy set up the goal to have 70% good roads, 20% fair roads and only 10% poor roads. Those goals were too far from the economic realities when the quality of the roads was 29% good, 27% fair and 44% poor in 2000 and with negative development for the past year (Republic of Ghana – European Community, 2002). To

day is only 15 % of the roads in Ghana paved (World Bank 2010).

In short – the situation in Denmark

The roads that were fine for horse driven transportation could be used for motorized vehicles, too. When the cars got faster, new construction principles were necessary to reduce the destruction of roads through the rubber tires whirling the sand from the road. In the early 1920s, tarring spread all over the country. More stable road constructions with asphalt were used in the late 1930s. The heavy trucks driving at a high speed were implemented after World War II when the balloon tire made them possible. After that, new construction methods with gravel layers in the depth were necessary.

The new cars could drive fast and with a rapidly increasing accident rate, especially after the second generation of fast cars in the late 1920s, it was necessary to change the traditional road building. The curves should be straighter and roads should bypass the city centers through new bypass roads. Much of this work was done by people unemployed during the world crisis in the 1930s. The police were involved in the process; they approved the new roads, which was a job they could handle thanks to their knowledge about where the accidents had happened.

The real expansion of the car traffic happened after World War II. After 1957 people were allowed to buy cars again without any regulation. After a few years, most Danish households had a motorized vehicle. The result was a constipation of the roads and a lot of new motorways and road systems were built. Even the rise of new cars was reduced because there are regularly traffic jams around the big cities. All roads in Denmark are paved.



Only 17 % of the roads in Ghana have asphalt. Here is one of them but with some large potholes - unfortunately very common.

Walking, head portering, porters, carriers and other human transportation

While we in the West can talk about “enforcement to promote walking in OCDE countries”¹³ walking is a natural thing in Ghana. People are using themselves as a means of transport. In the developing world, human transport is an integral part of the transportation structure.

In many areas of Ghana, children learn how to carry goods on their heads when they are three or four years old. They are an important source of labor for the families (Porter & Hampshire, 2012). They start by carrying a small bowl, and when they are about 8 years old they can handle a plastic bucket with 8 kgs. When they are 15 years old they can handle four of those buckets. The heaviest load is reportedly loads of firewood. There is a strong difference between the sexes where boys over the age of 15 are not usually expected to carry loads at all (Porter et al., 2007).

It is interesting to see how widespread the use of firewood and charcoal is. According to the first made time use survey in Ghana in 2009 (Ghana Statistical Service, 2012), households use mostly wood or charcoal for fuel for cooking. In total, 75% of all households use those fuels. This gives a lot of transportation with head portering to the households, but also to the commercial traders that often get their wood or charcoal from workers walking from the place where the wood was cut or the coal was made out to the public road where it can be collected by trucks. Also, 17% of the households use liquefied petroleum gas. Less than 1% use electricity. Could the explanation be an unreliable electricity delivery system? Even lighting is cause for much transport. In the rural areas, only 46% of the households have electricity; therefore the remaining households need to carry kerosene or candles back home. In the urban areas more than 14% of the households have a need for transported goods to have light in the dark period of the day.

The source of drinking water has some of the same needs for transportation. Only 16% have a pipe into their dwelling or yard. Therefore most people are forced to get their water from other sources such as a public tap or standpipe, or from a well (unfortunately is it not known to which extent those wells are in the own yard or people have to go for it).

Head loading has different uses among the sexes. Women and men carry water in Ghana.¹⁴ According to an investigation by Sorenson, Morssink and Campos (2011), water was gathered 17% by men, 16% by children and 64% by women. On average it takes 18 minutes to go the water source. For West and Central African countries, this is in the lower end of the time spent on water transportation, while Mauritania on average has 67 minutes and Sao Tome and Principe in the other end of the scale have 16 minutes. Another source has confirmed this pattern of collecting water primarily by women (Ghana Statistical Service, 2012). In total, of the 81 % of the households that collect water, only 12%



of the water is fetched by men and 7% is fetched by boys up to 17 years. For females, the distribution is this: 59% is collected by women and 12% by girls. It is interesting to see that the small children under 15 years old have a larger share of the work (4%) than the larger children (3%). Unfortunately, the survey cannot tell to what extent the two sexes have worked together. The same pattern is seen around the collecting of wood for cooking. Seventy-one percent of the adult women had this job in the 33% of the households where the wood was collected by themselves against 15% of adult males.

If we look at the time spent collecting water and wood, the overall picture is a little more mixed. Still, women are using the most time to fetch water, but the participation rate for collecting wood was surprisingly higher for men than for women for all age groups. Each day, a woman aged of 18 to 45 used 35 minutes to fetch water while the men in the same age only used 19 minutes. The children aged 10 to 17 used more time, and people over 46 years used less time. However, the picture is contradictory for collecting fuel. The children almost did not help with this work while men over 46 years old used nearly two hours a day (114 minutes). The elderly women used 48 minutes; the men used 88 minutes and the females 25 minutes. I used a normal family that spent more than an hour on collecting fuel.¹⁵ The time to go to the water source in minutes has been investigated by another project (Sorenson, Morssink and Campos, 2011). In average, a member of a household had a little more than 18 minutes to be at the place for the water. When 16% of the households had water on premises, 84% had to go for it, and 18% had to go more than 30 minutes.

In 1919, transportation workers in Accra had a head load on not exceeding 30 kg. They walked the whole day(s) on the roads to Cape Coast (in total around 144 km), Kpong (83 km) or other destinations from Accra for a daily fee of one shilling, three pence and up to four shillings (Ntewusu, 2011).

How long a porter could travel for a day is naturally very individual. From a report from British forces in Tanganyika in 1915, the average travel rate for a group



the carrier after the terms of load and the carried distance. On a good day the earnings could be 2,500 cedis, but young girls get a lower fee. For instance, an eleven year old girl could get 50-100 cedis per load while adult women got 200-500 cedis for the same work (Agarwal et al., 1994).

A study in India showed that water is one of the most important things carried on the head. It is assumed that a household should use between 15 liters per person per day and up to minimum 50 liters (Kapoor, 2003). In her literature review, Gina Porter (2013a) said women may spend more than 4 hours per day solely on transportation. By all accounts, women typically spend about 65 % of all household time in transport activities. The normal load is around 24-35 kg, but up to 60 kg has been reported. A very common load is probably a 20 liter water bucket. Beside this weight women often carry a baby or are pregnant. Porter (2011) has herself observed a woman over a distance of 8 km carrying a heavy load on 63 kg in addition to a baby on her back. A study of the carrying load limit for women found the load for carrying water should be around 15 kg to keep the women of a sound health (Sharma and Singh, 2012).

Carrying on the head could be combined with transport on a motorized vehicle. MacCall (1968, cited from Jordan, 1978) described a market in a large town in Ghana. He noticed around 1,000 people with head loads walking to the market, which he had estimated to be 30 tons of goods. The most goods came by trucks where it was estimated that 180 tons was carried by their 6,000 passengers. Those goods probably had been transported for longer distances than the head load to the truck at their starting points.

Transport to markets by head load is a widespread phenomenon. Pedersen (2005) cited different investigations about the extent of this. The oldest (Gould, 1960) showed that 81% of traders transport at a market in Northern Ghana by 1958 was by head and 5% by bicycle. In Mid-Ghana the extent was reduced to 53% and 6% respectively and the lowest part was in the Southern Ghana where only 45% and 2% of the traders used this human transport. Another study from 1988 shows still a large part of transportation to markets in the Northern Ghana but now reduced to 54% of the goods while 17% used a bicycle.

Head portorage of goods is an easy job that most Africans after they learn to carry things on their head—*kayayoo* as they are called in the Ga language spoken in Accra. Opere (2003) investigated the female porters in southern Ghana where she found a growing influx of young women and teenage girls coming from the poorer northern part of Ghana or from countries such as Burkina Faso and Togo. Of the 700 girls and women interviewed said 49 of them their age was 15 years or younger (9 years for the youngest even it is forbidden to be employed before the age of 15 years), 315 were between 16 and 20 years and 316 were older. They seldom had an education and came from poor families with a low education rate. The work as a porter is usually one of the lowest status jobs. It was often undertaken only



of carriers was around 24 km/day. The net load carried was 30 kg. It could be seen that villages and settlements in Zambia were spread along the trading routes with a distance corresponding to a day's walk for a laden caravan every 15 to 25 km (Gewald, 2009).

As the governor said about the danger with the rolling casks along tracks because it posed dangers to other track users, "On steep hills it was no uncommon sight to see one of these casks which was rolled by three or four men, get out of control and come bounding down the track, threatening unwary travellers with extinction and seriously damaging the wooden bridges and culverts" (Ntewusu, 2011, p. 127).

Head portorage has been the most expensive mode of transport. In 1925, freight rates was 5 shillings per ton mile compared to 1 shilling for trucks, 1.9 shillings for cask rolling of cocoa beans and only 0.5 for railroads (Jedwab & Moradi, 2012). A study about the recent female porters found they have not been given such an hourly price, but the price for each individual load was made through negotiations between the customer and

if women really had economic problems. It is said that men would have made the work before dawn in order to avoid to be seen doing it (Porter et al., 2007). Again, most of them are women. Head load carrying is a petty form of trading, often for the self-employed. Petty trading is often done at the roadside, at lorry parks and other places with traffic dangers. The density of human traffic on a market gives favor to an easy passage of pedestrian carriers instead of small cars and the goods are protected from theft when they are on the head of the trader (Agarwal et al., 1994).

The distances to the schools are rather short for primary schools. Most children walk less than 4 km (97%). Pupils in senior high often travel further (17% travel more than 4 km). On average young people aged 10 to 24 years in the rural areas used total 39 minutes a day for travel related to learning. The young in the city used a little more, 45 minutes; this was probably caused by the longer way to educational institutions for higher levels (Ghana Statistical Service, 2012). These numbers correspond with the finding by Porter et al. (2010) where only 10 % of the pupils in urban areas had to travel more than 46 minutes to school while 55% of the pupils in the most remote rural areas had to travel more than those 46 minutes.

Distances to health facilities are rather short. Only 13% have to travel more than 4 km to the nearest facility. Markets have around the same distance, with 14% traveling more than 4 km.

According to research, around 1990 village households used a total of 4,830 hours per year for transport, or about 216 tkm in an average household size of 12. This is transport for water and firewood, and together with other internal trips (crop production, to local market and grinding mill) represented 73% of the total time and tkm spent on transport. The other transportation was to health facilities and other outside locations (Riverson & Carapetis, 1991).

The transportation to the village market or roadside points can have a distance on many km by head portage. Even if they use bus or taxi they can still have a long distance to walk. Thirty-eight percent of the weight of commodities could be carried by head loads. On small roads with less than 25 vehicles a day, up to 90% of the carrying was on the head. Fine roads with more than 100 cars had still 25% of the total goods movements by head-loading because of a lack of alternative means of transport or lack of funds to pay for the for-hire services.

Riverson & Carapetis referred to research about the extent and distance of head loading. According to them, households in a farmland used 90% head load to carry goods from the field while 44% of the transport was made with the help of hired labor. The average distance was 3.9 km where nearly three quarters was taken up by footpaths. To empty a land on 1 acre for the widely used cassava would take 167 working days and for a harvest of plantain it would take 150 working days.

The local transport is a relatively large part of the total transport expenses. An example is made by the export of cocoa to Rotterdam in Europe. The price for

the transport of the long way on boat from the harbor in Tema is US\$53/tonne. The expenses for the trucking transport from the collection point in the rural area is US\$33/tonne and the head loading transport from the field to village and further to the collection point is US\$30/tonne. This last expenditure is hidden and part of the payment to the farmer.

Transport by walking is time consuming and can only deliver a few volumes. Use of non-motorized vehicles is not widespread in Ghana, although those vehicles are used in large towns like Accra in areas with wide streets (Amponsah et al., 1996). A number of NGOs and the World Bank have tried to introduce better low-budget transport alternatives such as a three-wheeled pushcart or bicycle trailers. The use of those vehicles was obvious: they could reduce the time used for transport, and this time could be used for more productive purposes. Tests with those new transport forms were rather negative. For instance, most of the paths in the rural areas were too narrow even for those small trailers (Pedersen, 2005).

A special group of people are working on the street—the street hawkers. They stand by the street ready to rush cars and try to sell their goods to the people in the vehicles (plantain chips, water, toys, mobile phone credit cards or whatever people need). They are well known from many developing countries, and pedestrians and drivers can buy what they need while walking and driving. They are often full time working hawkers going from car to car or they stand at the roadside (Klu, n.d.).

Let us end with mentioning the children working on the road, in spite of a lot of official prohibited works. More than 1.2 million children are directly involved in child labor (Ministry of Manpower, Youth and Employment, 2008). A report about children working in the cocoa sector shows the recommended carrying weight limits for children 9 years or younger, and it even shows how children 5 years old should limit their carrying weight to keep from hurting their bodies. Working children are often necessary for a poor household to get the daily food and many are walking on the roads.

In short – the situation in Denmark

Head portage is not known in Denmark, not even back in the history. Walking has been a very used means of transport and almost all roads in towns have a sidewalk and crosswalks – often regulated by light.

The self-transportation in Denmark is handled by bicycles.

The political and democratic system

The British created a rather strong central power after many years of fighting with the local tribes, especially the strong Ashanti tribe. After 1850 the colony was administered by the governor appointed by the British government. He had some advisory boards to help him, and after 1900 one of these councils included Africans with three chiefs and three prominent individuals. Until 1925 all members were appointed by the governor

(Kaplan, 1971). The central control and power arose through the years. The service from the administration was delegated to local officials or councils.

On the other hand, the local government had its roots in tradition with village councils of chiefs and elders. They followed the traditional law and order. In the beginning, the British administration tried to weaken the traditional forms of government, but they stopped this effort in 1902 to build direct ties between the authorities and the population. The local chiefs got wide latitude to run their own affairs, giving them even more power than before.

Roads and road transportation were not only used for the economic purposes of transporting people and goods. They had an important role in the political agenda allowing standardization of bureaucracies and by this controlling the society as Gewald, Lunning and Walraven (2009) state in their introduction to the car in Africa. The physical movement of people was important in a time before a nationwide radio, telegraph or telephone communication system existed. The state could better spread its message and enforce its will. The missionaries were another rich group with access to cars. Through the new roads they could have a greater impact on the popular belief among the native inhabitants. The car became a symbol of the white man and his colonialism.

In the 1890s, the British administration introduced a systematic policy of road rehabilitation. Until then the native king of Asante had given the local chiefs the responsibility for the local roads, but with the new policy, the British gave money from the state funds to pay the chiefs of villages that provided manpower for road works and maintenance. They could give fines inflicted on chiefs and headmen who failed to obey the order. The system did not work perfectly as can be derived by a report from 1902 in which a regional British administrator said, "The roads in this district are very good, they are now well cleared, and I have had bridges built over most of the rivers [and] swamps. I have never found any great difficulty in getting the Chiefs to keep their roads in order so long as I was continually travelling about as they invariably set to work when they heard I was coming through." (Boni, 1999, p. ??).

Many years later, motorized transport on roads gave the liberation movement a means to political action in the countryside through the use of propaganda vans. Those vans toured around to propagate the views of the liberation leader and later president Nkrumah's policy against the British colonial power (Gewald, Lunning and Walraven, 2009).

As it is said in an official report on transport and the issues on poverty, the problems are caused by: "Inadequate infrastructure and weak institutional and human capacity in all sectors including transport sector" (African Development Bank Group, 2005, p. iii). An explanation of the declining efficiency of the railways is due to too low fares charged, and by this the mission opportunities to maintain its overall services.

The road sector had the same problems. The construc-



The traditional chiefs are not only for feasts and celebrations. They have a strong power in the local society.

tion new roads suffered from changed objectives resulting from faulty design and unforeseen circumstances. An example from 2005 showed the kind of problems: a very important trunk road in Anyinam-Kumasi had severe problems. The 136 km long road is part of the connection between Kumasi and Accra, and not only the internal Ghanaian transport uses this road but transit traffic from/to Burkina Faso, Niger and Mali also uses it. The road needed renovation and a project was set up in 1985. Unfortunately the design was faulty and the project was stopped in the early 1990s. The project was re-introduced in the late 1990s with the same budget but under a reduced scope of now only 89 km. Through the following years it was realized that this project had a bad design, too, and the objective was changed from rehabilitation to reconstruction. The scope was further reduced to 39 km. Nearly 20 years after the approval of the loan for the project, the road as still not finished.

Other kinds of problems can be seen in the road between Anyinam and Accra. This 136 km road should be built but segmented into six sections, each financed by different actors. The first 6 km was financed by the World Bank and was built quickly. The next section of 15 km had problems with the financing and could not be finished. The following section with 30 km is under rehabilitation with financing from the Chinese government, and the following two sections with 22 km each are in projects financed by two other organizations.

The large projects often suffer from other problems. Delay is a very common issue. A road project in 1978 had a considerable delay; it took 46 months for the entry into force of the loan to the building. A railway project financed in 1981 took 36 months for the loan to be effective. The project of the Mpatabe-Elubo Road was delayed 87 months together with the delay of the project implementation for 105 months (10 years). A great

part of this delay is due to its handling by the Ghanaian Parliament.

The daily maintenance of the roads has similar problems. Originally Ghana Highway Authority had a monopoly on the work, which was carried out by its 14,000 employees. Through reform, 90% of the maintenance work was given to private contractors. This was a good policy for large projects where foreign contractors could be engaged, but those larger projects could not be handled by local contractors because they usually lacked management skill and capital. Some of this is explained by the lack of experienced engineers because they got a low salary and often had delays in payments, too. A recent report on the maintenance of feeder roads (Auditor-General, 2010) showed many problems caused by bad management.

From my own fieldwork, I have realized that the Ghanaian roads are very poor. Even the best roads of first class have large pot holes that force the cars to slalom driving, which is often on the wrong side of the road. When small pot holes are not repaired, they grow and soon many meters of the road are destroyed. The second class roads have the same problem, especially the roads without an asphalt layer that are often destroyed by rain. A run by a scraper could solve the problem, but even important roads in large towns are not maintained by this simple and cheap method.

In short - the situation in Denmark

The other chapters have mentioned a political system that grew through centuries and with an efficient administration behind it. The public institutions grew from the bottom up. The car owners got their interest group as early as 1901 to support the motorized transport, and an organization for bicyclists was founded in 1907. From 1935 began an organization for better security in the traffic. More business oriented organizations have existed for many decades; some of them have their origins from organizations for horse carriers and in this sense have been in action since the Middle Ages.

Dangers on the road

The road made a tremendous change in people's access to trade, health care, education and information. On the other hand, it gave the vehicles negative consequences through the rapid spread of diseases such as HIV/AIDS through drivers and prostitutes. And it created accidents. The large increase in road traffic has a huge consequence in the growth of crash deaths and injuries. In Ghana, that number grew from 920 killed in traffic in 1991 to 2,237 in 2009. Twenty-five percent of the people killed in 1994-1998 were children up to 15 years old. While accidents involving children are rather few in high-income countries, they account for about 96 % of all traffic fatalities globally (Lund & Rundmo, 2008). The killing of pedestrians happened mainly in larger towns, but deaths caused by bus and minibus crashes were more rural with 82% (Ghana Open Data Initiative; commented in Afukaar, Antwi & Ofosu-Amaah,

2003). Africa has the highest traffic injury mortality rate in the world. In 2004 the rate was 28 per 100,000 people compared with 11 in Europe. The continent did not have the largest proportion of road fatalities, which happened in Asia, but the accidents were more serious (Peden, 2004). Severe accidents per vehicle were very high too. It is necessary to look at the numbers of vehicles to get a clear picture of the risk of accidents. In Africa the risk for a vehicle to be involved in a deadly accident was 50 per 10,000 in low-income African countries compared with 1.7 deaths in high income countries around the world (cited from Lagarde, 2007). According Chen (2010), Ghana had more than 100 fatalities per 10,000 vehicles. This number is very high. With this fatality rate an increase in the number of vehicles would create severe problems.

Not surprisingly is that the most common accident is caused by minibuses, which make up a large part of the transportation in Ghana. Thirty-four percent of all accidents are passengers or drivers in minibuses. Number two on the list are pedestrians with a share of 29% of all accidents, although they are hurt more seriously (46% deaths compared to 21% of bus passengers) (Afukaar, Antwi & Ofosu-Amaah, 2003).

Often an accident has several explanations. The driver can have visual acuteness (a study of truck drivers in Cape Coast showed that 12 of a group of commercial drivers did not have the minimum visual acuity required for driving while 7% had visual impairment, Oveneri-Ogbomo, 2011; a similar survey in Nigeria showed that 18% failed their vision test (Onabolu, Otulana, & Awodein, 2008). He can be tired or have been drinking. His car can be overcrowded and it can lack maintenance with replacement parts not endorsed by the original manufacturer or have bad brakes and defective tyres probably with incorrect tyre inflation as well (a survey of minibuses in South Africa was made by Schoor, Niekerk & Grobbelaar, 2000). Safety seat belts are generally not functioning in Ghana except in brand new cars, and those are seldom used. A study from Kumasi shows that only 18% of the drivers used a seat belt and only 5% of the front right passengers. Those numbers are remarkable because there is a national seat-belt law for both front and rear occupants (Afukaar, Damsere-Derry & Ackaah, 2010). WHO estimated the effectiveness of seat-belt law enforcement to be 3 on a scale from 0-10 with 20 as best (WHO, 2013). The road can be in bad shape with potholes and sharp/steep bends. He will drive fast, even in town; his speedometer does not function and no police officers have warned him against the danger from a high speed. The inspection requirement for vehicle safety is very seldom and those existing do not work in practice. People can suddenly be on the road before his fast driving car and an accident will happen. It is not to known in which category this accident will be categorized in the statistics or if it will be at all. There are probably no police at accidents far from the big towns (Chen, 2010). There are controls to some extent where WHO has estimated its effectiveness to be 4 on a scale with 10 as the best and 0



as the worst (WHO, 2013).

Since 1934, vehicle quality has been regulated and demands have been made on the drivers' ability. For instance, it was required for drivers to be literate to read and understand road signs. From the beginning, the state had difficulty defining and controlling driver practices. The colonial definition of a man qualified to be a driver and the African understanding was different, leading African drivers to ignore the laws (Hart, 2011).

The statistic addresses the distribution of fatal crashes by driver errors when the most indicated single error to fatalities was the "loss of control." More than 30% of the fatalities were caused by this. Number two and three on the list were "too fast" (24%) and "inattentive" (20%). In total, inattentive drivers driving too fast and losing control can account for 75% of the accidents (Ackaah & Adonteng, 2011).

Dangers on the road are a daily problem for the people walking on the road, especially when they are carrying goods. More than half the traffic accidents in Africa are targeted to pedestrians. Those 55% shall be seen against 15% or less in the U.S. and Europe (Naci, Chisholm & Baker, 2009). It is, to a large account, caused by the many pedestrians compared to very few walking people in the U.S. In Ghana the share of killed pedestrians in the years 1994-1998 made up 46% of all severe accidents. Of them, 67% were killed in urban areas (Afukaar, Antwi & Ofosu-Amaah, 2003). This high number is not surprising because of the high share of pedestrians. A closer look at the statistics shows some interesting details about the problem. According Damser-Derry et al. (2009), 70% of all pedestrian deaths come when of people are crossing the roadway. This is understandable because of the many and aggressive

street hawkers anywhere in Ghana. This is understandable when coupled a high speed (accounts for 65% of pedestrian fatalities¹⁶), no street light in many settlements and no road construction for walking people. A very high rate of the fatalities (73%) happened in rural areas, with 63% in the villages. It is obvious that daily life in Ghanaian small towns for most people happens near the central road where people meet. Lorry parks, street selling and shops are here by the roadway.

A closer look at street hawking does not explain the high numbers only of accidents by crossing the road in towns. Most hawkers are women but the statistic tells us that most of the dead pedestrians were male with a three to one ratio to female fatalities (Chen, 2010). A share of the accidents involving male Ghanaians can be explained by the use of alcohol both as a driver and as a pedestrian walking out on the street. Unfortunately we do not know even approximately how large the share is because the control system does not exist. The police do not have the equipment to test on the spot and generally it is not possible to take the driver or pedestrians to a medical centre to be tested (Chen, 2010, evidence from South Africa is discussed in Pirie, 2011). A single survey from a random test at a roadside in Ghana showed that 21% of the drivers tested had been drinking and more than 7% had more than the allowed permitted limit on 80 mg/dl (Mock, Asiamah & Amegashie, 2001). Some of the hit-and-run drivers involved in pedestrian accidents—approximately 8% of the accidents—were caused by drinking (Aidoo, Amoh-Gyimah & Ackaah, 2012). One-third of crashes with pedestrians involved occurred during the early night-time hours when alcohol could have played a role (Ackaah & Adonteng, 2010).

The high level of death and severe injury compared to high-income countries can be explained by the high rate of accidents and by the poor subsequent treatment. Transportation to a hospital is often carried out by eyewitnesses, relatives or other people not educated to make the necessary pre-hospital care (Ackaah & Adonteng, 2011). It is estimated that less than 10% are transported by ambulance (WHO, 2013; further reading Ohene, 2014 and Aziato, 2014).

Naturally road casualties are a risk on small and poorly maintained roads, especially in rural areas. They are mentioned later in this chapter, but there are several risks posed by walking along the road. Assault and attacks are a problem, especially in the dark period of the day. Wild animals can be a danger in some areas and rapes can be a risk everywhere far from villages. There is always a risk of falling because the paths are very slippery in the fall.

In short - the situation in Denmark

Security is built into every new road today. Experts have analyzed the statistics and can give their evidence to the engineers to handle the planning of traffic lanes, traffic signs, light regulations and a lot more. Throughout history, much of those efforts were carried out by the car owner organizations that introduced their own type of traffic signs in the early 1910s. Official systems

Collision Type Resulting in Deaths and Injuries 2010

Collision Type	Persons Killed		Persons Injured	
	No	%	No	%
Head -On	343	17,3	2282	15,3
Rear end	175	8,8	1832	12,3
90 degree	71	3,6	1119	7,5
Side Swipe	109	5,5	1393	9,3
Ran off Road	285	14,4	4322	29,0
Object on Road	11	0,6	100	0,7
Object off Road	38	1,9	379	2,5
Parked Vehicle	52	2,6	390	2,6
Pedestrian	846	42,6	2918	19,6
Hit Animal	5	0,3	34	0,2
Other	51	2,6	149	1,0
Total	1986	100	14918	100

From Ghana Open Data Initiative.

have gradually taken responsibility for this.

Education has been a very important part of the system in parallel with physical artefacts. Driver's licenses have almost been a necessity from the beginning of the motorized vehicle era although the requirements first became an issue after the mass motorization in the 1960s. Professional drivers had a similar development and education has been required for chauffeurs driving buses, trucks with dangerous liquids, etc., since the 1970s. Most of the education is necessary because of the new regulations about how to drive, when to drive, and a lot of technical requirements to the vehicle. One of these rules is about the driver's driving time; technical instruments register his working hours to ensure the driver is awake and aware.

The statistics

Statistics are important for many reasons. They can monitor the effect of new prevention policies, identify hot spots and similar places for an effective intervention and help advocate for allocation of appropriate resources (Lagarde, 2007). This paper used a lot of statistics to describe the transportation situation in Ghana. Some statistics are not reliable (the numbers of registered vehicles when the registrations are not removed when the vehicles are scrapped). In this chapter I will continue with a critique of the statistics used that can influence on the results.

The history of the statistics for traffic accidents seriously began in 1989 when Ghana joined the National Road Safety Program, headquartered in Accra, and with the Road Research Institute (BRRRI) in Kumasi that became responsible for the accident statistics. The

first step with the statistics was an extensive training for police officers to make accident reports. Accidents were entered into a central computer using a program popular in 25 other low-income countries. In Ghana, the BRRRI staff collected data from each of the 10 regions. The limited economy gave some problems from 1992.

The problems with statistics are not unknown. A problem has been raised on the numbers in the official international statistics made by the International Road Federation and WHO, which both had numbers for road mortality rates (Moriarty & Beed 1989). Sauerzapf, Jones & Haynes (2020) discussed the problem and found that data for the least developed nations should be excluded from the statistics because they were too unreliable. This may be why the statistics from Ghana are not used in the WHO statistics in its book on road safety (WHO, 2013). At the same time, the WHO was responsible for increasing the statistic about road traffic deaths in Ghana from the Ghanaian number of 1,986 to 5,407 deaths – and probably up to 6,085.

Statistics are very important in monitoring development. Only through reliable data can political involvement be judged and new and better initiatives be taken if necessary. Afukaar, Ackaah & Agyemang (2006, cited from Ackaah & Adonteng, 2010) estimated the under-reporting and non-reporting of accidents. They found that the level of missing accidents should be 37% for fatal casualties, 120% for serious accidents and 199% for slight accidents. A similar study was published in 2011 (Salifu & Ackaah) without the same correction. They found that none of the fatal crashes with deaths were missed and the seriously injured were 8% non-reported and 57% for crashes with property damage only. A more general discussion about methods for level estimates of traffic crashes is made in Bhalla et al. (2009).

It sounds likely that reports on dead people can be found easily. The under-reporting is documented by other research where Labinjo et al. (2009) made the same observation in Nigeria. Eighty percent of the deaths did not occur inside the hospitals and thus hospitals will supply information for police reports that do not necessarily give the accurate number. It is estimated that only 20% of all deaths in Ghana are registered with the government (London et al., 2002). Guerrero et al. (2011) came to the same conclusion. Many deaths are not reported to any government agency, the reports from the police are often not filed, and the injured people can avoid the public health system. Damsere-Derry et al. (2009) explained the reporting problem with both under-recording and under-reporting. For instance, the police would not deliver their final report if a case was still pending in court, which led to under-recording. Under-reporting occurs when two parties involved in a crash decide to settle the case out of court and away from the eyes of the police.

One survey documented that in the 1990s most of the deaths in Kumasi were not registered in official files. Only 70 injury deaths per year were reported from a town with more than 1 million inhabitants. There were subsequent initiatives to correct the faults to get a more

reliable statistic. A few years later the number of cases became higher than 600 (Adofo et al., 2010). This study can explain some of the increased number of accidents, which is, in reality, an increased quality of the statistic.

I will express my distrust of the statistic too and even the corrected numbers can be too low. From my experience with the Ghanaian health system, the lack of ambulances and police officers and volume in the public administration, I think the numbers are much bigger. Even in Denmark with a well-functioning system the statistic is rather imperfect. The so called “dark figures” in the Danish statistic about traffic accidents tell us that 77% of all accidents with injuries never come to the knowledge of the people making the statistic. Most of them are solo accidents that explain 55% of the missing 77 % (Danmarks Statistik, 2000).

Another problem with the international statistics is that the mortality rates are compared between countries but motorcycles not included in the statistics in some countries. To this came the problem with the not removed but registered vehicles (Bhatti et al., 2010).

Current problems

Developing countries have many problems and most of them are the same. Lots of reports and plans have been made. One of them from the World Bank (Pendakur, 2005)¹⁷ described traffic conditions in Ghana in general as chaotic. The safety is low, air pollution is high and a lot of time is lost because of traffic jams. The enforcement of traffic laws is low/poor due to corruption and inadequate human and financial resources. In the towns uncontrolled parking often makes it difficult for passengers to find the appropriate bus. The road space is occupied by street vendors that take up an average of 25-35% of road space. Little space is available, but it is often occupied illegally by parked cars and both legal and illegal kiosks. Typical door-to-door travel speeds in big towns are low because of traffic congestion. Walking could give a speed on 3-5 km per hour, cycling 10-12, motorcycle 15-20, car 15-17, standard bus 8-10 and a minibus 10-12.

The destruction of roads by overload is a general problem in all African and developing countries (Pinard, 2010). A single overloaded truck destroys a road just as much as 70,000 small cars. Often road pavements are designed to carry 8.2 ton axles over a period of time. American experiments around 1960 developed the formula known as the Fourth Power Law, which predicts an exponential relationship between axle loads and damaging power. The destruction also depends on the spacing between axles, uneven load distribution, wheel type and tire pressure. Overloaded trucks (and busses) have a reduced steering and braking effect which also causes many traffic accidents, too.

The poor farmers want to have transported their crops as cheap as possible, but it is too expensive for some of the world's poorest countries to pay for road rehabilitation. It is estimated that transport costs for eastern and southern Africa are four to five times higher than that of



Overload is a severe problem in a country with few resources. The roads are still under destruction in spite of laws against overloading.

developed countries. The problem is surely on the same level in Ghana where such high costs reduce international trade and have a huge impact on the country's economic competitiveness. Through the liberalization of the economy and removal of the protection of railways, there has been a shift from rail to road transportation. This resulted in an increase in vehicle numbers, sizes and payload capacity.

Institutions such as UNEC, USAID and the World Bank have focused on this problem for several years. One report indicated that all African countries have a permanent overload and found that in seriously affected Mozambique, 50% of trucks are overloaded, even though there have been laws and regulations for more than 40 years (Pinard, 2010). If there are no consequences for breaking the law, the firms behind correctly loaded vehicles cannot compete with those who overload. There have been campaigns in southern and eastern African countries against the problem without a great effect. The causes other than the economic incentives from the parties involved directly lie in a row of stand-alone issues. The courts see overload as a “non-serious” problem compared to more serious crimes. The staff at the weight stations receive low wages and therefore been open to bribery and corruption. The road authorities have no connection with the control or a financial link to the payment of fines and the fines are so small that they have no relation to the huge profit that overweight is bringing. Only some of the police forces have direct responsibility to make controls and a lack of staff train-

ing affects the quality of the service provided.

Weigh stations were set up to prevent the overloading of trucks according advice from foreign developing donor organizations. In 2005, 26 weigh bridges were set up in Ghana, of which only 6-10 were functioning properly (African Development Bank, 2005). In 2010, 14 permanent weigh bridges and 8 high speed weigh-in-motion stations were set up (National Development Planning Commission, 2011). According to the authorities, the overloading rates fell from 28% in January 2011 to 16% in December 2012 (National Development Planning Commission, 2013).

In 2009, Ghana began to implement the more restrictive regional axle load restrictions from the ECOWAS (Economic Community of West African States) cooperation to give a smoother driving for trucks in transit and facilitate the free movement of goods and persons. In 2014, a new set of rules came in action and the maximal axle load became 12 tons, nearly identical to the recommendations from ECOWAS and close to those agreed upon by the European Union.¹⁸ For the haulage business, the new rules were a negative burden when they could exploit their vehicles with fewer goods. Where a truck with two axles before could handle up to 28 t, the new rules make the limit 21 t. A six-wheeled truck also had its total weight reduced from 68 t to 51 t.

Between 90 and 97% of all vehicles exceeded the posted speed limit of 50 km/h in the settlement areas and in rural undivided highways where the recommended speed limit of 80 km/h was exceeded by 47-66 % of the vehicles (Ackaah & Adonteng, 2011). Lowering the speed limit would help bring down the numbers of accidents, and speed control carries the greatest potential for this. Unfortunately the police have few resources and a spare education and corruption of the police officers has it at a low enforcement level. Though speed bumps and rumble strips are cheap investments they have reduced fatalities more than 55% where they are used (Afukaar, Antwi & Ofosu-Amaah, 2003).

Therefore, there is connection between the education/learning of traffic dangers and the allowance for small children to move away from their home on their own. Even small children of 9 years old can travel on their own in urban areas, but in rural areas can even a child of 15 may not travel because of the unfamiliarity with the dangers from cars (Porter et al., 2010).

Most accidents are caused by human factors. Public awareness of the risks of road traffic injury is necessary to make efficient campaigns. In that sense is it probably not suitable to transfer the know-how from Western countries to developing countries if the attitudes among drivers are totally different. A kind of fatalism in the belief that accidents are pre-determined can reduce the effect of campaigns. Cultural beliefs and understanding need to be incorporated into the discussion of factors (Dixey, 1999).

Much attention has been paid to avoiding accidents, although there can be a huge effect in reducing the severity of the accidents by focusing on the moment of the crash and the post-crash. The Hatton matrix can

be used to help to identify possible countermeasures to road vehicle crashes. Together with the time vector dimensions it should be seen together with the factors: of human, vehicle/equipment and environment (presented by O'Neill, 2006).

We know tools that can reduce the consequences of accidents. The use of helmets is a very important way to reduce the severity for motorcyclists, who we know from the U.S. have an estimated fatality rate 35 times higher than automobile occupants. An investigation in a Ghanaian town showed that more than 54% of drivers did not wear a helmet. As few as 4 % of passengers on the back seat wore helmets (Akaateba, Amoh-Gyimah & Yakubu, 2013). Those numbers are remarkable when we know that the law in Ghana applies the use of helmet for both drivers and passengers.

While approximately 80% all traffic accidents in Ghana can be attributed to drivers' error, campaigns could be made to reduce the drivers' acts through safety education. Television and billboards have been cre-



Speed bumps are one of the simple technical issues to reduce too high speed.

ated to raise the problems. In theory this should come through to the target group, a large part of which is illiterate, but an investigation showed that the results were limited. Larger and more expensive campaigns should be created to make an impact (Decardi-Nelson, Solomon-Ayeh & Okoko, 2011).

Thanks to foreign help, Ghana established and mostly financed a National Road Safety Commission, which is functioning well (African Development Bank, 2005). In the years around 2005 its road safety program included a television broadcast once a week for 15 minutes. It had programs for radio, schools, churches and mosques. The drivers have a three-day safety training focusing on issues such as vehicle maintenance, testing of tires, drivers rest, speed and alcohol.

Conclusion

We now know the outline of the Ghanaian transport history and a small contour of the Danish history.

Of the most important trails:

The tsetse fly made animal transport impossible in large areas. Therefore had Ghana no transportation development before the foreign colonial traders came to the coast. Only small pathways made some transportation possible and only with very expensive goods such as gold and ivory. Indirectly the bad traffic connections made it possible for many different tribes and societies to live side-by-side in sparsely populated areas.

The first transportation system for motorized transport was the railway, with its first line built in the 1900s. Its development continued but it came only to one of the regions in Ghana. It was built to serve the needs of the mining industry but became an important transportation system for cocoa farmers. The small coverage of the country made the railway outdated to a large extent when truck transportation took over much of the local and regional transport. Today the railroad has its force in long distance transportation, and therefore the railway in Ghana has a very limited role to play in the future. Its narrow gauge means that plans for future railways with connection to international rails have to be a newly-constructed railway.

Road transportation has had a very slow development. The laterite ground and the heavy rainfalls affect road construction and the maintenance is rather expensive, sending the whole society behind other societies. Better roads with asphalt and drains have been built gradually, but new construction still occurs rarely because of limited budgets.

The number of vehicles was relatively small for a number of years. They were mostly trucks on the feeder roads to the railway and a few for the European administrators and missionaries. After 1945 became the mammy wagon important to carry both goods and people. Efforts to build a public transport system based on large busses became partly a fiasco and first by the liberalization of the trade with second hand vehicles came a rather functioning transport system.

Implementation of a new technology in two different cultures, climates and economic conditions has been very different to compare. It is the same technology in a narrow sense of the term, but the infrastructure—not only garages and traffic lights, but also the necessary administration, police, laws, attitudes—are totally different. Very few lessons can be learned and transferred. The action against speeding by building bumps is one of the more successful ones, but many other have been fiascos more or less.

One of the most important lessons from the comparison between Ghana and Denmark is the importance of the local involvement in shaping the transportation infrastructure. In Denmark the infrastructure has been built through many hundreds of years of local involvement. Similar involvement began in Ghana a few years ago; the country has many more years to go before a

priority of tasks and a minimization of the maintenance cost can be made through engaging a democratic, bottom-up, engaged population. A local responsibility and taxation system could improve the engagement.

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- safrica.com.
- 9 Faktaark pending DTU Transport 2013.
- 10 Scientific American, December 8, 1900.
- 11 Merriam-Webster dictionary.
- 12 There is apparently faulty information in the figure on p. 59 in Soeters 2012 which is reproduced in p. 10 in Ntewusu 2014. The figure is telling “No. of Loads,” but should be weight.
- 13 “Contribution of traffic legislation and enforcement to promote walking in ECDE countries” were one of the many presentations during the scientific conference in 2010 in Den Hague, “Getting communities back on his feet.”
- 14 Porter 2013a has a more rigid opinion on this with a more fixed pattern.
- 15 The presentation of the results lacks a lot of precision; therefore this presentation can only be of a preliminary nature.
- 16 A table on p. 1084 mentioned 43.9%, but the text on p. 1086 mentioned 65%.
- 17 The experiences are from Kenya and Tanzania, but the same problems exist in Ghana.
- 18 According to a newspaper advertisement on 9 December, 2013, DailyGuide.

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Endnotes

- 1 “Ghana” is used all over in the article. Before independence in 1957 it was called Gold Coast and some areas (former German protectorates), Togoland.
- 2 The Takoradi harbor was built in 1928. In this text either Sekondi or Takoradi is used for the same town and harbor.
- 3 First railway came in 1844 in the later German area.
- 4 Fra Climatemps.com, August 2014.
- 5 Wikipedia, “Gravel road.”
- 6 Wikipedia, “Tsetse fly.”
- 7 Presentation by director Kingford Amoah, Ghana Road Fund 2003.
- 8 Discussions and resume of contracts can be seen at railway-